Faculty
of Business
and Economics

Svatopluk Kapounek
Veronika Krůtilová (eds.)

20th ANNUAL
INTERNATIONAL CONFERENCE

ENTERPRISE
AND COMPETITIVE
ENVIRONMENT

MARCH 9–10, 2017
MENDEL UNIVERSITY IN BRNO

CONFERENCE PROCEEDINGS

Mendel
University
in Brno

Mendel University in Brno
Faculty of Business and Economics

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Editorial

Svatopluk Kapounek and Veronika Krůtilová

Dear readers,

It is our great honour to present you the Conference Proceedings as one of the research outputs at the occasion of the 20th anniversary of the International Conference Enterprise and Competitive Environment, ECE 2017.

The conference was held in March 9–10, 2017, as is traditional taking place on the campus of Mendel University in Brno, Czech Republic. The conference was organised by the Faculty of Business and Economics, Mendel University in Brno (`https://ece.pefka.mendelu.cz/`).

The purpose of the conference is to enhance academic debate on current problems in the global socio-economic environment, to provide effective legal and regulatory frameworks, economic instruments and other incentives in the policy decision-making process. Last but not least it is a chance to meet our research counterparts in person and critically review our perspectives on contemporary research problems.

In 2017 the conference reacted to several interdisciplinary topics from the areas of bioeconomics, welfare economics, consumer behaviour and life quality, business economics, management, marketing, financial markets and taxation. These topics were further extended by the topics from the area of informatics focusing on decision making processes, text mining and machine learning.

We were pleased to welcome more than 230 researchers with 200 presentations from all over the world representing universities and research institutes from countries including Algeria, Austria, Bulgaria, the Czech Republic, Estonia, France, Germany, Georgia, Hungary, Iran, Italy, Lithuania, Malta, the Netherlands, Norway, Poland, Romania, Russia, Serbia, Slovenia, Sweden, the United Kingdom and the United States of America.

At the occasion of the 20th anniversary three distinguished well-known speakers contributed to the conference programme with their speeches. Prof Vaclav Klaus (the former president of the Czech Republic) gave a speech on Euro adoption and specific challenges for the European Integration Process. Dr Giorgia Maffini (Tax Policy and Statistics Division Centre for Tax Policy and Administration, OECD) contributed to the discussion on the topic of Automatic Exchange of Information and Country Reporting. Prof Laurent Weill (University of Strasbourg) discussed corruption in banks and its consequences on bank lending activities.

In the presented Proceedings you find 100 papers which were recommended by conference discussants and selected on the basis of a peer-review process. We believe that the presented research outputs contribute to and extend the current state of knowledge and will stimulate further debate not only in academia but also in other institutions of public and private sector.

We would like to thank to all the participants in the conference for their inspiring contributions. Furthermore, we are grateful to all the reviewers and the members of the scientific committee for their contribution to the organisation of this high-level scientific conference.

Let us also thank the members of the organising team for their support and hard work which contributed to the successful organisation of the conference.

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Do We Know the Attitudes of Future Managers and Other Professions?

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Abstract

This contribution presents the research done at the Faculty of Humanities at Charles University in Prague in comparison with the Faculty of Business and Economics at Mendel University in Brno. The focus is on selected aspects of values which might correspond to future job market success and also presupposed value differences of students at these faculties. The longitudinal research among first year university students has been taking place since 2007. This innovative approach is trying to show the characteristics of young students reflecting their values, socialization and attitudes. The main aim is to analyze the differences in these two student bodies' samples with the focus on values and attitudes of future managers and business experts. The questions under focus include topics such as 1. Are students at these two faculties different because they study different field of study or are they very similar because belong to the same age cohort? 2. Is the group of economic students homogeneous or are there big differences in value orientation? 3. Can we use this knowledge to improve educational management and prepare students successfully to their future careers? The results showed that the students of the FBE in Brno are less liberal in comparison with students of the FH from Prague. These students come from families with similar level of educational background of parents but their opinion on ideal society, where they would like to live in, is different. It seems that economic students are more diversified as there are gender differences regarding the ideal society image.

Keywords: educational management, values, attitudes, priorities, university students

JEL Code: I, I 29

1. Introduction

The topic of values, value preferences and the importance of value frameworks has become an interdisciplinary agenda where experts from psychology, sociology, manage-

ment, economy and other disciplines exchange their knowledge on the state of art. Sociologists are able to provide more or less representative perspective on the national preferences for the inhabitants. Psychologists are cooperating with management experts in the field of intercultural management which is becoming an alarming discipline in the age of global business. Behavioral economists are exploring what is the role of education to understand the complexity of educational investments and outcomes. As mentioned in our previous study, managerial world is traditionally supposed to be entirely rational, whereas emotions are considered as psychological or physiological phenomena. Research shows that emotion in the sociological perspective of the organizations can become a key success concept of the organization. Moreover, the intercultural background may be an influential issue related to emotional behavior of managers, employees or businessmen (Pavlikova, E. A., Rozboril, B., Ziaran, P., 2015).

This contribution is focused on the values of young generation of 1st year students at two different faculties and universities in the Czech Republic. The first one, the Faculty of Business and Economics at Mendel University in Brno is located in Southern Moravia, the city of Brno. The other one, the Faculty of Humanities at Charles University, is situated in the capital city Prague. This paper presents the explanation of the role of values, theoretical framework as well as general values in the Czech Republic, but mainly the results of own research focused on the young generation of 1st year university students.

The focus is on selected aspects of values which might correspond to future job market success and also presupposed value differences of students at these faculties. The longitudinal research among first year university students in the Czech Republic, has been taking place since 2007. This innovative approach, developed by researchers at Charles University, is trying to show the characteristics of young students reflecting their values, socialization and attitudes as mentioned by Prudký et al. (2009) or Šmídová, Vávra and Čížek (2010). Theoretically, the research is based on the pyramid concept of values, general value priorities, value orientations, value frameworks and norms which are used in daily life as what is acceptable in behavior and what not.

The main aim is to analyze the differences in these two student bodies´ samples with the focus on values and attitudes of future managers and business experts. The questions under focus include topics such as 1. Are students at these two faculties different because they study different field of study or are they very similar because belong to the same age cohort? 2. Is the group of economic students homogeneous or are there big differences in value orientation? 3. Can we use this knowledge to improve educational management and prepare students successfully to their future careers?

2. The Role of Values

2.1. Culture and Values

As Ferraro (1998) states, culture can be defined by many concepts and authors, but to simplify, one can say that culture is basically everything that people have, think, and do as members of their society. The three main components thus include: at first, the possession of material objects, at second thinking which means ideas, values, attitudes, beliefs and at third, it is doing which makes people to behave in a prescribed way resulting in normative or expected patterns of behavior.

Culture can be presented on different levels. The culture of national or the regional society is on the highest level. The corporate or organizational culture describes the way

in which attitudes are expressed within a specific organization. The third level is a professional and ethical one which could be a culture of particular functions in organizations such as marketing, research and development, personnel where people with certain functions share the culture. The internationalization of business life requires more knowledge of cultural patterns. There is a theory that internalization will lead to a common culture worldwide. What is important to consider is not the fact that products and services became common to world markets and can be found physically maybe anywhere, but what they mean to the people in each culture. The essence of culture is invisible. These are the shared ways in which groups of people understand and interpret the world. (Trompenaars, Hampden-Turner, 1999)

2.2. General Values in Czech Society

The importance of values for Czech society is reflected in the results of public opinion poll from June 2014. The representative sample based on a quote selection consisted of 1049 respondents older 15 years which were given a standardized questionnaire during an interview. Respondents were given a many item battery of questions and asked to decide which values are important for them from the areas of family life, work, social and political issues or life style. The results show that for 70% of respondents, the most important issue is happy family background, for 22% this item is rather important. Among very important values for 50%–75% belong assistance to family and friends, having children, having friends, having a nice housing, life in a healthy environment, having interesting job, having a meaningful and useful work, healthy life, taking care of healthy life and live according to own convictions. The comparison with the same research from 2011 shows that the answer very important increased for the item: living in a healthy environment but also decreased for the item: own convictions. If we count together the category very important and rather important, about 70% of respondents consider as important: living in a nice environment, having always own undisturbed privacy, serving perfect professional performance, having friends which can be useful, having pleasant life and enjoy life, having any job only to avoid the state support, help people who need help, to be favorable among people, have time for hobbies and interests, to possess a general knowledge about culture, science, technology, politics, to take part in the improvement of quality of life in the place of living, to be well informed about the situation in the Czech Republic and abroad. The majority also selected as important items: having a job which enables to try new things; active participation in the protection of environment; to life interesting and exciting life; to help the development of democracy in society. It should be noted that the least important item for people is to life according the religious values and also to promote the policy of a political party or a movement.

The items mentioned were included in the factor analyzes which showed 7 important factors giving the structure to deeply internalized value orientation in Czech society. These factors included: 1. Private personal life: family, children, housing, nice environment, healthy life, own conviction, friends, needs of others; 2. Work as a value, as source of living, need for good work: any work, interesting work, meaningful work, good team, earn a lot of money; 3. Work and life career: important position, management function, own company, innovations, possession of nice things; 4. Civic engagement: religion principles, political party, environmental protection, community and democracy development; 5. Hedonistic approach to life: hobbies, undisturbed privacy, enjoying, possession of nice things; 6. Culture and education: be informed, general knowledge; 7. Social capital: be favorable among people, useful friends.

This research showed that there are statistical differences between young and seniors in the following five factors. It seems to be natural that both work as a value and work as a career lost its importance for seniors. The difference in civic engagement and family values, which is smaller for young people and the importance of social capital and hedonistic approach which is in the contrary higher, might be highlighting the difference in value for young and seniors. It may be assumed that the family values will become important for young people in next years but the items related to hedonistic way of life and civic engagement activities most probably may not be the case. (Tuček, 2014)

3. Methodology and Data

The following research was introduced at the Faculty of Humanities (FH), Charles University in Prague and at the Faculty of Business and Economics (FBE), Mendel University in Brno. The Faculty of Humanities, the youngest faculty of Charles University, offers two undergraduate Bachelor's study programs of Liberal Arts and Humanities in English and Studies of Humanities in Czech. The Faculty also offers four graduate Master's study programs of German and French Philosophy (in German), Gender Studies and Historical Sociology (in English) and Oral History and Contemporary History (in English). Students can further study at Master level 9 graduate courses and continue in several PhD study programmes. Currently, there are 795 enrolled students. Excluding distance learning students, there are 577 daily students, out of which 462 on BA level and 73 on MA level. Total number of all enrolled students by 31.12.2016 is 2415. (FH, 2017; MEYS 2017)

Faculty of Business and Economics was established in 1959 and is the oldest business school in Moravia. It has accreditation for all degree levels: Bachelors, Masters and Ph.D. In recent accreditation the school received the highest rating (ranking in group A) as one of the best schools from a total of 21 business schools in the Czech Republic. It offers both economic and IT study programs at all three levels of university education in Czech and in English. There are nearly 4,000 applicants on average each year. Currently, there are 843 enrolled students. Excluding distance learning students, there are 746 daily students, out of which 658 on BA level and 54 on MA level. Total number of all enrolled students by 31.12.2016 is 2882. (FBE, 2017; MEYS 2017)

As conceptual starting point we use analytical framework of Prudký et al. (2009). This approach has been repeatedly verified in the Czech higher education area (e.g. publications such Prudký et al. 2010, Prudký, Pabian, Šíma 2009, Prudký 2005 etc.). For the study, we focus mainly on analysis of life priorities, value orientations and norms. This conceptual framework was introduced as a quantitative research in a form of questionnaires. We have used basic quantitative (statistical) analysis[1] for analysis as well, i.e. frequency analysis and correlation analysis (testing by χ^2, 99% significance) test.

We formulated one hypothesis which is focused on comparative aspect of the study where two different faculties are under investigation: Students of FBE are less liberal in comparison with students of FH. We understand "liberal" in the given context as 1) life priorities are more important for students of FBE in comparison with FH students; 2) especially xenophobic, authoritarian and religious, etatistic value orientations will be more intensively held by FBE students; 3) norms such as abortion, euthanasia, etc. will be less tolerated in comparison with FH students. The most attention will be paid to value orientations; we analyze them through (dis)agreement with given statements, ideal society

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[1] Statistical software SPSS was used.

preferences and attitudes towards people in need. To give educational background of students to our research we provide information about family backgrounds of students (education of parents, completeness and climate of family), and their motivation to study at given faculty.

We compare two data sets which consist of first year students of bachelor study programs at FBE and FH. Data sets are not designed as representative. The survey at Faculty of Humanities takes place every second year[2], therefore we will use data which were collected in the start of academic year 2016/2017. The number of respondents from the Faculty of Humanities (FH) at Charles University in Prague was 152 of which 98 females (64.5%) and 54 males (34.2%) and all of them study BA programs in their first year study. The number of respondents from the Faculty of Business and Economics (FBE) at Mendel University in Brno was 776 which included 525 females (67.6%) and 241 males (31.7%). The collection of data took place in 2015 and 2016. All respondents are students of the first year study.

4. Results

The following Table 1 shows that FBE is targeted selection for almost 40% of the 1st year students who wanted to study exactly at this faculty. Together with students who were only somewhat decided where to study (37.6%) it makes about 77%. The 1st year students at the Faculty of Humanities have significantly lower targeted selection criteria, as only 18.5% have fully decided to study specifically this faculty or about 54% have more or less taken this specific decision. About 17% of the 1st year students from the Faculty of Humanities wanted to study at different faculty but were not accepted in comparison to about 5% from students at FBE. It is clear that students of FBE are much more motivated to study there, motivation to study at FH is rather accidental or sort of "the second choice" for those who don't know exactly where to study.

Table 1: Motivation to study at the given faculty

Have you enrolled for this faculty because you wanted to study here or were there different reasons?	% FBE	% FH
Yes, I wanted to study at this faculty	39.3	18.5
Rather yes, I wanted to study at any faculty with this specialisation	37.6	35.1
Either of those, I was not sure at which faculty I want to study	15.86	24.5
Rather not, I wanted to study at different faculty but I was not accepted	5.24	17.2
No, I wanted to study something different	1.18	2.0
Different situation	0.8	2.6
No answer	–	–
Total	100	100

The results show, that the highest mothers' education of 1st year students both at the FBE and FH is commonly a high school with A-level exam (49% FBE and 44% FH) followed by university or higher education (26% FBE and 34% FH). The highest fathers' education of 1st year students both at the FBE and FH is similarly a high school with A-level exam (35% FBE and 37% FH) followed by university or higher education (34% FBE and 32% FH) but also including professional high school without A-level exam (20% FBE and 17% FH).

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[2]The first wave of survey was conducted in the academic year 2002/2003.

Based on the table 2, for the students at FBE the most important priority is family, the same for students at FH and it corresponds in general for value priorities as such. A majority of value studies confirm that among the most important values in general belong family, friends and acquaintances which is stated also here where the 2nd place is given for both FBE and FH to friends and acquaintances. As the table shows, the 3rd important priority for students at FBE is work whereas for FH students it is leisure time. It seems that work is for FBE much more important that for students at FH.

Table 2: Life priorities

	FBE mean	FBE very important	FH mean	FH very important
Work	1.79	28.6%	2.10	13.2%
Family	1.14	88.7%	1.22	82.2%
Leisure time	1.86	25.9%	1.76	34.9%
Friends and acquaintances	1.45	59.1%	1.48	59.2%
Religion	3.30	4.4%	3.03	3.3%
Politics	3.03	1.8%	3.30	2%

Note: four point scale from 1 – very important to 4 – not important at all.

The importance of religion and politics was chosen by both groups of students as not really important. Even here we have a small difference. Politics seems to be little bit more interesting for FBE students than religion, whereas for students at FH the situation is the opposite. Given the fact that FBE is situated in Brno which could be considered as more religious area than Prague, where FH is located, it opens interesting issue into consideration.

Based on a statistic significance (χ^2 test, 99%), family and religion is more important for women whereas leisure time and politics is more important for men. This reflects very traditional gender focus where the priority for female is connected with a private sphere and males are more focused on the world outside of family. This stands for both FBE and FH faculties under investigation.

Table 3: The ideal society according to FBE students

What principles should the society, you would like to live in, follow?	FBE mean	1st principle %	2nd principle %
Focus on the most effective economic results VERSUS focus on peaceful life	2.82	35.4	59.6
Prefer to follow the traditions VERSUS prefer modernizing changes	3.06	32.1	54.2
Experts decision making VERSUS public opinion	2.75	53.7	28.2
Strive for technological development VERSUS spiritual development	2.53	56.7	31.2
Bring order into life VERSUS to give people as much as freedom	2.74	49.8	36.8

Note: Choices very + rather important are shown in the table, four-point scale was used for this question.

The table 3 explains how the ideal society in the minds of FBE students looks like. According to the answers of FBE students, they would like to live in a society which is more focused on the highest economic performance, technical advantages, the decisions are taken by experts, life is driven by rules (not by freedom) and they prefer modernization changes (not the maintenance of traditions). It can be summarized that majority of students at FBE are technological, modernizing and expert optimists. There were visible gender differences. Male students tend to prefer economic development, modernizing changes, expert

decision making and technological development. The item of bringing order into life was the least problematic in terms of gender differences.

There were no significant gender differences found out at the Faculty of Humanities when analysing the ideal principles for society where students want to live in.

Table 4: The ideal society according to FH students

What principles should the society, you would like to live in, follow?	FH mean	1st principle %	2nd principle %
Focus on the most effective economic results VERSUS focus on peaceful life	3.27	9.9	86.5
Prefer to follow the traditions VERSUS prefer modernizing changes	3.10	39.7	39.0
Experts decision making VERSUS public opinion	2.60	64.0	19.0
Strive for technological development VERSUS spiritual development	3.27	22.3	63.1
Bring order into life VERSUS to give people as much as freedom	3.19	30.2	53.9

Note: Choices very + rather important are shown in the table, four-point scale was used for this question.

It should be noted that except for the focus on the most effective economic results, in all other items students had problems to decide what their opinion is. From 15% to 21% students answered "I do not know" which can be described as ambiguity or ambivalence.

Students at FH prefer the society where people should be given as much freedom as possible, they strive for spiritual development and expert decision making.

We can conclude, that both faculties are in the opposition when facing the image of an ideal society. The only connecting platform is experts' decision making. The students from FH and FBE have very opposite views on the role of technological or spiritual development.

5. Discussion and Conclusions

This contribution explores the results of two research cycles in 2015/2016 done at the Faculty of Humanities at Charles University in Prague in comparison with the Faculty of Business and Economics at Mendel University in Brno. It analyzes the differences among students of humanities and students of business with the focus on values and attitudes. The questions under focus included topics such as 1. Are students at these two faculties different because they study different field of study or are they very similar because they belong to the same age cohort? 2. Is the group of economic students homogeneous or are there big differences in value orientation? 3. Can we use this knowledge to improve educational management and prepare students successfully to their future careers?

The Tuček´s factor analyzes (2014) identified 7 important factors deeply internalized in the Czech value orientation: 1. Private personal life, 2. Work as a value, as source of living, need for good work, 3. Work and life career, 4. Civic engagement, 5. Hedonistic approach to life, 6. Culture and education and 7. Social capital. In general Czech society there are statistical differences between young and seniors in the factors concerning work, civic engagement, family values, social capital and hedonism. As Ferraro (1998) stated, culture can be defined by many concepts and authors. It can be presented on different levels including national, corporate or professional ones as shared ways groups of people understand and interpret the world. (Trompenaars, Hampden-Turner, 1999). We have chosen the approach of Libor Prudký (2009) and experience from his team with longitudinal

studies of 1st year university students. We formulated one hypothesis which was focused on comparative aspect of the study: Students of FBE are less liberal in comparison with students of FH.

The results showed that the economic students of FBE are much more motivated to study at their faculty. The motivation to study at FH was rather accidental or sort of "the second choice" for those who don't know exactly where to study. The highest mothers' education of 1st year students both at the FBE and FH is commonly a high school with A-level exam followed by university or higher education. The highest fathers' education of 1st year students both at the FBE and FH is similarly a high school with A-level exam followed by university or higher education but also including professional high school without A-level exam. We can state, that the education of both mothers and fathers at FBE and FH has a similar structure.

For the students at FBE the most important priority is family, the same for students at FH and in general it corresponds for value priorities as such. The 2nd place is given for both FBE and FH to friends and acquaintances, the 3rd important priority for students at FBE is work whereas for FH students it is a leisure time. We can state, that after family and friends, there is a difference in the 3rd priority. It seems that work is for FBE much more important that for students at FH.

The importance of religion and politics was chosen by both groups of students as not being really important. Even here we have a small difference. Politics seems to be a little bit more interesting for FBE students than religion, whereas for students at FH the situation is the opposite. Given the fact that FBE is situated in Brno which could be considered as more religious area that Prague, where FH is located, it opens interesting issue into consideration.

We can state, that both faculties are similar in the gender focus issues on family and religion. Based on a statistic significance (χ^2 test, 99%), family and religion is more important for women whereas leisure time and politics is more important for men. This reflects very traditional gender focus where the priority for female is connected with a private sphere and males are more focused on the world outside of family. This stands for both FBE and FH faculties under investigation.

The ideal society for business students is more focused on the highest economic performance, technical advantages, the decisions are taken by experts, life is driven by rules and they prefer modernizing changes. Majority of students at FBE are technological, modernizing and expert optimists. It is interesting to note, that among business students, there are gender differences related to ideal society image. Male students tend to prefer economic development, modernizing changes, expert decision making and technological development. The item of bringing order into life was the least problematic in terms of gender differences. On the other hand, students of humanities do not declare significant gender differences when analysing the ideal principles for society where students want to live in. Except of the focus on the most effective economic results, in all other items students had problems to decide what is their opinion. From 15% to 21% students answered "I do not know". Students from FH are less decisive or ambivalent in many aspects of ideal society. Students of humanities prefer the society where people should be given as much freedom as possible, they strive for spiritual development and expert decision making. These students have also higher empathy for people in need giving the reason of injustice in society in comparison with the students from the Faculty of Business and Economics. We can conclude, that both faculties are in the opposition when facing the image of an ideal society. The only connecting platform is expert's decision making. The students from

FH and FBE have very opposite views on the role of technological or spiritual development.

To conclude and confirm the hypotheses, we think that the students of the Faculty of Business and Economics in Brno are less liberal in comparison with students of the Faculty of Humanities from Prague. These students come from families with similar level of educational background of parents but their opinion on ideal society where they would like to live in is different. It seems that economic students are more diversified as there are gender differences regarding the ideal society image.

It is important to note, that in general, civic engagement and family values are not so popular for young generation as for seniors. This might change when they get older but also it could be supported for example by educational system. What is more striking, is the importance of social capital and hedonistic approach which is in the contrary more popular among young people in comparison with seniors. If the promotion of hedonism would be increasing to a large extent, it could also bring negative consequences to general society. This is again an issue which could be reflected in education of young generation. It confirms the results of our previous study which promotes implementation of senior friendly policies to increase the quality of life. It is evident that demographic transition results in population ageing in all European societies. Life expectancy is rising almost in all European countries, mortality rates are falling in many countries. It is clear that the group of older people in these countries is under focus of politicians with the aim to prepare active and healthy ageing for seniors (Rasticova, M., Birciakova, N., Pavlikova, E. A. et al., 2015). In this respect, it is evident that the values of young generation are important for maintaining intergenerational solidarity and our contribution confirms the importance of research in this area.

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Profit Shifting and the Tax Response of Multinational Banks in Eastern Europe

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Abstract

The aim of the paper is to measure the amount of profit shifting within the banking sector in Eastern European countries. The paper uses firm-level bank data from the Bankscope database of multinational subsidiary banks operating in Eastern Europe for a period of 10 years (2006–2015). An empirical analysis is performed on the panel data to identify the profit-shifting activities of these banks. Focusing on the banking sector of Eastern European countries, which are a microcosm of the European Union, substantial evidence of profit shifting is found and confirms that banks have enhanced tax-planning opportunities similar to firms from different jurisdictions. The paper also seeks to contribute to recommendations on how fair and sustainable taxation and social policy reforms can increase the economic stability of the EU member states.

Keywords: Profit Shifting, Multinationals, Subsidiary Banks, Eastern Europe.

JEL Code: H260.

1. Introduction

1.1. Background of the Study

The debate on base erosion and profit-shifting activities undertaken by multinational corporations (MNCs) is continuing unabated in the public domain, as heads of states, developmental organizations, and the international media have in recent times raised many concerns about the growing activities of aggressive tax planning. The debate has recently been stirred up by the unprecedented leak of approximately 11.5 million documents, the "Panama Papers", from the database of the offshore law firm Mossack Fonseca, spanning the period from the 1970s to spring 2016. The Panama Papers basically expose how some of the world's leaders and most influential people have allegedly used offshore accounts and "shell companies" to avoid paying taxes. Multinational companies, such as Apple, Google, and Starbucks, have also come under heavy criticism recently with regard to their

considerable involvement in profit shifting and aggressive tax planning, especially in relation to their British sales, based on anecdotal evidence.

The financial crisis in 2008 and the colossal amount of public money invested to stabilize the financial sector caused huge pressure on the national budgets, therefore attracting increasing attention to the collection of taxes and fiscal strains in many countries, especially among MNCs and the financial sector. This point to the fact that companies set up complicated tax structures to indulge in aggressive tax-planning practices to shift income from high-tax to low-tax locations. When MNCs engage in tax planning, the possible motive is to shift profits to erode the taxable base to locations where they are subject to more favourable tax treatment (OECD, 2013).

In response to the need for a solution to this problem, several initiatives, collaborations, and developments have been undertaken by world leaders and various organizations. In May 2012 for instance, the G-20 leaders held a meeting in Mexico to reiterate the need to prevent base erosion and profit-shifting (BEPS) activities by MNCs. At the meeting the world leaders affirmed their decision to follow closely the concrete 15-action plan to tackle BEPS by the Organisation for Economic Cooperation and Development (OECD), which was later produced in July 2013 and the final reports presented in October 2015. Dharmapala (2014) alluded to the fact that the 15-item action plan that was released by the OECD is intended to facilitate multilateral cooperation among governments with regard to the taxation of MNCs. Furthermore, a joint task force initiative has been introduced by the International Monetary Fund (IMF), the Organisation for Economic Co-operation and Development (OECD), the UN Department of Economic and Social Affairs (DESA), and the World Bank Group. This Platform for Collaboration on Tax has purposely been tasked to produce measures to support developing countries in combatting BEPS with respect to sharing information, building capacity, and delivering guidance, among others. Very recently, in October 2016, the European Commission also announced new reforms in corporate tax- and BEPS-related activities. The reforms consist of three separate measures: (1) a two-stage proposal towards a common consolidated corporate tax base (CCCTB); (2) a directive on double taxation dispute resolution mechanisms in the EU; and (3) amendments to the Anti-Tax Avoidance Directive (ATAD) relating to hybrid mismatches with third countries.

The extant literature on international tax planning has largely provided ample evidence of BEPS and aggressive tax planning in different jurisdictions (Buettner & Wamser, 2013; Crivelli, De Mooij, & Keen, 2016; Finke, 2013; Huizinga & Laeven, 2008; Weichenrieder, 2009). Research on the profit-shifting activities of MNCs has mostly been associated with the non-financial industry (Clausing, 2015; Haufler & Schjelderup, 2000; Hines & Rice, 1994; Huizinga & Laeven, 2008; Krautheim & Schmidt-Eisenlohr, 2011). A few studies have also been conducted in the area of tax effects on capital structures. For instance, Desai, Foley, and Hines (2004) analysed the capital structures of foreign affiliates and the internal capital markets of multinational corporations. They found that 10% higher local tax rates are associated with 2.8% higher debt/asset ratios, with internal borrowing being particularly sensitive to taxes. Huizinga, Laeven, and Nicodeme (2008) also found that a foreign subsidiary's capital structure reflects the local corporate tax rates as well as the tax rate differences vis-à-vis the parent firm and other foreign subsidiaries. They therefore suggested that ignoring the international debt shifting arising from differences in national tax rates would understate the impact of national taxes on debt policies by about 25%. However, the financial sector has fallen short and has seen few studies on this evidence. Demirgüc-Kunt and Huizinga (2001) examined the taxation of domestic and foreign-owned banks as well as conducting an investigation into whether domestic and foreign banks pay different amounts of domestic tax. Their study revealed that the taxes paid by foreign banks are shown to raise relatively little with the local statutory tax. Merz

and Overesch (2016) also examined multinational banks' response to taxation. Using firm-level bank data, the authors found significant tax effects of profit shifting on the reported profits of bank subsidiaries, but the consequences reduced after the financial crisis in 2008.

The need to examine the profit-shifting activities of MNCs in the banking sector is further strengthened by the evidence found by Merz and Overesch (2016) suggesting that banks have enhanced tax-planning opportunities, similar to firms from the IT industry or the retailing sector. The aim of the paper is therefore to measure the amount of profit shifting within the banking sector in Eastern European countries. Specifically, the study examines the effect of multinational banks taking advantage of the differential rate in corporate tax of the host countries, particularly due to different business models. For the purpose of this study, we use a micro-level panel database of 45 subsidiary multinational banks from 14 countries in Eastern Europe as defined in Amadeus over a period of 10 years. The countries under consideration are Belarus, Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Macedonia, Moldova, Poland, Romania, Serbia, Slovakia, and Ukraine.

1.2. Review of the Literature

The theoretical underpinnings of the estimation of BEPS can be explained by the "Hines–Rice" (HR) approach, which stem from Hines and Rice (1994). According to Dharmapala (2014), the HR approach operates on the premise that the observed pre-tax income of a subsidiary firm constitutes the sum of "true" income and "shifted" income. True income is derived by the subsidiary firm using capital and labour inputs. Shifted income, on the other hand, is the measure of the tax rate differential between two subsidiaries, which is the incentive to move profit in or out of a subsidiary. The HR approach largely focuses on the semi-elasticity of the tax differences, which represents the percentage change in pre-tax income associated with a 1 percentage point change in the tax rate (Dharmapala, 2014). Since its introduction the HR approach has been widely used by several authors and the magnitude of BEPS found has been enormous and varied.

To start with Huizinga and Laeven (2008) used a unique data set that contains detailed firm-level information on the parent companies and subsidiaries of European multinationals and detailed information about the international tax system to test and examine empirically the extent of intra-European profit shifting by European multinationals. The authors considered profit shifting arising not only from the international tax differences between affiliates and parent companies but also from the tax differences between affiliates in different host countries. Their finding was semi-elasticity of reported profits with respect to the top statutory tax rate of 1.43, while shifting costs were estimated to be 1.6% of the tax base.

In 2009 a 10 percentage point increase in the parent's home country tax rate, leading to roughly half a percentage point increase in profitability, was the BEPS evidence found by Weichenrieder (2009). The author considered profit-shifting behaviour in the EU using data on German inbound and outbound FDI. The study also found an empirical correlation between the home country tax rate of a parent and the net tax profitability of its German affiliate, which is consistent with profit-shifting behaviour.

Heckemeyer and Overesch (2013) also predicted tax semi-elasticity of subsidiary pre-tax profits of about 0.8 using the meta-regression approach to identify estimates from 25 studies and the existing literature. The authors estimated the tax response through financial planning from the transfer pricing and licensing channel, and their results suggest that transfer pricing and licensing are the dominant profit-shifting channel.

The use of panel data and affiliate fixed effects in estimating BEPS has also been considered extensively. Dischinger (2010) used a large micro database of European MNEs that includes detailed accounting and ownership information (AMADEUS) to provide indirect empirical evidence of profit-shifting behaviour by multinational enterprises (MNEs), employing a panel study for the years 1995 to 2005 while controlling for unobservable fixed firm effects. The study also found that a 10 percentage point decrease in the tax rate of the affiliate increases its pre-tax profitability by 7%.

Lohse and Riedel (2013) also used panel data from Amadeus to investigate empirically whether national tax laws implemented by transfer-pricing legislation, which is intended to limit the leeway of multinational firms to exploit international corporate tax rate differences and relocate profit to low-tax affiliates, are instrumental in restricting shifting behaviour. The study found semi-elasticity of about 0.4 and further suggested that transfer-pricing rules significantly reduce shifting activities.

The role of internal debt as a vehicle for shifting profits to low-tax countries was also explored by Buettner and Wamser (2013). Using data on German multinationals, their study exploited the differential tax rate in more than 100 countries over 10 years. The results established that internal debt is used more by multinationals with affiliates in low-tax countries and increases with the spread between the host-country tax rate and the lowest tax rate among all the affiliates. However, because the tax effects found in the study were small, the authors suggested that profit shifting by means of internal debt is rather unimportant for German firms.

In the banking sector, firm-level bank data from the Bankscope database were used by Merz and Overesch (2016) to analyse how multinational banks respond to taxation. The authors found significant tax effects on the reported profits of bank subsidiaries and that the magnitude of the tax response of the reported profits was double the effects found in previous studies for non-financial MNCs. Our aim, particularly for this paper, is to focus our attention on Eastern Europe, which is a microcosm of the European Union, and to estimate the magnitude of BEPS undertaken by multinational bank subsidiaries.

2. Methodology and Data

2.1. Data Description

For the purpose of this study, we collected comprehensive bank data from the Bankscope Database compiled by Bureau Van Dijk for 14 countries in Eastern Europe. We use a data set of 45 foreign subsidiary banks over a period of 10 years from 2006 to 2015, yielding a total of 450 year-bank observations. A subsidiary bank is defined in this study as a bank in which at least 50% of the shares are owned and controlled by the parent company. Banks that have negative earnings before tax are excluded from the database, because we want to consider profit-making companies that have the motivation to shift or receive profits from different subsidiaries. We only consider private commercial banks; therefore, we exclude central banks, specialized governmental credit institutions and micro-finance institutions, and banks with insufficient tax information from our data compilation. Although this paper aims to achieve it's objective, the limitation of the study is that the research was uniquely conducted on a small sample of population compared to previous studies.

2.2. Model Construction

A few studies have used transfer pricing and estimations of deviation from arm's-length prices to find evidence of profit shifting (Bernard, Jensen, & Schott, 2006; Clausing, 2003; Swenson, 2001). Other previous studies have also dealt extensively with tax planning and profit shifting in industries other than the financial industry (Bagwell & Staiger, 2012; Dischinger, Knoll, & Riedel, 2014; Maffini & Mokkas, 2011; Peralta, Wauthy, & Van Ypersele, 2006). This study, however, investigates whether multinational banks take advantage of the corporate tax differentials among subsidiaries by focusing on the financial sector in Eastern Europe, which is a microcosm of the European Union, unlike previous studies in which large data sets have been used across the globe. The Hines–Rice approach (the HR approach) has been referred to as the most frequently used model in the estimation of profit shifting. According to Dharmapala (2014), the basis for this approach is that the unobserved profit before tax (PBT) of subsidiary i at time t represents the sum of "true" profit and "shifted" profit (where the latter can be either positive or negative). The firm theory assumes that capital and labour inputs are used to generate true profit. Following the work of Merz and Overesch (2016) and other previous studies, we use the common estimation shown below in this study.

$$PBT_{it} = \alpha_0 + \alpha_1 \tau_{it} + KAP_{it} + LAB_{it} + \alpha_2 X_{it} + \rho_t + \phi_{it} + \varepsilon_{it} \tag{1}$$

As indicated earlier, the capital (KAP) and labour (LAB) inputs are included to predict the counterfactual "true" profit. Dischinger (2010) provided a contrary view that the inclusion of labour and capital does not significantly affect the coefficient estimate of the tax differential. X_{it} is a vector of additional subsidiary-level control characteristics. The coefficient of interest, α_1, is used to identify the shifted profit and the tax incentive to move profit in or out of the subsidiary. Therefore, we expect $\alpha_1 < 0$ to obtain evidence of profit shifting, which is tax semi-elasticity of the reported profits. Variables ρ_t and ϕ represent the control for heterogeneity across banks by a bank-specific effect and random term, respectively. ε_i is the error term, and α_1 is the constant.

2.3. Variable Description

This study follows the previous literature in using earnings before taxes (PBT, in logs) of the bank subsidiary as its dependent variable. The work of Merz and Overesch (2016) is followed by applying other variables, such as *net interest revenue, non-interest operating income*, and revenue from *net fees and commissions* as additional dependent variables to conduct a test on the differences in the tax response across different business models. Again the loan loss provisions (LLPs) and the total debt-to-total assets ratios (LEVERAGE) are used.

To control for bank characteristics, the variable KAP_{it} defines subsidiary *i*'s capital inputs (a proxy by total assets), and LAB_{it} defines subsidiary *i*'s labour inputs (proxied for instance by employment compensation). The off-balance sheet (OBS) items are the variable used to capture the subsidiary banks' activities that do not appear on the balance sheet. Additional bank-level variables include earning assets to total assets (EATA), which captures banks' assets used to generate interest income, and GROWTH (the annual change in the total assets of banks). We also follow the work of Gropp and Heider (2010) and Merz and Overesch (2016) and use total securities, T-Bills, and other bills as banks' COLLATERAL; PROF is used as a profitability measure defined as net income with interest

expenses/total assets; and PIOP, which is the pre-impairment operating profits, is used to control for profitability before loan loss provisioning (Merz & Overesch, 2016).

The tax variable used is the statutory corporate tax rate (*CTR*) of the bank subsidiary's host country. This is the incentive to shift taxable profits to and from the subsidiary banks. Merz and Overesch (2016) asserted that there is a need to include the average tax rate (ATAX) within the multinational banking group of which the subsidiary bank in question is excluded. This is to account for the incentives existing within the multinational bank, and a positive coefficient is expected. MTAX is the minimum tax rate that exists within the multinational group and is used to indicate a lower incentive to shift profits. We assume that the entire countries under consideration use uniform transfer-pricing rules and a common rule of law.

Table 2.1: Summary Statistics

Variable	Obs.	Mean	Std Dev.	Min.	Max.
PBT	391	11.10092	1.546734	7.1108	13.9402
NTR	388	11.95256	1.296197	8.9984	14.4986
NTOI	387	11.25805	1.430045	7.9442	13.7569
NFC	383	10.84213	1.563599	5.8833	13.5842
LLP	354	10.22086	1.579326	4.9174	13.2073
LEVERAGE	391	0.883307	0.047674	0.703054	0.968829
KAP	391	15.3749	1.349472	11.2554	17.9563
EATA	391	0.885053	0.074826	0.570137	0.98833
OBS	328	13.638	1.932473	6.6464	19.0232
LAB	364	10.92436	1.331966	8.21207	13.38682
PIOP	388	11.55732	1.415149	8.21207	14.32922
PROF	386	0.036898	0.018185	−0.00518	0.135338
GROWTH	379	0.106862	0.175521	−0.5294	1.160414
COLLATERAL	154	7.745943	1.829954	2.423527	12.23984
CTR	449	0.174653	0.043538	0	0.25
ATAX	450	0.183815	0.053031	0	0.254182
MTAX	450	0.167076	0.057193	0	0.25

Source: Authors' estimations

3. Results

This section presents the regression results of the impact of tax on the reported profits of our multinational subsidiaries in the banking sector.

3.1. Effect of Tax on Reported Profits

The table below is used to start our analysis of the impact of tax on reported profits using (ln) PBT as the dependent variable. We first perform a random-effect panel analysis for the period 2006–2015. Our basis for finding evidence of profit shifting, as used in the literature, is that we expect the coefficient $\alpha_1 < 0$. From our regression results, a negative coefficient is found but no significant effect of the host country tax rate on the reported profits. Although the evidence found is not significant, it seems to suggest that bank subsidiaries with higher tax in host countries have smaller pre-tax profit and confirms our

argument regarding how multinational banks respond to taxes with their reported profits in host countries. The coefficient of the variable CTR, yielding the result of 1.106, suggests that every 1 percentage point increase in the host country tax rate is associated with about 1.1% lower reported profits of a bank subsidiary.

This estimated result, which shows evidence of profit shifting, confirms the findings of previous studies. For instance, Merz and Overesch (2016) also found evidence of semi-elasticity of -2.378 in the banking industry. Our results also confirm the results of Dischinger (2010) and Huizinga and Laeven (2008), which provided evidence of profit shifting in other jurisdictions. The ATAX and MTAX are included in columns (3) and (4), for which a positive coefficient is expected but the opposite is obtained.

Table 3.1: Banks' Profit Shifting

	(1) PBT	(2) PBT	(3) PBT	(4) PBT
CTR	−1.106	−0.693	0.253	0.0582
	(−0.54)	(−0.39)	−0.08	−0.02
KAP	0.228	0.929***	0.907**	0.914**
	−0.81	−3.35	−3.17	−3.18
EATA	0.314	1.756	1.835	1.894
	−0.28	−1.78	−1.83	−1.86
OBS	0.0975	−0.0196	−0.0208	−0.0142
	−1.25	(−0.28)	(−0.30)	(−0.20)
LAB	0.766**	0.239	0.268	0.25
	−2.78	−0.95	−1.02	−0.93
GROWTH	0.904	1.460**	1.462**	1.455**
	−1.77	−2.89	−2.89	−2.86
COLLATERAL	−0.0754*	−0.0766*	−0.0747*	−0.0745*
	(−2.09)	(−2.29)	(−2.20)	(−2.19)
LEVERAGE		−10.03***	−9.848***	−9.876***
		(−5.44)	(−5.11)	(−5.12)
ATAX			−1.119	−0.342
			(−0.38)	(−0.09)
MTAX				−0.768
				(−0.34)
_CONS	−1.637	2.27	2.11	2.095
	(−1.08)	−1.63	−1.45	−1.44
N	139	139	139	139

t statistics in parentheses
* $p<0.05$, ** $p<0.01$, *** $p<0.001$

3.2.   Income from Different Business Models

In this section we test the tax response of multinational banks using income from other business as our dependent variable, instead of lnPBT, as suggested by Merz and Overesch (2016). The net interest revenue, non-interest operating income, net fees, and commission are used in our analysis.

The results presented in the above table provide evidence of multinational subsidiary banks' response to taxes using income from different models. Column (1) presents evidence of profit shifting with net interest revenue as the dependent variable. In this column we find insignificant evidence of profit shifting with semi-elasticity of 0.173. In column (2) we use another dependent variable, which is the non-interest revenue, for which similar evidence is found but is not significant.

Table 3.2: Income from Different Business Models

	(1)	(2)	(3)
	NTR	NTOI	NFC
CTR	−0.173	−1.17	−1.442*
	(−0.29)	(−1.07)	(−2.47)
KAP	0.287***	0.184	0.511***
	−3.42	−1.24	−6.11
EATA	−0.168	−0.408	−0.12
	(−0.54)	(−0.68)	(−0.40)
OBS	0.00714	0.0204	0.0191
	−0.34	−0.49	−0.94
LAB	0.680***	0.805***	0.523***
	−7.69	−5.69	−5.73
GROWTH	−0.510***	0.00738	−0.0551
	(−4.12)	(−0.03)	(−0.47)
COLLATERAL	0.0112	0.00371	0.0048
	−1.22	−0.19	−0.55
_CONS	0.174	−0.0628	−2.631***
	−0.34	(−0.08)	(−4.81)
N	139	137	138

t statistics in parentheses
* $p<0.05$, ** $p<0.01$, *** $p<0.001$

Moving to column (3), the net fees and commission are used as the dependent variable to seek evidence of profit shifting from other income sources. The result in the above table is a significant negative coefficient. Merz and Overesch (2016) suggested that such evidence means that shifting profits to low-tax subsidiaries seems to be rather easy.

3.3.   Loan Loss Provisions

This section investigates the relationship that exists between the loan loss provision variable and the CTR.

The basis for our argument is that we expect a positive correlation between the CTR and the LLPs. The above table shows the results, in which the loan loss provision is used as the dependent variable. Although we do not achieve the expected results, in column (2) we include the pre-impairment operating profits, which we expect to have a positive im-

pact on the LLPs. It can be seen from the results that a highly significant positive coefficient is recorded. This seems to suggest that banks with higher pre-impairment operating profits accumulate LLPs for future losses as well as means to reduce their tax base.

Table 3.3: Loan Loss Provisions

	(1) LLP	(2) LLP
CTR	−2.99 (−1.09)	−2.938 (−1.19)
KAP	0.498 −1.31	0.108 −0.31
EATA	0.0738 −0.05	0.532 −0.42
OBS	−0.149 (−1.52)	−0.148 (−1.70)
LAB	0.682 −1.72	0.0752 −0.2
GROWTH	−2.642*** (−4.64)	−2.339*** (−4.67)
COLLATERAL	−0.00264 (−0.06)	0.0156 −0.42
PIOP		0.983*** −5.65
_CONS	−2.272 (−1.00)	−1.693 (−0.81)
N	127	127

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

4. Conclusion

The aim of this paper was to measure the amount of profit shifting within the banking sector, particularly in Eastern European countries. International taxation and multinational tax planning have attracted public and political attention for some time now due to their adverse effect on countries' public purse. In this study we use a data set from the Bankscope Database compiled by Bureau Van Dijk of 14 countries in Eastern Europe. The approach and method of previous studies are followed and we regress the panel data set for the period of 2006–2015. For the purposes of our analysis, we define a subsidiary bank as having at least 50% of its shares owned and controlled by the parent company.

Our results show that multinational banks' subsidiaries reported an earnings response to the host country's tax incentives. In comparison with previous studies, the mag-

nitude of the tax sensitivity of the evidence found is substantial. Using income from different models in an additional analysis, we find evidence of the banks using net fees and commission to respond to tax. We perform another task using loan loss provisions, but our results do not agree with the previous findings; however, including pre-impairment operating profits in the model suggests that banks with higher PIOPs accumulate LLPs for future losses as well as means to reduce their tax base.

The results obtained in this study confirm that banks have enhanced tax-planning opportunities similar to firms from different jurisdictions, such as the IT industry or the retailing sector. Therefore, taking into consideration the results obtained in this study, we conclude that, in spite of the measures being put in place by regulators, MNCs are still carrying out activities of profit shifting. We therefore recommend that expedited action be taken to implement the Directive on the disclosure of income tax information, which would in effect require MNCs operating in the EU to draw up and disclose to the public income tax information, including a total breakdown of the profits made, revenues, taxes, and employees.

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How can measurement of delay be helpful for geolocation databases?

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Abstract

The geolocation of computer or mobile phone is widely used to increase enterprises' income by targeted marketing using customer's location. The knowledge of computer's geographic location also helps to provide better services e.g. localized webpage content like national settings, weather forecasts, news and so on. Many companies spend a lot of money to get precise geographic and demographic information about their customers, mostly using some IP geolocation database. In the paper some of these databases are described and we discussed their effect on business. The issue of IP geolocation databases is the necessity of regular maintenance because of changes in IP address assignment and devices relocation. The problem can be solved with active IP geolocation methods, which are mostly based on delay measurement. The paper deals with verification of selected database records' trustworthiness using active IP geolocation methods. We present the comparison of geographic location gained from databases and calculated using results of measurement. Most of results verified by active methods were accurate, but small percentage of database records had wrong location. This could influence the enterprises' business due to targeting the wrong information to customers. Therefore, the paper recommends to regularly check all database records with some active IP geolocation method to prevent providing incorrect information.

Keywords: geolocation, delay measurement, CBG, location database

JEL Code: M37

1. Introduction

Over a past few years we have noticed massive increase of localization and personalization of e-commerce services. This facilitates the use of online services for customers by presenting products and services in local language, currency and even recommendation

of nearest shops. The responsibility for giving precise location of user is put on IP geolocation databases. The webserver looks up the visitor's source IP address in the online or offline database and can offer to e-commerce various information as country, language, currency, region, city and in some cases approximate geographic coordinates. The number of attributes and the accuracy of database records depend on the cost of it. Therefore it is up to company, how valuable the location data are for its e-commerce. Nowadays classical business intelligence is put together with geolocation to create location-based intelligence (Panian, 2012). The enterprise uses the location-based intelligence to improve business decisions, customer facing activities and consumer applications.

Our aim in the paper is to evaluate reliability of geographic coordinates gained from IP geolocation databases. We used a dataset with 5000 distinct IP addresses, which are located all over the Europe. Then we performed delay measurement from a few servers to all addresses in dataset. Based on the measured data we employed three active IP geolocation methods to estimate an area of IP address's possible location. Afterwards we evaluated if the coordinates provided by IP geolocation databases are in the estimated area.

2. IP geolocation databases

The IP geolocation databases are nowadays preferred over measurement based IP geolocation, mainly because they provide sufficient level of accuracy and are simple to use. Unfortunately, there is a constant problem with IP addresses relocation, especially with common IPv4 address trades between ISPs (Internet Service Providers). In contrast IPv6 address space is enormous therefore the geolocation databases for this protocol are hard to use due to their size.

Most of IP geolocation databases provide various level of information about IP address. Cheapest versions include only information about country, region and city. More advanced versions can provide properties like ZIP code, coordinates, language, currency, time zone, connection speed and many other. Yearly price starts on $49.00, the popular version usually costs around $499.00 and the most advanced databases can cost few thousand dollars per year (IP2Location.com, 2017).

Nowadays the significant IP geolocation databases are sold by MaxMind (2017), IP2Location.com (2017) and Neustar (2017). These companies offer also free or demo versions of their databases. The drawback of the free versions is lower accuracy, while the demo versions have limit of requests per time unit. The geolocation service provided by Geobytes (2017) is completely free unless you need more than 16 000 requests per hour, then you need to become VIP member. In the paper, we used demo version of IP2Location.com database (allows 200 requests per day) and free database Geobytes.

If we look for the usual accuracy of IP geolocation databases, we can find that precision of country level is better than 97% and for city level it is more than 80% (Shavitt and Zilberman, 2011). Another research done by Poese et. al. (2011) uses about a million random addresses and compares records from three databases with IP subnet assignment to ISP. There were more than 96% success in determining country, but precision of ISPs' location was poor – 40% at maximum. The most recent accuracy comparison was done by Kester (2016), who compared IPv4 and IPv6 records and presents that IPv6 records has lower accuracy than IPv4. Kester (2016) also states that the best IP geolocation database in his research had precision around 90% in country level and 60% in city level.

3. Active (measurement based) IP geolocation methods

The measurement based methods are not as accurate as IP geolocation databases, but since they are based on physical attributes, they can provide certainty of location. The paper uses this certainty to evaluate trustworthiness of databases' records.

The principle of most active IP geolocation methods lies in correlation between RTT (round trip time) and geographic distance. The main component of RTT (measured minimum) on longer distances (over 100 Km) is time needed for signal to propagate through cables. Therefore, the measured RRT directly depend on length of cables (Komosny et. al. 2012). Some IP geolocation methods also analyze number of intermediate devices and their location.

Overwhelming majority of active geolocation methods use several servers with known location (called landmarks). The sufficient number of landmarks is 10 but more landmarks increase the results precision. The accuracy is also better, when the landmarks are uniformly spread over the area, where the targets lie. The job of landmark is to measure RTT to target IP address and sometimes also to other landmarks for calibration.

Over the time there were developed several methods, which differs in complexity and accuracy. Further in the paper we describe and use these methods: Constraint Based Geolocation (CBG), Octant and Cable Length Based Geolocalisation (CLBG).

3.1.   Constraint Based Geolocation

CBG (Gueye, 2006) employs self-calibrating algorithm to construct Bestline (Figure 1), which is used for conversion RTT into geographic distance. Each landmark measures RTT to other landmarks and from the results plots dependency of RTT on geographic distance between landmarks. The Bestline is then constructed as a line with a positive slope and intercept, which is closest to all calibration pairs, but bellow them.
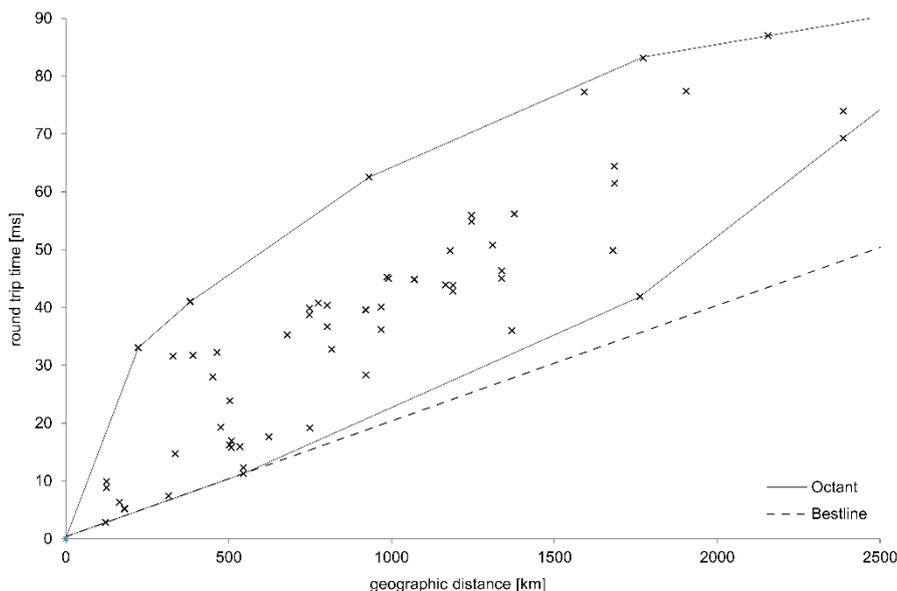
Figure 1: The round trip time to geographic distance mapping based on calibration data (used for CBG and Octant).

Using Bestline, the measured RTT (e.g. between landmark and target) can be easily transformed into geographic distance. This distance represents farthest point from landmark, where the target IP can lie and is referred as constraint. The intersection of each landmark's constraint creates the area of target location. The estimated geographic coordinates are calculated as a centroid of this area. The example of target's position estimation is in Figure 2.
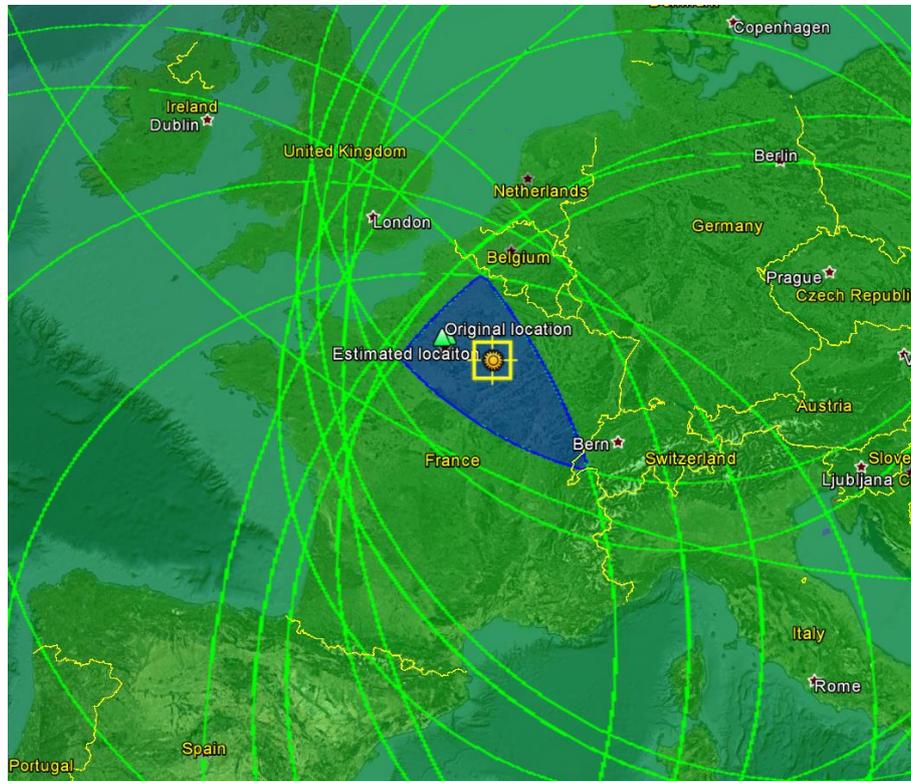
Figure 2: Estimation of target position. Green circles are constraints around landmarks. The intersection of constraints is estimated area (blue). The estimated location is in centroid of blue area.

3.2. Octant

Octant (Wong, 2007) framework is, similarly as CBG, based on constraints around landmarks. This is the area, where the target lies and is called positive constraint. Moreover, Octant employs negative constraints, which delimiting the area, where the target should not lie, usually it is area too close to landmark and (or) unhostile locations like Oceans. Negative constrains can decrease the area of possible location, but also makes areas more complex (concave and discontinuous).

To create both constraints, Octant also use calibration phase to construct distance to RTT plot. The difference from CBG is in transform equation, which is based on convex hull around all points (Figure 1). The lower part of convex hull is used to calculate positive constraints, upper part for negative ones.

3.3. Cable Length Based Geolocalisation

The method developed by Komosny, et. al. (2012) also uses RTT to distance mapping to make constraints intersection, but in contrast with CBG and Octant it does not perform

calibration before each measurement. The RTT to distance mapping relies on earlier detailed delay analysis in the Internet. It considers also delay caused by intermediate routers and time needed to generate a reply. The aim for developement this method was to set positive constraint at the maximum distance from landmark based on physical properties. Hence it can be used for evaluation of IP address position, with guarantee that the calculated distance cannot be further. On the other side CLBG produce larger area of possible location than CBG and Octant.

4. Measurement methodology

The paper deals with evaluation of geographic location from IP geolocation databases. Due to heterogeneous of the Internet we narrowed the area, where we performed the experiment to Europe.

4.1. Set of landmarks

Active IP geolocation methods require servers with known location, which could perform a measurement. We have chosen a PlanetLab research network (PlanetLab, 2017), where are available servers located all over the world. We used 21 servers variously spread around Europe mainland. The calibration measurements were done between all landmarks before each measurement set.

4.2. Dataset of targets

The set of IP addresses to geolocate was downloaded from webpages devoted to iPlane project (iPlane, 2013) run on University of Washington, unfortunately the website is nowadays not active. Only active IP addresses in Europe were chosen from the dataset, the provided location from the dataset is referred as Ground truth. Subsequently we selected 5000 addresses by random function and looked up for their geographic coordinates in Geobytes (Geobytes, 2017) and IP2Location (IP2Location, 2017) databases.

4.3. Measurement background

The RTT measurement for each address was done 30 times and the lowest value were used (to minimize short-term load on network links and devices). The measurement was done in two batches by 2500 addresses, where each address was measured independently. The number of intermediate devices, needed for CLBG method, was calculated from TTL of returning message. The measured data were downloaded from servers after all measurements were done and the IP geolocation calculation was made offline.

5. Results

The geographic coordinates estimated by all three active IP geolocation methods were compared with location provided by databases and location from dataset (Ground truth). Than we verified if the locations from databases are in the area estimated by individual methods. Lastly we compared the size of area provided by IP geolocation methods.

5.1. IP geolocation databases comparison

The geographic coordinates provided by both databases and the locations from dataset differed for almost every IP address. Therefore we calculated distance between estimated location and location provided by each database (further referred as error distance). The aim of error distance comparison was to evaluate approximate accuracy of each database and even the active geolocation methods are less accurate than the databases (Komosny et. al., 2016), we can compare accuracy of databases between themselves. All IP geolocation methods show similar accuracy, so we present only the graph for CLBG (Figure 3). The main reason for CLBG selection is the lowest number of IP addresses without estimated location (0.48%), the other two methods (Octant and CBG) were not able to localize 9% and 24% target addresses. The targets were not located due to underestimation of constraints – there were no circles intersection.
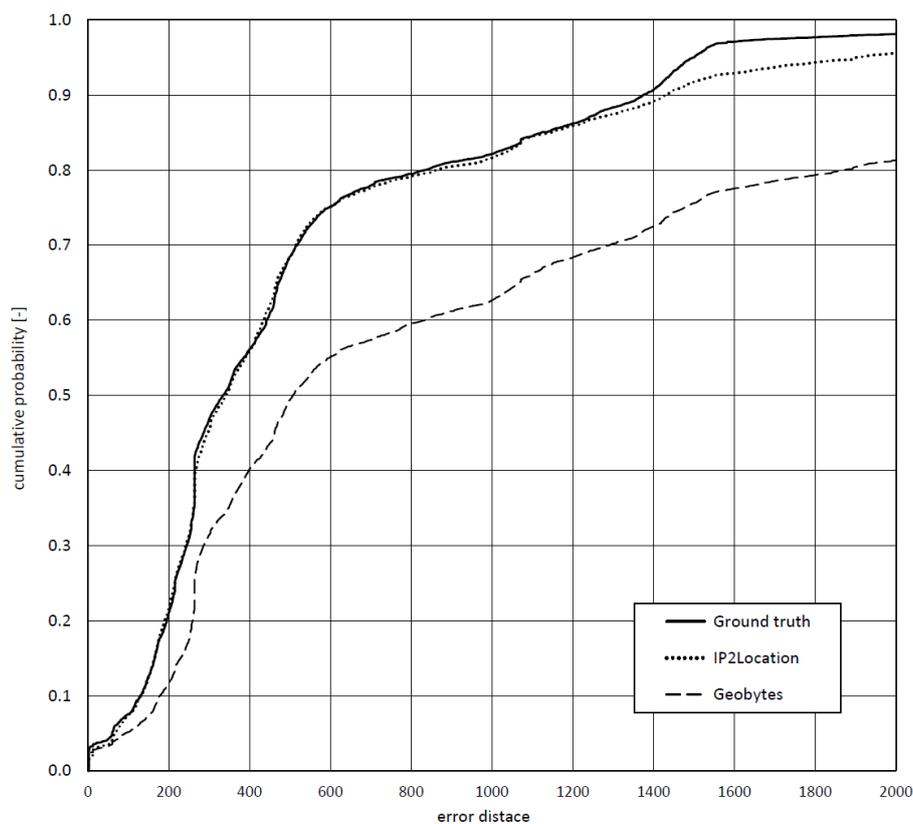
Figure 3: Cumulative distribution function of distance between estimated and database location (labeled as error distance, plotted in Km).

From the results in graph of error distance cumulative probability (Figure 3) is evident that Geobytes database has much lower precision than IP2Location and Ground truth. The reason for it is probably in the nature of Geobytes, because it is mostly used for free and therefore there are not much resources to maintain database's records.

5.2. Verification of databases trustworthiness

The main objective of the paper was to evaluate the reliability of geolocation database records. In this part we tested if the coordinates reported by databases lies in the area

estimated by active IP geolocation methods (the blue area in Figure 2). In Table 1 is percentage of records from individual databases, which are in the area estimated by CBG, Octant and CLBG. We can see that Geobytes database has poor accuracy in comparison with IP2Location or the location provided by dataset (Ground truth) and the possible reason for it was discussed in previous section. There can be also stated that CLBG database proved correct location for the most of IP addresses. That's probably because CLBG method is based on physical laws and therefore it estimates region of all possible locations, unfortunately the estimated area is much larger than with other methods, which we present in the next section.

Table 1: The table shows percentage of databases records, which lies in the area estimated by active IP geolocation methods.

	CBG	Octant	CLBG
Ground truth	46.5%	44.0%	91.9%
Geobytes	39.4%	36.5%	68.0%
IP2Location	45.2%	45.1%	91.7%

5.3. Comparison of estimated areas

With regard to number of right locations reported by CLBG, we compared all methods in size of estimated area. In Figure 4 is cumulative distribution function of area estimated by individual methods. The horizontal axis (estimated area) has the logarithmic scale. The graph shows that CLBG method provides much larger estimated regions as we expected. Smallest regions was provided by method with positive and negative constraints – Octant.
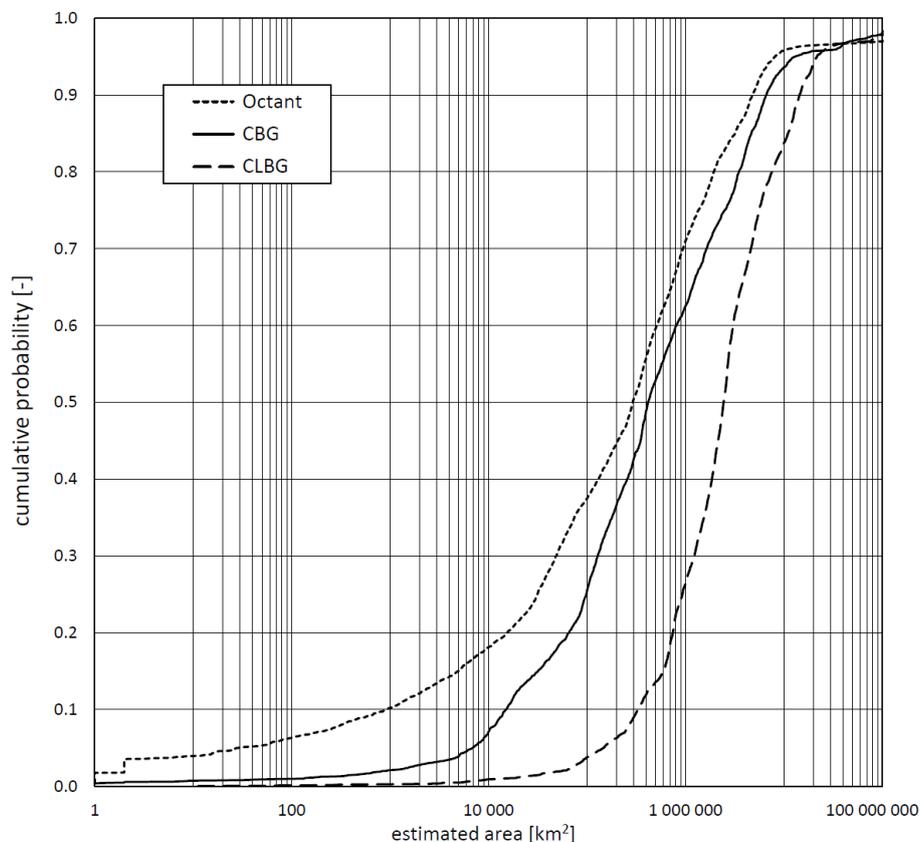
Figure 4: Semilogarithmic plot of cumulative distribution function of area estimated by different IP geolocation methods.

6. Discussion and Conclusions

We calculated position of 5000 IP addresses using three active IP geolocation methods (CBG, Octant, CLBG). For all evaluated addresses were gained their geographic coordinates from two geolocation databases and then we compared their accuracy using measurement to find out that IP2Location had better accuracy than Geobytes database. In our opinion the reason of it is that Geobytes database is available for free and IP2Location is paid (we used demo version).

The next step in our work will be to evaluate other databases and more records to prove or refute our conclusion that some records in IP geolocation databases have wrong location. The cause is probably the volatility of IP address assignment in general. Anyway, we recommend to regularly check all records in geolocation databases with measurement based IP geolocation methods to prevent records with incorrect locations.

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A Time Series Analysis of Agriculture Production and Food Security in Ghana

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Abstract

The aim of the study is to evaluate agricultural production in Ghana. The methodology used for the work was through the use of qualitative and descriptive analysis of various researchers. Secondary data was predominantly used as a result of careful applying reasonable data simulation techniques. This work was strictly descriptive in nature. The results noted are numerous, to mention a few, the decline in agriculture labor force which is adversely affecting the country in absolute level terms and relative importance. Irrigation facilities for farming is almost no conformer to agricultural production, even though there is progress in increase of production. The government of Ghana needs to employ macroeconomic policies. Agricultural Production has the potential to be improved through an enhanced extension service system, improving agriculture practices to realize production increase on yield in the long run.

Keywords: production, household, agriculture, consumption, accessibility, availability, food, farming, usage

JEL Code: A10, I10, I30

1. Introduction

Ghana is not different from other Tropical African countries such as Burkina Faso border to the North of Ghana, Togo and Cote d'Ivoire among others, depends on Agriculture for food security, and majority household incomes (Darkwah, 2013 Bamwesigye, and Pomazalova, 2015, Verter, Bamwesigye and Darkwah, 2015, Bamwesigye et al. 2016). Lying at the Atlantic Ocean to the south making a coastline of 550 km wide.

The country's agriculture, drainage and water works systems/irrigation is mostly supported by the Lake Volta which is an artificial dam SRID (2010).

The underlying forces in the agricultural production and food security are complex in nature. This is due to the fact that in semi-urban areas there is large number of backyard farming, which is usually by households. Through the sustainable use of forages and

household wastes from crops such us cassava, plantain and potato peels and leftovers of vegetable crops, this is however supported by extra livestock for the market which as per Mensah 2013 is mostly heightened during festival occasions traditional and religious in nature, climatic circumstances (Nyadzi, 2016), Rainfall patterns over the past four decades of observations on temperature was of the opposite due to the analysis that, decreased rainfall was not in conformance with that of meteorological rainfall data from 1970-2009, which was of an increase in rainfall. Indication showed that roughly as high as almost 35% farmers in some selected places in the northern part had no measures in place for curbing climate change issues. Also is the fact that an overwhelming majority, about 96% had problems with technological and capital flow measures for enhancing food crops. Socio-economic factors of Ghana as a country, includes high volume of illiteracy rate continuing on farming. Evidently it is observed that Ghana is a low middle –income nation. Inflation in Ghana as in February 2016 was 18.5%. As per the statistical efficiency the survey is 65% of assessment of the WB. This leaves the spot of doubts that indeed there is deeper problems with the some aspects of human capacity.

GDP BY SECTOR

	2009	2010	2011	2012	2013	2014	2015
Agricultural sector	32%	30%	25%	23%	22%	22%	19%
Industry Sector	19%	19%	26%	28%	28%	27%	27%
Services Sector	49%	51%	49%	49%	50%	52%	54%
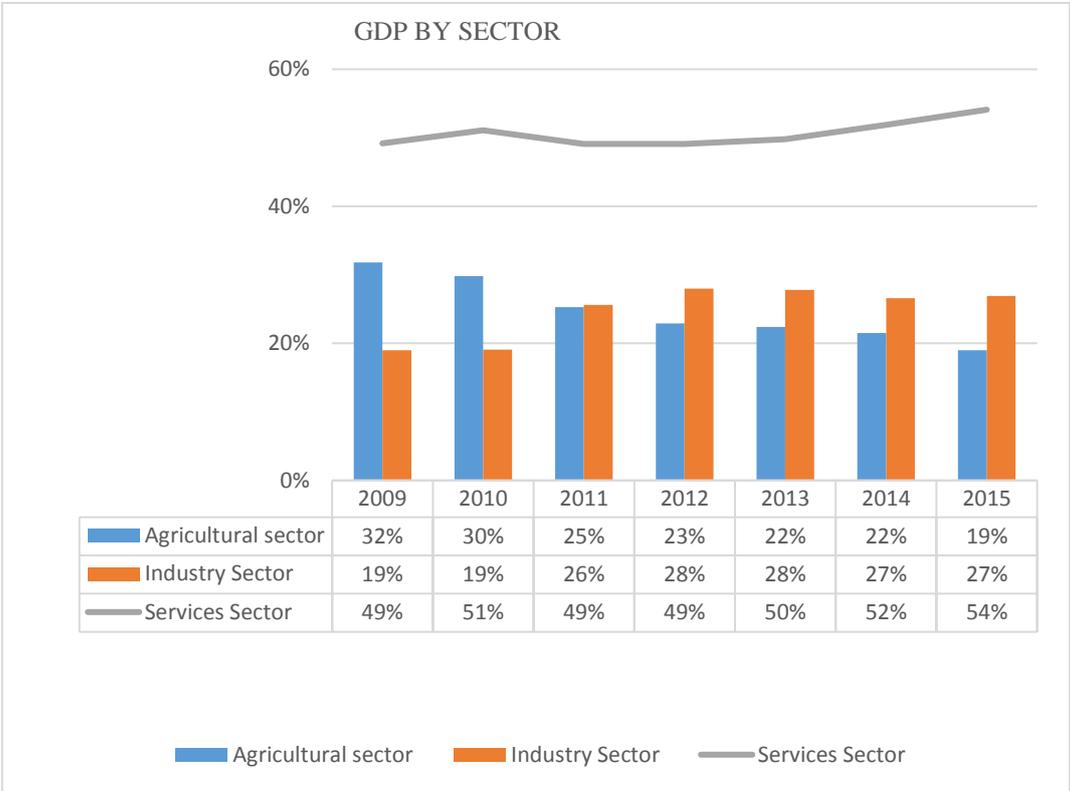
Figure 1: GDP of Ghana by sectors 2009–2015
Source: Authors analysis based on World Bank 2016

The economic structure of most African countries such as Uganda among many is also controlled by the agriculture sector, this not any different for Ghana (Figure 1) Thus over 50% of the people are engaged in the agriculture sector and which is not only source of food, and employment but also a good source of government revenue. It is evidenced that the strength of government in terms of poverty head count ratio at national level in 2012 was 24%. This gives the picture that nearly one quarter of the economy are living under poverty line. Modernization for industrialization is a key drive to development by an essential agriculture tool. From the look of the contribution with value lost on electricity outage as at 2013 this was 15.8% to national output.

Agriculture being a dominant aspect of the Ghanaian economy this is an issue worth studying for the future recommendation on economics, governance, food and security. Bamwesigye et al. 2016, gives an indication that Uganda amongst other countries in Africa such as Nigeria, Ghana is still characterized by low productivity, linked to lack of enhanced scientific and technological mechanisms, though it is the back bone of the economy.

Krausova and Banful, (2010), declares that that agriculture input franchise in Ghana is reliant on highly on the male population, also high levels of educational level gap between farmers in Ghana. The input enterprise were found to be infants under 10 years in operation. Africa has limited water irrigation provisions for farm production and consumption (Darkwah, 2013). Irrigation aptitude of Ghana is non evident even though it is gaining attention and improving.

FAO (2015), shows that labour force in agriculture in relation to Ghana's population over a period 15 years shows that agriculture's principal role play is progressively declining. Nevertheless, in nominal terms, labour force in a whole is declining. Decline. Agriculture labour force within 2005 to 2010 was 2.74% however, between 2010 and 2015 this declined. Total labour force also shrink from 3.19% to 2.15% within the same period. There is an inverse relationship of the Agriculture sector's role to that of GDP.

Food security

The WB referrers to food security as access by all at all times to enough food for a healthy active life. The UNSCN defines it in view to FAO (1996–2009), thus; "food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutrition food to meet their dietary needs and food preferences for an active and healthy life". To digress into 2 of the caveats, FAO (1996) defines availability of food in view to the supply and demand side of food in relative levels of food production and net trade. None the less, World Health Organization 2015, principally states; this is sufficient quantities of food available on consistent basis". Table 1, gives a view into the intricacies involved within the pillars of food security (Tab 1).

Table 1: Pillars of Food Security

Availability:	Access	Stability	Utilization
Domestic Production Import Capacity Food Stocks and food aid	Poverty/purchasing Power transport and market Infrastructure food distribution	Weather Variability price fluctuations political and economic factors	food safety and quality clean water health and sanitation care and feeding

Source: WFS, 1996

Utilization therefore conveys about the issue of how the body of human beings absorb and make use of the various nutrients in food crops. This offers an explanation of nutritional status of individuals as per WHO 2015. On a wider viewpoint, looking at food security, one sees it is a global distress. Sub-sahara Africa having a global regional impact from 2014-2016 of 27.7%, which is not different in the case of South Asia with 35.4% overall effect, FAO 2016.

The concept of food security and agriculture needs time to improve. Various studies provide an overview since colonial time where policies were tangled to cash crops such as cocoa, coffee among others which has led to a downward effect on food crops needed for consumption by individual household irrespective of income level. This the authors believe is a grey area which needs attention. In the northern as well as central part of

Ghana, a higher number of people did not meet the required mean percentage regards to protein, energy and fiber.

2. Methodology and Data

Time series data was generated from institutions included among others Food and Agricultural Organization (FAO), United Nations Conference on Trade and Development (UNCTAD), World Bank etc. The study equally used literature from various journals, articles and domain page websites of sound justifiable benefit. Issues in line with agriculture production and food security were studied.

A mixed-methods research approach, qualitative and quantitative (Maxwell, 2005, Creswell, 2009, Creswell, 2011), Descriptive statistics (Klotzbaugh and Glover, 2016) were used to study the time series data as obtained from various sources. Describe the basic structures of the data in the investigation. This hence provides a modest summary about the illustration and measures. Composed of simple graphics analysis, they form the foundation of virtually every quantitative analysis of data.

3. Results and Discussion

This chapter presents the findings as well as the understandings of frequency tables, graphs, figures and text. The study endeavored to capture contextual information of the respondents in order to determine the demographics of the people who engage in coffee production ranging from planting, harvesting, processing and selling and trading.

Crop production has had challenges in terms of production which is being depicted as per Fig 2. Production though heightened from 1980 to 2013, Onion production was one of the key crops which had a good progress encountering a few falls. There was a drastic increase in production from 2010 to 2014 to a production value of around 16,500,000 tonnes.

The carcass is a good source of mushrooms. The range of growth in production of oil palm for both Ghana and Nigeria is within 2% to 4% from 1980 to 2010. However Nigeria experiences declines in the years 1996 to 1998 but experiences drops from 2010 to 2012 in relative terms. Ghana on the other hand had a steady progress with production.

Verter (2014), noted that cocoa bean production while using the Johansen cointegration test depicted a long run equilibrium relationship between cocoa bean productions, area harvested, and world price amongst other factors such as cocoa export. As per the association between annual cocoa beans production and area harvested, cocoa export and RGDPK.

The demand factor rests with stability in food crops while the supply side deals with availability of food. It is clear that there needs to be a balanced role to enhance food security not only in Ghana but also in the entire Sub-Sahara African countries as evidenced by various studies.
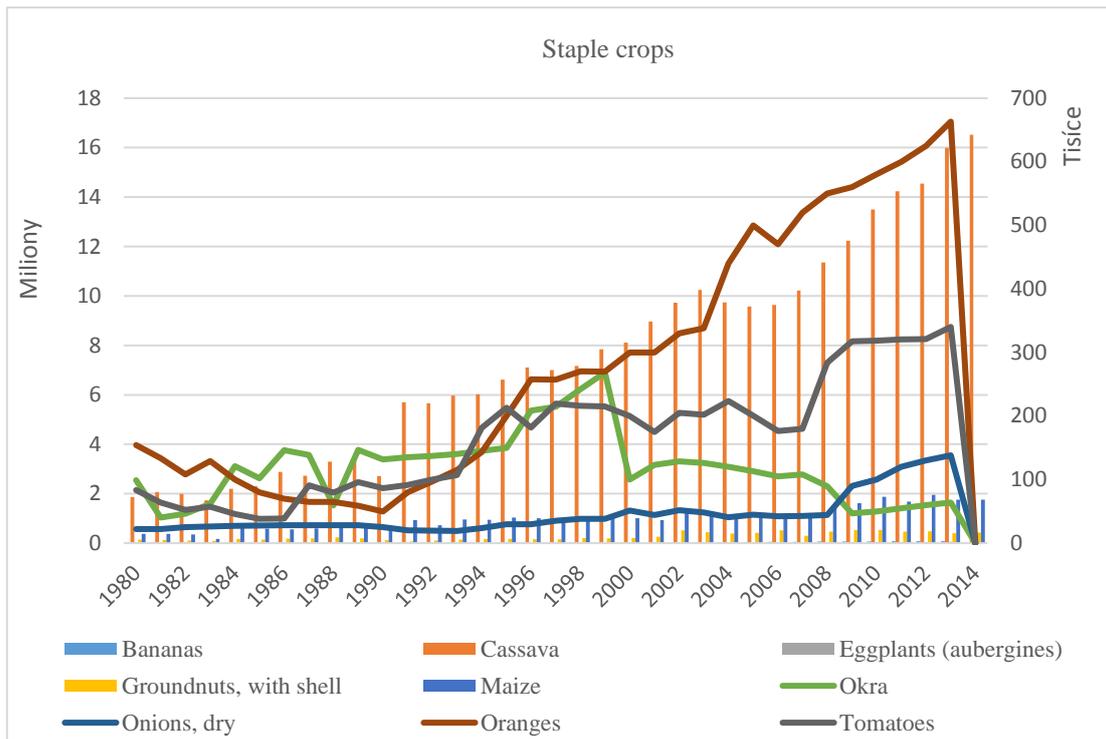
Figure 2: Stable Crops of Ghana, 1980–2014
Source: Authors analysis based on FAO (2016)

Becvarova and Verter 2014, stress that there are two factors of determining food security, i.e. supply and demand factors. The market, the state and the civil society need to recognize their individual roles to subduing hunger.
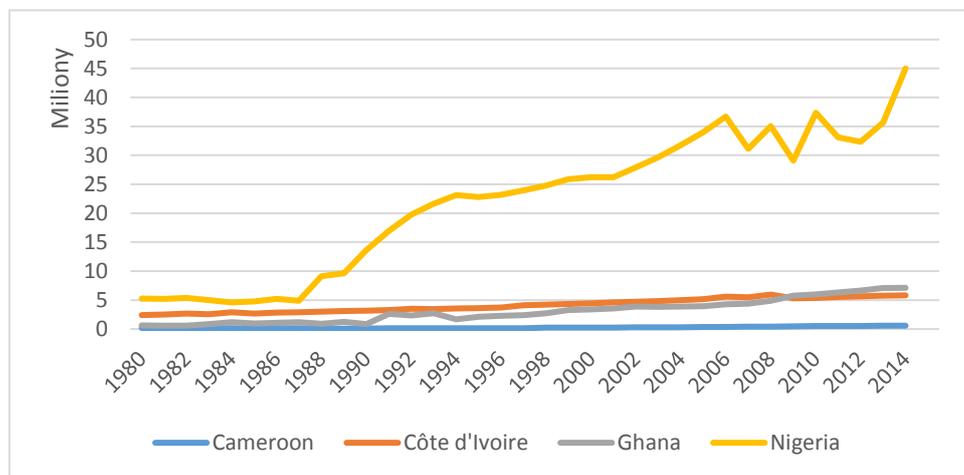
Figure 3: Yam Production
Source: Authors analysis data from FAO (2016)

The Ministry of Food and Agriculture (MOFA, 2016) spells out important crops which make value for money. Crops include, rice, maize, yam, cassava, oil palm, plantain, cocoa etc. Food is a major component of life as such an embodiment in the foundation of living. Most of these food crops produced are prepared with minimal preparation methods which decreases the hunger level of people. Vegetables and fruits are also produced widely in the region, example, pepper, mango, oranges, pawpaw, okra and so on are eaten

on voluminous base. The West African states steal lead in yam production, even when Ghana yam production is still struggling, Nigeria and Ghana are still the world leaders in the crop/yam production (Figure 3).

Oil Palm (Figure 4) is one of the main crops, if not the only major crop (MOFA 2015) to be a self-sufficient in the production and usage as a food crop. This crops points periods for the production of two different types of edible oils, i.e. Palm oil and kernel oil. The copra which is used for fuel, whiles the tree produces both palm wine and local dry gin respectively.
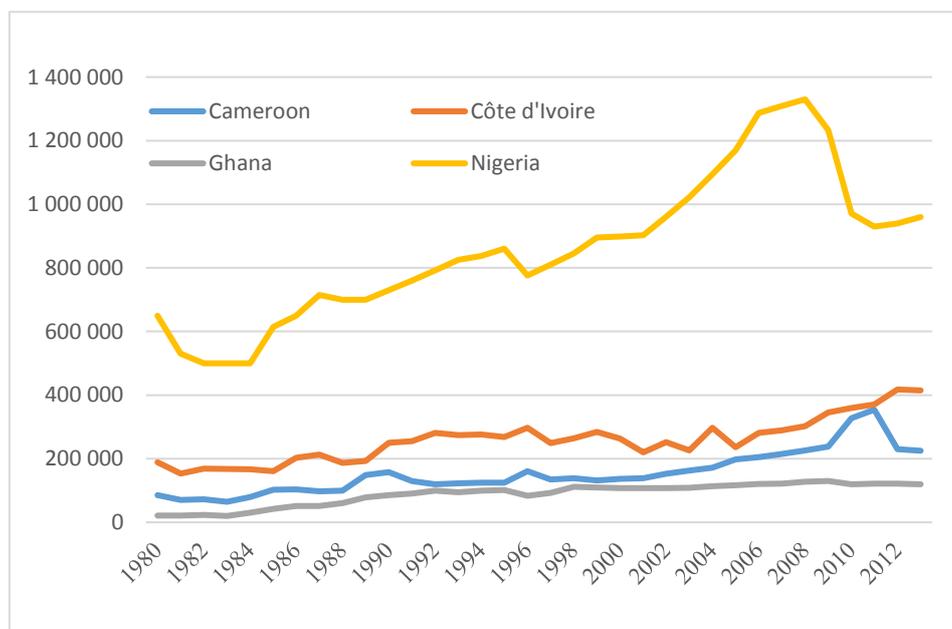
Figure 4: Oil Palm Production Ghana, 1980-2012
Source: Data from FAO 2016.

Again the total value of food imports was higher than the value of total exports of food. Balance of trade is affected immensely which affects food security looking at food utilization. Perhaps this could be due to the fact that, imported food were substandard in quality or could not be purchased as a result of price dynamics to be consumed in large quantities. Ignowski (2012), noted that employment and asset ownership has a direct relationship in diminishing the probability of household food security. Also household food security and the nature of dwelling class, as a de-facto for income, had the most substantial impact to diminishing the probability of child malnutrition as with the case of Zimbabwe.

Bamwesigye et al. 2016, notes that both Uganda and Ghana have the missing link of specialization with regards to performance. Need to say, he makes emphasis that there is the need to use monetary and fiscal policies optimally, thus to gain favourable macroeconomic variables of full employment, economic growth and as well as price stability. In Both countries, agriculture is the major employer, and source of livelihood hence supporting in terms of economic policies such as subsidy, tax policies which can improves the food security situations as with regards to both Ghana and Uganda.

4. Conclusion

Even though there seem to be improvement in the quantities of major food crops in Ghana, there is equally an increase in population, and negative factors of growth and development such as high price food on imported products, increasing inflation, among others as noted by Bamwesigye et al. 2016. The government of Ghana needs to strong macroeconomic tools to stabilise and stimulate business activities, create jobs among others hence reviving the economy.

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The government of Ghana needs to strong macroeconomic tools to stabilize and stimulate business activities, create jobs among others hence reviving the economy. Agricultural Production can be upgraded through the enhancing and extending the provision of extension farming education/services, fertilizer usage being key to improving agriculture production on yield and taking into account climate change, there practicing sustainable practices. Never the less, there is the need on expounding on agrarian polices and their implementation.

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Assessment of Market Dominant Position in the European Union

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Abstract

Articles 101 and 102 of the Treaty on the Functioning of the European Union (TFEU) are aimed at regulation of competition, and preventing undertakings who hold a dominant position in a market from abusing that position respectively. The paper discusses the problem of abusing of market dominance position by enterprises. The objective is to analyze how the European Union and singular European states intervene to solve this kind of market problem to make sure that the objectives of perfect competition are saved. A qualitative investigation of four particular cases in the EU was carried out. The paper presents different cases of market dominance and the results of intervention of the EU Court of Justice, and other National courts. The study found out pronounced cases of Google and breach of Articles 101, and 102 of the TFEU i.e. over rival shopping services, Railway Freight Sector (SNCF), Orange and Outremer Telecom, and Société Nouvelle des Yaourts de Littée (SNYL) whose case have heard and their fines accorded for abusing their dominant position in the common market area. Ceteris paribus, the study concludes that, abusive behavior is a positional strategy and not as result of marketplace factors. The study recommends that competition offices in the member states carry out knowledge sharing activities for businesses/companies, but also keep a focus since abuse of dominant position is real.

Keywords: market dominance, positional strategy, perfect competition, strategic position

JEL Code: F15, D40, H73

1. Introduction

The concept of self-reinforcing market dominance based on the Market perfect equilibrium can be discussed in two ways. One is the increasing dominance (ID), whereby the

leading firm has a greater probability of winning the next sale; another is increasing dominance (IID), whereby a firm's probability of winning the next sale increases with the length of its lead. (Cabral and Riordan, 1994; Chen, Doraszelski, 2009). Market dominance is also considered as a typical outcome of markets with network effects (Posner, 1974, Chen, Doraszelski, 2009,).

According to the European Court, dominant market position is defined as a position of commercial strength enjoyed by an undertaking which empowers it to stop real competition being maintained on the applicable market by affording it the power to behave to a considerable extent independently of its competitors, and eventually of its customers. The European Court of Justice defines market dominance in relation to a position of economic strength enjoyed by an undertaking, which enables it to prevent effective competition being maintained in the relevant market by affording it the power to behave to an appreciable extent independently of its market opponents, its customers and eventually of the consumers. Such a situation does not prevent some competition, which it does where there is a monopoly or quasi-monopoly, but enables the undertaking, which proceeds by it, if not to control, at least to have an appreciable influence on the conditions under which that competition will develop, and in any case to act largely in disregard of it so long as such conduct does not work to its disadvantage.

In rivalry law the dominant position is accepted, that is, an undertaking having a dominant position is not itself a retort. Therefore, to distinguish the benefits from the costs of the existence of a dominant position, main stress from the aforementioned article 82 of treaty two elements regarding the dominance concept; dominance is an economic strength that enables the undertaking the power. It can be analyzed in two positions: the one is to act to a considerable extent independently of other agents, i.e. to operate so as its conduct does not bring about harms to itself; and to have an appreciable inspiration, in terms of easing. The first point can be restated in the following terms: the inability of the remaining agents to react to some acceptable actions of firm in dominant position. The second point demonstrates the firm in dominant position's ability to deteriorate the competition on the merits in another form of competition. Consequently, the strategies give rise to a positional added value, i.e. their significant increments for the fact that there is asymmetry midst strategy sets. Precisely the study distinguishes two no replaceable strategies: if the no replaceable strategy is played only for its positional adding value, it is called positional strategy; differing, if the no replaceable strategy is played no matter what the counterparts can react i.e. its adding value is irrelevant for the firm calculus, it is signified as regular strategy. Formerly, in this diversity among strategy sets or action-reaction correspondences, strategy can be designated for its positional value, that is, in this situation the firm in dominance "uses" the market asymmetry leading to a distorted behavior and competition. The choice importantly induced by the market imperfectness is an abuse of that imperfectness, that is, a part's choice essentially caused by its dominance is an abuse of dominant position. The study identifies action-reaction irregularity, the sense of "independent behavior" of a dominant firm and in the positional approach the economic rationality of an abusive behavior. Competition exaggerated from positional effect can determine a competition for these positional effects, then a positional competition. Besides, positional competition is much harder, and sometimes more vehement, than normal competition or competition for merits. For instance, a competition on the merits if all the firms investing i.e. for reducing the cost of production, they may all increase their profits because productive inadequacies are reduced and demand is increased (Pagano, 2002, Sergio et al. 2016).

The Article 82 of the European Union Treaty statuses: "any manipulation by one or more undertakings of a dominant position inside the shared market and or in a considerable part of it shall be prohibited as incompatible with the common market in so far as it may affect trade between the Member States. The concept of abuse of a dominant position, as a conduct "which, through recourse to methods different from those which condition normal competition in products or services on the basis of the transactions of commercial operators, has the effect of hampering the maintenance of the degree of competition existing in the market or even the growth of that competition". Abusive behavior entails mainly of exclusionary practices such as destructive pricing, exclusive dealing, refusal to supply, and tying. It is commendable to emphasize that European law does not punish the dominant position in itself, just the abuse. The vigorous of abuse i.e. as a result of positional and cumulative causation effects and the role of special responsibility (Hohfeld, 1919, Bartaleich, 2016, Sergio et al. 2016). The OECD (2012) considers the potential anti-competitive and pro-competitive effects of public announcements of future prices under a number of headings: the first is the policy and legal matters regarding the treatment of public announcements; and the second describes the diverse types of public price declarations i.e. the economics of coordinated effects and how price declarations may facilitate harmonization, pro-competitive effects, the counterfactual and comprehensive issues; and conclusions as to the object and effect of price announcements and the challenges of providing vigorous compliance guidance.

2. Methodology and Data

This research is qualitative in nature (Maxwell, 2005, Creswell, 2009), Conferring to Creswell 2013, qualitative research approaches comprises key main fundamentals of narrative research, phenomenology, grounded theory, ethnography, and case study.

The five study cases were chosen using the non-probabilistically sampling approach. The information discussed in the article was found in other articles and documents. The analytic and comparative methods were used to discuss the main information found during the research process.

3. Results

CASE 1: European Commission vs Google: An Analysis of Google's alleged abuse of dominant position

The European Commission dispensed a press-statement accusing Google of breach of Articles 101, and 102 of the TFEU, stating that the search giant has abused its dominant position on the market by preferring its own comparison shopping package (Google Search), over rival shopping services. The attempt is made to explain what exactly the EU is accusing Google with, and what steps follow next. The European Commission dispensed a press-statement accusing Google of breach of Articles 101, and 102 of the TFEU, stating that the search giant has abused its dominant position on the market by preferring its own comparison shopping package (Google Search), over rival shopping services. The attempt is made to explain what exactly the EU is accusing Google with, and what steps follow next.

According to the EU Law, Articles, 101 and 102 of the TFEU prohibits any abuse of dominant position within the internal market or a substantial part of it in so far as it may affect trade between Member States. Supremacy is assessed in relative to three variables,

namely the product market, terrestrial market and chronological factor. When the relevant market has been defined, the Commission has to assess whether the responsibility in question is dominant within that particular scope. The legal examination used by the court was industrialized in the United Products case, and defines dominance as a position of economic strong point that allows an undertaking to act independently from its participants, customers and consumers by enabling it to prevent effective competition on the relevant market.

As opposed to the United States where search engines Yahoo and Bing appreciate greater influence on the search market, in most EEA countries Google embraces a market share of over 90%, making it a dominant responsibility on the European search-engine market. After having received grievances from a number of firms including Microsoft, Tripadvisor and Expedia, the Commission initiated an inquiry into Google's practices as dominant market player in November 2010. Though, no formal Statements of oppositions had been issued until now.

The Commission's criticism concerns Google's comparison shopping service, 'Google Search' which allows consumers to search for products on online shopping websites and compare prices between different sellers.

The Google's search chef Amit Singhai suggested that there is a ton of competition among shopping search engines including eBay and Amazon, two of the biggest shopping sites in the globally, and insisted Google's shopping results have not damaged the competition

According to Article 23(2) of Regulation 1/2003 on Application of rules on competition provides that the fine for non-compliance with Article 102 TFEU cannot exceed 10% of an undertaking's total turnover in the preceding business year, meaning that in the worst-case situation, Google would have to recompense a fine of around 6.2 billion euro should the Commission establish abuse of dominant position in the case of Google Shopping.

Case study 2: French competition authority vs Railway freight sector (SNCF)

A decision by the French Competition Authority (FCA) imposed a fine of €60.9 million on the same organization, the national railway operator for abusing its dominant position in the railway freight business in France, which issued an injunction to modify its commercial practices. The practices authorized by the French Competition Authority (FCA) in its decision were;

In its position, Railway freight sector (SNCF) of delegated infrastructure management of traffic and technical safety maintenance of the network infrastructure, it had gathered delicate and confidential information on the strategy and business behavior of its competitors and used it in its own commercial interest; and SNCF had been avoiding its competitors from accessing rail capacities that were indispensable to their business by deterring the access to freight yards and overbooking train paths and specific wagons that are used for large tonnage transportation at the same time.

The other practice involved was valuing below cost to selected clients by which, according to the FCA, Railway freight sector (SNCF) aimed to insincerely delay competition in the market. The FCA considered that the practice was likely to prevent competitors as efficient as SNCF from joining the market.

It is worth observing that the FCA's investigation was in step with the Post Danmark judgment delivered by the European Court of Justice. The prices charged were below the average total costs nonetheless above SNCF's average incremental costs. In such a case, according to the Post Danmark judgment, the FCA was required to demonstrate that the operator intended to exclude competitors from the market: the FCA considered that SNCF

had an overall exclusionary strategy because it had fixed prices irrespective of profitability conditions. With regards to this last practice, the FCA did not impose a fine but did issue an injunction against SNCF obliging it to set up an analytical accounting system within 18 months that would accurately identify the costs incurred by its freight business, and to set its prices at a level that covers its average avoidable costs within three years.

However, the Paris Court of Appeal overruled the FCA decision on 6 November 201430 on this point. Although it confirmed the proper application of the Post Danmark judgment, the court held that the FCA had failed to prove that SNCF's pricing policy aimed to exclude competitors from the market by charging prices below the average incremental costs. Moreover, the court found that there was no intent to exclude on the part of SNCF, which was primarily focused on securing consumers' choice between rail and road and on protecting the environment.

Case study 3: SFR vs Mobile phone service in La Réunion and Mayotte

Following a complaint by Orange and Outremer Telecom, the FCA ordered SFR and its subsidiary in La Réunion, SRR, to pay a €45.9 million fine for excessive pricing differences between calls made within its network (on net calls) and calls made to competing operators' networks (off net calls), charging more for the latter and exceeding the differences in costs SFR bore.

On the substance, the FCA confirmed that SRR, with up to 70 per cent of the market in La Réunion and in Mayotte, had abused its dominant position by implementing pricing differences that were not justified by the costs incurred by SFR for routing off-net communications. This had the effect of making calls to customers of competing networks more expensive, thereby encouraging customers to subscribe to SRR.

Case study 4: TDF vs DTTV broadcasting in French overseas territories and communities

Following a complaint lodged by Outremer Telecom (OMT), the French Competition Authority (FCA) imposed a fine of €4.2 million on TDF, the incumbent French terrestrial broadcaster, for having delayed without due cause the publication of regulated orientation offers specifying the technical and pricing conditions of regulated offers for hosting and access to its own broadcasting facilities. OMT and other TDF competitors alleged that since TDF owned the majority of the necessary infrastructure, they needed this information in order to submit bids in France Télévision's call for tenders for DTTV broadcasting in the French overseas territories and communities. TDF did not publish the information before or during the procedure, which meant most competitors were precluded from bidding in call for tenders, and all contracts were awarded to TDF.

The French Competition Authority (FCA) held that TDF had abused its dominant position on the upstream wholesale market for access to broadcasting facilities in order to exclude competitors on the downstream retail market for DTTV broadcasting.

The FCA applied a 20 per cent increase in the fine because TDF had already been sanctioned for similar practices in 1999.

Study case 5: the French Competition Authority vs Yoghurt distribution on the French Caribbean

The French Competition Authority (FCA) imposed a fine of €1.6 million on Société Nouvelle des Yaourts de Littée (SNYL), the leading manufacturer of fresh dairy products in the French Caribbean, for disapproving the products of one of its competitors in inland France, Laiterie de Saint-Malo.

SNYL cast doubt on the freshness of Laiterie de Saint-Malo's yoghurts and fresh cheeses by misrepresenting the result of bacteriological studies, and questioned whether they complied with applicable health standards by alleging that they were overstepping

regulations on 'best before' dates. This communication was circulated to a broad audience, including a professional association. As a result, the Laiterie de Saint-Malo's products were delisted by a certain number of supermarkets.

4. Discussion and Conclusions

Ceteris paribus, effect-based vs form-based focused on the investigation of effects more than that of form. Unquestionably, abusive behavior stemming from positional strategy and not as result of marketplace factors. A positional strategy referred herein as the action preferred crucially for its positional adding-value. Then positional effects are the reasons of abusive behavior and, subsequently, the investigation results of abuse is an examination of positional outcomes on the market. Moreover, these are a cause of a dynamic consequence: the positional competition, which represents in this framework the more generally increasing process triggered by the presence of power. In other words, positional competition favors who is already in an advantaged position. Therefore, the dominant firm is associated to two crucial and chronological effects i.e. static, illustrated in positional terms, and the other dynamic, as a result of positional competition.

The study concludes that, abusive behavior is a positional strategy and not as result of marketplace factors. We recommend that competition offices in the member states carry out knowledge sharing events for businesses and companies, but also keep a focus since abuse of dominant position is existent.

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Importance and function of marketing analysis of competition as a support of managerial decision-making process within competing environment

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Abstract

The study describes the importance and the function of competition analysis within marketing activities. The aim of the article is to review the role and the meaning of marketing analysis, especially the competition analysis and its importance within the decision-making process of managers. It searches mutual dependence between the rate of realizing marketing activities and carrying out the competition analysis as a basic tool of knowledge of external business environment. It investigates opinions of employees in 189 Slovak SMEs about the importance and the function of the competition analysis within business activities. We searched our assumptions within three categories of the companies: the companies with established marketing department or work position, the companies doing marketing activities within other departments or work positions and the companies where nobody does marketing. The conclusions of the analysis enable Slovak SMEs to consider the importance and the function of marketing and marketing analysis.

Keywords: marketing, marketing analysis, competition analysis, information system, SME

JEL Code: M31 Marketing

1. Introduction

Marketing stands for an inevitable business function, that should be implemented by every company regardless its size, market or industry. Marketing doesn't' mean only an advertisement. It is attending every business process: searching for customers' needs, production according to customers' requirements, business environment analysis, etc.

The main features of marketing oriented business according to Narver and Slater (1990) are: focus on the long term profit, customer orientation, competition orientation and inter-functional coordination (Figure 1).
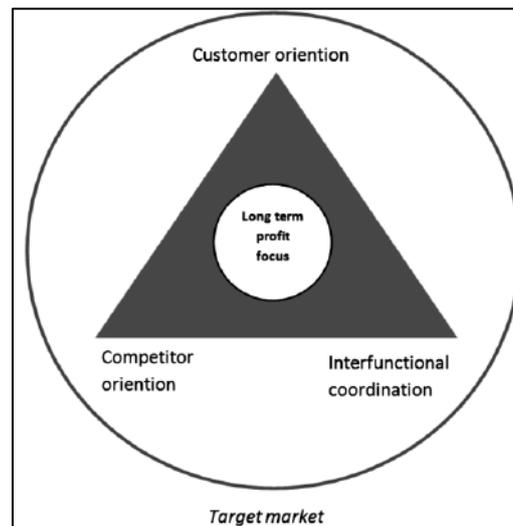
Figure 1: Features of marketing oriented business

Inter-functional coordination is very important in every business. In our opinion, this coordination among all employees and departments should be provided by marketing. In every company should be set one particular employee or department responsible for all marketing activities (marketing analysis, marketing segmentation, marketing goals, marketing strategies, marketing mix). But this established marketing position or department should also be responsible for the coordination of all activities within a company related to the marketing (definition of business vision, mission and goals; product specification, production and delivery process determination, services, finance, etc.). And marketing work-position (or department) should be responsible also for the coordination of information about internal and external environment of a company from all business areas, its analysis and distribution to the right people in the right time.

Therefore, marketing should be also responsible for analysing of business situation. Marketing department, marketing employee or an employee involved in marketing activities in a company should coordinate flow of information within whole company, to collect it, to analyse it and to distribute it to the right people in the right time. In order to achieve this goal, it is necessary to create marketing team consisting of experts who are real professionals in their field, have knowledge, and who are willing and able to cooperate voluntarily with team members and support each other within a company (Žižlavský, Šmakalová, 2011).

A marketing orientation is connected with the long-term growth, stable, enhanced customer satisfaction and it is the result of marketing effectiveness (Webster, 1995). The marketing effectiveness is operationalized as merge of five components designed by Kotler (1977; 1997): customer philosophy, integrated marketing organization, adequate marketing information, strategic orientation, and operational efficiency. We were searching whether Slovak companies realize marketing activities, how they realize them and whether they use marketing information. Companies with strong marketing orientation usually apply strategic marketing (as a part of strategic management) and they process information about a market and competitors and provide top management with information background for strategic decisions (Milichovsky, Simberova, 2015).

2. Marketing Analysis and Marketing Information System

No company is closed system. Every company is in connection with its customers, partners, competitors. Business environment should be divided into two parts: the external and the internal one (Kotler, 2000; Kotler, Keller, 2012). Many factors influencing the performance of a company operate in business environment and each of them should be analysed thoroughly to know the situation on a market and in an industry. A company can define own strengths and weaknesses on the base of internal environment analysis and external environment analysis can reveal lurking opportunities and threats (Bartková, 2015).

Marketing analysis is related with results of company's activities, such as growth of the company in the long-term time period, provision of increased satisfaction to the customer, competitive advantage (Dunn, Norburn, Birley, 1994; Webster, 1993; Sin, Tse, 2000; Kok, Hillebrand, Biemans, 2003). Each one of these activities is realized within different department and all of them should be coordinated by marketing department or marketing employee.

Marketing analysis is the starting point for other marketing activities as planning and implementation and a company has to be staffed to be able to perform it (Appiah-Adu et al., 2001). Marketing analysis provide also the feedback regarding the outcomes of marketing efforts (Clark et al., 2006) and inputs for further planning and decision making (Slater and Narver, 1995; Morgan et al., 2002). Marketing decisions have to be supported by information that helps marketing managers to decide what, when and how much to produce (Chatzipanagioton, Vassilikopoulou, Siokos 2008) and how to compete on a market. Such necessary information is provided by the marketing information system.

2.1.   Competition Analysis

One of the most important factors influencing not only a company itself but also its supplying and distribution channel is competition (Banyte, Gudonaviciene, Grubys, 2011). Competition exerts pressure on entrepreneurs to react on changing customer needs and requirements, to innovate their production and to find substitutes in business environment (Milostná, Presová, 2005).

Companies are facing a need to rethink the fundaments of competition and to make a company different from competitors (Zostautiene, Daraskeviciute, 2009; Kotler, Armstrong, 2010). It involves precisely elaborated analysis of competition. Competition analysis includes defining the competitive arena, analysing the strategic group, and describing and evaluating each key competitor (Cravens, 2000).

Lehman and Winer (2007) suggest four main stages in competitor analysis. First stage is assessing competitors' current and future objectives. Competitor objectives are presented in company reports or press releases. Second stage is assessing the competitors' current strategies. Group of companies with similar strategy on particular target market is called strategic group (Kim, Mauborgne, 2009). The competitor presents its strategy by introducing a new product, using advertising media, by price level or distribution channels used. Here it is important to identify the competitor's market, chosen operation on this market and the marketing mix that is adapted to this market.

Third stage is assessing competitors' resources. These resources may not be fully deployed at present but can give further clues into how the competitor will move in the future, or how the competitor will react to threats (Ďaďo, Táborecká-Petrovičová, 2013).

Last stage is predicting competitor's future goals and strategies. This part of competitor analysis is the ultimate aim for determination of competitor response profile (Porter, 1980).

One of the goals of competitor analysis is to learn from it how to compete more effectively. There are three ways this can be done (Hooley, Saunders, Piercy, 2004).
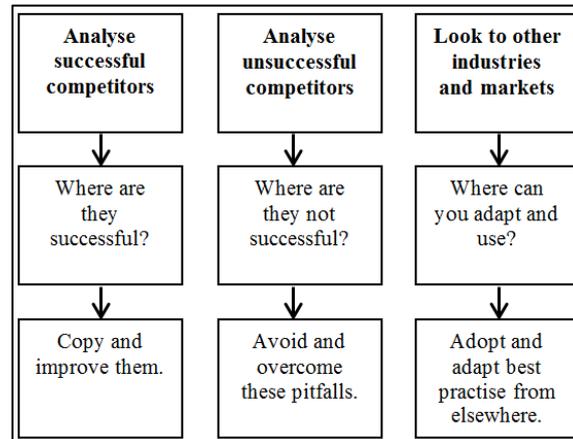
Figure 2: Possibilities for learning from competitors.

We can see that there is a lot of information about competition to be obtained, processed and analysed for better understanding competition. This information is allocated in many places in a company and it is the role of marketing to coordinate it, collect it, analyse it and distribute it for right decision-making process how to compete with other subjects on a market.

2.2. Marketing Information System

Correct information can help a company to act against its competition, especially if such company has built a strong marketing information system that is able to quickly convert knowledge into values for a customer (Allak, 2010). Marketing information system (Kotler et al., 2004) means people, equipment and methods to collect, sort, analyse, evaluate and distribute well-timed and exact information for managers' decisions. Conception of marketing information system is described in Figure 3.
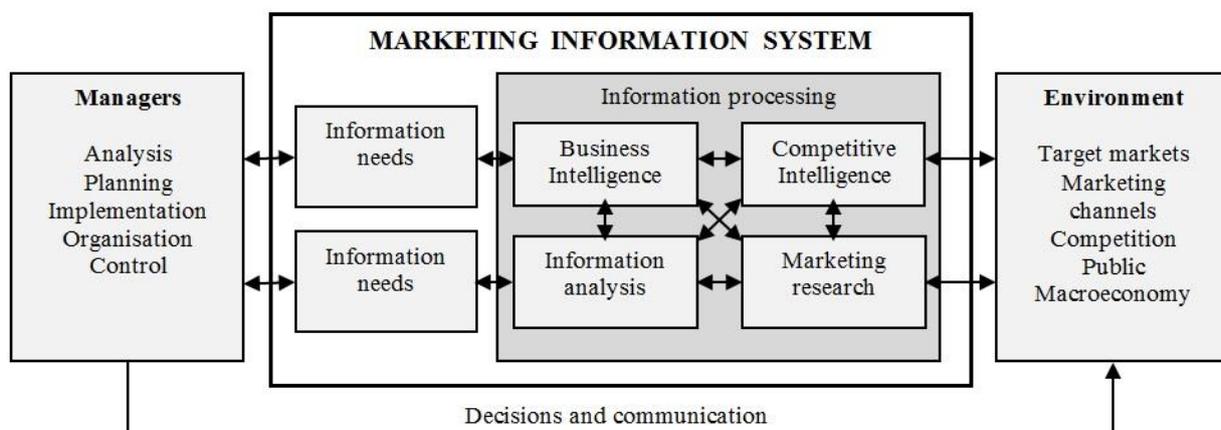
Figure 3: Marketing information system

Marketing information system (Kotler, Keller, 2012) begins and ends with managers and their information needs. It obtains required information from internal sources (Business Intelligence), from external environment (Competitive Intelligence can be understood as a part of marketing information system aimed on external environment) and from marketing research (Pomffyová, Bartková, 2016). According to literature sources, marketing information system is a concept that can make an interaction and include both internal and external attributes (Hooley et al., 2005; Barney, 2010; Calof, Wright, 2008; Lin, Chen, 2008; Vorhies, Morgan, 2005). It further processes, sorts, analyses and evaluates suitable information. At the end, it distributes information to managers in right form and right time to help them to make decisions. According to Fleisher et al. (2008), the broad capabilities of such information system ensure all activities from providing data to its using as a support of decision making process.

3. Methodology and Data

The research sample in which dependence of using marketing within a company and carrying on competition analysis was searched includes 189 companies and the research was done from September to December 2016. There were 9 agricultural companies, 6 extractive industry companies, 4 chemical industry companies, 22 engineering companies, 25 food industry companies, 16 building enterprises, 84 companies doing business in retail and wholesale business, accommodation and catering services, 5 enterprises from the area of traffic, communications and telecommunications, 9 companies from financial sector and 10 companies from the area of health service, educational system, culture, and state administration. Size of companies was determined by the number of employees – included in the set of respondents. From this point of view our research sample contained 73 micro-companies, 57 small companies, 34 middle sized companies and 25 big ones. The respondents who filled in the questionnaires were usually in a position of company owners or top management members (55%), middle management members of lower management ones (26%), administrative workers (15%), consultant (3%) or worked as marketers and copywriter, commercial premises operator or sales and accounting employee (1%).
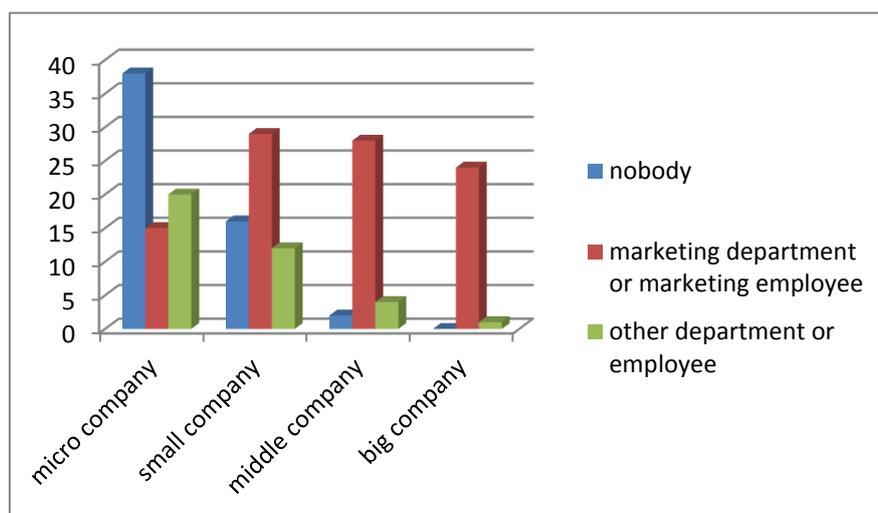
Figure 4: Who is realizing marketing activities in the companies?

According to our research, 52% of micro companies don't realize marketing intentionally. Only 48% of the micro companies realize marketing activities (20% within marketing department or marketing position and 28% within other departments and positions – mostly as the owner or the top manager).

Within the category of small companies – 28% don't realize marketing, 51% realize marketing activities within marketing department or position and 21% do it within other positions. Only 2 middle companies (6%) don't realize marketing activities, 82% do it within marketing positions and 12% within other ones. All 25 big companies realize marketing, only one of them within other than marketing department or position. We decided to test our assumption that the companies realizing marketing have better attitude to competition analysis than companies without marketing activities via Two-Sample Kolmogorov-Smirnov test. We verified hypothesis H0 assuming that the respondents from the companies realizing marketing are more convinced that they have enough information about competition than others. It should be checked if the found coefficient is higher than 0.05. We used the program SPSS for the evaluation of the results. According to the calculation the coefficient $α = 1 > 0.05$ so we can confirm our hypothesis of correlation between realizing marketing within the company and persuasion of the respondents about sufficiency of information about competition.

4. Results

We divided all companies into three categories. So much that 30% of all companies don't realize marketing activities (from this amount is 68% of micro, 29% of small and 3% of middle companies). Other 51% of the companies have established marketing department or marketing position (16% of micro, 30% of small, 29% of middle and 25% of big companies). 19% of the companies realize marketing activities within other department or work position, most often the owner or the higher manager or the sales employee do it (54% in micro, 32% in small, 11% in middle and 3% in big companies). The goal of our research was to compare the companies doing marketing activities and the companies that don't do it, and their approach to competition analysis.

According to our research, the companies realizing marketing activities find and use information about competition more often (more on daily, weekly or monthly base) than the companies that don't do marketing (more on half-yearly and yearly base or never). The companies with established marketing department or marketing work position use internet, human resources, and reports and audits as source of information, then printed media, business documents, electronic communication, and after that TV or radio news in the sixth place. The companies without such department or position but realizing marketing use also internet and human resources as source of information in the first place, then printed media, business documentation, and reports and audits and TV and radio news are in the fifth place. On the other hand, the companies without marketing activities use internet and human resources but TV and radio news as a source of information are in the third place.

Within the companies with marketing department or position is information summarised by particular employee (the owner or top manager mostly in micro and small companies), by particular functional department individually and within marketing activities. In the companies without such department or position is information summarised also by one particular person (mostly owner) and functional department, but instead of marketing they use automatic systems. But in the companies without marketing

activities was answer that nobody summarise information more often that in the companies realizing marketing (within marketing position or within another one).

The companies without marketing activities also carry out competition analysis more on half-yearly and yearly base or never than the companies with marketing. The companies with established marketing position use financial analysis in the first place, profile analysis in the second place and relationship analysis in the third place. The companies without established marketing positions but realizing marketing carry out financial analysis, profile analysis and answer "no analysis" was in the third place. But in companies without marketing at all the answer "no analysis" was in the second place after financial analysis.

Within 43% of the companies with marketing positions is also marketing department responsible for carrying on competition analysis. In other 34% of such companies is responsible for competition analysis every functional department for its area, what is a mistake because marketing department (work position) should collect all information and carry on whole analysis. In the category of the companies doing marketing without established department – in 54% of the companies top management is responsible for competition analysis, in 19% it is particular independent employee and in 16% is responsible every functional department individually for its own area. Results from the category of the companies without any marketing activities are interesting – in 43% of such companies is top management responsible for competition analysis, but in the second place in 27% of these companies is nobody responsible.

In the companies with established marketing work-positions, these employees are responsible for the work with information about competition. In the companies without established such position but providing marketing activities, there are some particular employees (owner usually in micro and small companies) responsible for it. But in the companies without any marketing is nobody responsible for it in most often cases (66%).

In all companies top management is mostly using information about competition and it is also making decisions in this area, but in the companies without marketing activities was the second most often answer – "nobody". Also according to this answers we can see dependence between marketing orientation of the companies and using information about competition and providing competition analysis.

We decided to verify our assumption about correlation between rate of using marketing within the company and its decision-making process based on information about competition via Friedman test of preferences. Results from this test showed final order of the subject of decision-making process based on the value of the mean rank. The results are in the table 1.

Table 1: Mean ranks in Friedman test.

Who in your company makes decisions based on acquired information about competition?	Whole sample	Companies realizing marketing	Companies without marketing
top management	5.06	5.25	4.78
individual employee	3.48	3.64	3.26
each functional area individually	3.25	3.32	3.14
marketing employees	3.10	3.02	3.22
nobody	3.06	2.86	3.34
other	3.06	2.92	3.26

According to the results from statistic calculations we can see that the answer that nobody uses information about competition for the decision-making process is the sec-

ond most often in the sample of the companies without marketing activities compared to the whole sample or the sample of the companies realizing marketing where this answer is in the last place.

5. Discussion and Conclusions

According to the research, there is dependence between realizing marketing activities within a company and carrying on competition analysis. We divided the companies within our research sample into three categories: the companies with established marketing department or work position, the companies realizing marketing activities without such department or work position and the companies where nobody does marketing.

According to the results of our research the companies without realizing marketing work with information about competition and carry on competition analysis less often than the companies using marketing. But we discovered a mistake also within the category of the companies with established marketing positions. In 34% of these companies marketing department (work position) is not responsible for competition analysis but every functional area is. That is the problem, because functional areas should obtain information, but the person responsible for marketing should collect information from all functional areas, elaborate it, appraise it and distribute it to managers for decision-making process.

Therefore, it is very important to nominate somebody in a company to be responsible for active obtaining information, data collecting from all business areas and departments, and finally analysing and distributing information about competition. Such inter-functionality is one of the three marks of business marketing orientation.

There is also problem with using information about competition from competition analysis for support of decision-making process within the companies without marketing activities. In 20% of these companies nobody uses obtained information and in 14% of these companies nobody makes decisions according to the information. It is very important to use the information to make decisions according to the results of competition analysis to keep a good track of competition environment and to gain good competition position and competition advantage on a market.

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Influence of internal factors on the growth of gazelles in selected service sectors in Slovakia

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Abstract

A lot attention in the existing literature has been devoted to the issue of growth and performance of the companies, but there is a noticeable lack of research oriented on high-growth enterprises – gazelles. Moreover, literature in this area is aimed primarily at large enterprises, while research of fast-growing small companies is lacking. This article explores the internal factors of high growth small and medium-sized enterprises in the services sector. Based on the questionnaire survey the internal factors of high growth were identified and examined a sample of 65 companies. The results of our analysis suggest that growth of gazelles is determined by the diversity of internal factors.

Keywords: SMEs, fast growing companies, gazelles, services sector

JEL Code: L80

1. Introduction

According to foreign studies and experience, the creation of many new jobs carried out in considerably small group of small and medium sized enterprises. Authors Birch and Medoff (1994) found that in the United States in the period from 1988 to 1992, half of all new jobs generated through only four percent of businesses. Schreyer (2000) by examining data from six OECD countries came to the same conclusions. It can therefore be concluded that the new jobs are in greater volumes generated in small and / or young dynamically developing companies.

These assumptions have prompted us to pay more attention on the existence of gazelles in the economy and to the factors fostering their growth. Many publications are devoted to external growth drivers of these companies, but internal factors of growth

are an area that is not well explored. The aim of this paper is to identify the most important internal factors of growth gazelles operating in selected service sectors in the Slovak Republic.

2. Literature review

In international publications, we can find various approaches for the definition and typical characteristics of gazelles. Henrekson and Johanson (2010) defines them as significantly smaller and younger companies from the average. From the studies and surveys focusing on OECD countries, is clear that their share is higher in the emerging knowledge and technology-intensive sectors, but there are present also other sectors (eg. Bishop et al., 2009; Acs and Mueller, 2008). These companies invest more money on research and development. According to a study conducted by Schreyer (2000), up to 70% Spanish manufacturing gazelle spend money on research and development, comparing to the group of all enterprises, where this proportion was only 50%.

Publications devoted to the dynamics of firms (Birch, 1981; Acs and Mueller 2008; Henrekson and Johanson, 2010) distinguishes three types of businesses:
- gazelles – represents high-growth enterprises,
- elephants – represents a few large companies that still employ a large number of people but their contribution to employment growth is low,
- mices – newly created small enterprises, which is growing at a slow pace.

As already stated, the definition of gazelles in the various currently available publications differs. Indicators such as number of employees, market share, profitability and sales volume are most commonly used variables to identify and count of gazelles.

As a result of this diversity of approach in the definition of gazelles, the OECD in 2007 adopted a definition under which a gazelles are considered businesses, whose average annual growth for three consecutive years exceeds 20% and the beginning of the period had at least 10 employees. Growth can be measured by the number of staff or volume of turnover (OECD, 2010).

In recent decades, researchers have identified a number of difficult "measurable" factors that may affect the growth of enterprises. It has been shown that rapidly growing firms, especially the highly successful small and medium-sized enterprises, can attributed their success to the human factor, especially to the personality of owners and managers and the created and adopted system of management by them (Longenecker et al., 1989; Davidsson et al., 2006). Many empirical studies (eg. Davidsson et al., 2006; Auerswald and Bozkya, 2008) identified that many entrepreneurs reach success mainly due owns creative abilities, purposefulness, networking and management capabilities.

Diez-Martin et al. (2013) stated that enterprises which carry out their activity in accordance with the moral parameters of society can easier achieve business success. This is clear evidence that the ethical dimension of business resized to socially responsible activity has a positive impact on business performance.

According the European Commission (2016) Corporate Social Responsibility (CSR) brings advantages for businesses in the area of risk management, cost savings, access to capital, customer relations, personnel management, ability to innovate. The professional public was led to believe that the behavior of firms in accordance with the principles of CSR brings business profits mainly in the form of increases in the value of intangible assets such as. corporate reputation, brand value, human capital, and others. It can also lead to cost savings in connection with low staff turnover or environmental measures

(Steinerova and Makovski, 2008). The application of concepts and principles of social responsibility we consider as company´s internal factor of growth.

In domestic literature is mapping the existence of gazelles and specifics rather poorly represented. Recently published works by Kubičková et al. (2016), Čukanová and Fúrová (2016) and the team of authors Krošláková, Kubičková, Jurkovičová and Kubinyi (2015) highlighted the existence and growing importance of gazelles in the services sector. On the other hand, to the issue of internal factors and their importance for the growth of gazelles in the service sector is not yet given special attention.

3. Methodology and Data

Basic methodology of carry out this study consisted of the following:
- Collection and processing of information on the factors of growth of fast-growing SMEs – gazelles, with special emphasis on identifying internal factors
- Implementation of primary research on a sample of Slovak gazelles operating in selected service sectors
- Analysis of the results and the identification of important internal factors that influence the growth of gazelles in selected service sectors in Slovakia.

In order to achieve the goal stated above we used classical scientific methods as numerical and verbal analysis, synthesis, comparison, deduction, abstraction, concretization and generalization.

Those methods we applied while working with theoretical knowledge of various domestic and foreign sources. Secondary data came mainly from ProQuest databases, EBSCO Host, Scopus, Web of Knowledge, OECD, Eurostat, the Statistical Office of the Slovak Republic. During the research, we studied, compared, analyzed different approaches to the issue of the existence of gazelles in the economy. We synthesized studied phenomena and the relationships between them. Through the method of deduction, available theoretical resources we draw up specific knowledge relating to the internal growth factors of gazelles.

We used primary research to collect data from Slovak gazelles. In the survey the method of standardized questionnaires was used.

Table 1: Basic characteristics of primary research

Criteria	Entry
Source of basic data set	Statistical office of Slovak Republic
The number of gazelles interviewed	198
Number of accepted questionnaires	65
Period of data collection	11/2015 – 03/2016
Data collection method	online interviewing (CAWI)
Data evaluation	Microsoft Excel

The parent company database, retrieved from Statistical office of Slovak Republic, consisted of a group of 198 service companies meeting the criteria gazelle. Finally, questionnaire was completed by 65 subjects in the structure stated below (table 2). Better return rate was prohibited due the following facts: part of gazelles was death, respectively went into liquidation, they changed their business name, had incorrectly stated contacts, respectively we received outdated contacts. The barrier was also unwillingness to answer the questions.

Table 2: SK-NACE distribution of gazelles in data set

Value label	Tourism frequency	Business services frequency	Percent of total
49390 – Other passenger land transport	7		10.77
51100 – Passenger air transport	1		1.54
55909 – Other accommodation	5		7.69
56300 – Beverage serving activities	9		13.85
62010 – Computer programming activities		4	6.15
62090 – Other information technology and computer service activities		3	4.62
63110 – Data processing, hosting and related activities		5	7.69
63990 – Other information service activities		3	4.62
70100 – Activities of head offices		6	9.23
70220 – Business and other management consultancy activities		10	15.38
72190 – Other research and experimental development on natural sciences and engineering		3	4.62
73200 – Market research and public opinion polling		6	9.23
79110 – Travel agency activities	1		1.54
93110 – Operation of sports facilities	2		3.08
Total	25	40	100,00

In the process of processing the data obtained from the answers of respondents we analysed the data and evaluate the results. Our results were compared with results of other studies that focused on the issues under consideration.

4. Results

Structure of the sample in terms of business ownership was as follows: domestic gazelles represented almost 68% of all gazelles. Partial foreign capital was identified in more than 23% of gazelles. The 9.23% of gazelles had foreign ownership, and these gazelles were active in business services. The gazelles in tourism were 96% of enterprises with only domestic capital and 4% had foreign participation. In the sector of business services was domestic only 50% and foreign participation declared 35% of respondents.

In the surveyed sample were dominated gazelles (61.54%), where management of the company was realized the owner himself (Table 3). The proportion of gazelles in tourism, where the owners participate on corporate governance, was 68% and in enterprises of business services represent these gazelles 57.50% of the total number of enterprises in the relevant sectors.

Table 3: Participation of the owners on corporate governance

Values	Tourism gazelles		Business Services gazelles		Total gazelles	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Yes	17	68.00%	23	57.50%	40	61.54%
No	8	32.00%	17	42.50%	25	38.46%

Table 4: The share of university graduates in the total number of employees

Values	Average (in %)
Tourism gazelles	21.11
Business services gazelles	61.52
Total gazelles	48.32

In our research focused on gazelles the share of university educated employees in total number of employees (Table 4) shows on the fact, that in the enterprises of business services is significantly higher proportion (average 61.52%) of employees with higher qualifications than in tourism enterprises, where average was only 21.11% employees with university education. This difference follows from essential nature of activities and confirms the general known fact that the sector of business services is characterized by higher knowledge intensity as activities in tourism.

Representatives of gazelle marked as the most important internal factor of business growth (Table 5) the level of qualification of employees (22.22%). This factor was significantly discovered in responses of enterprises operating in the business services (19.44%). By contrast, in the tourism sector is motivation of the company owner / leader / manager considered (11.11%) as the most important factor.

As the next most important factor from all responses effective management and correctly adjusted production processes (both with 16.67% of enterprises) were highlighted. These factors were also preferred mostly by the representatives of enterprises from business services sector.

Functional and well-constructed organizational structure was the most important factor for 11.11% of respondents. The significance of this factor was equally rated by tourism enterprises and business services gazelles too.

Corporate culture (8.33%), employee motivation (5.56%) and teamwork (2.78%) were picked up as most important internal growth factor only by the representatives of business services gazelles.

Table 5: The most important internal factor of growth according to representatives of gazelles

Values	Tourism gazelles	Business services gazelles	Total gazelles
Qualification of employees	2.78%	19.44%	22.22%
Motivation of owner/leader/manager	11.11%	5.56%	16.67%
Production processes	2.78%	13.89%	16.67%
Effective management	2.78%	13.89%	16.67%
Organizational structure	5.56%	5.56%	11.11%
Corporate culture	0.00%	8.33%	8.33%
Employee motivation	0.00%	5.56%	5.56%
Teamwork	0.00%	2.78%	2.78%

If we look at the preference in the style of company management (see Table 6) we can see closed management style is preferred – 60% of all gazelles in the whole data set. More significant this style prevails in enterprises operating in the tourism sector, where 84% of respondents prefer this method of business management. In companies of business services dominates the open management style (55%), i.e. all employees have access to management and may influence the direction of the company future.

Table 6: Preferred style of management in gazelle enterprises

Values	Tourism gazelles	Business Services gazelles	Total gazelles
Open management – all the staff can participate on the management	16.00%	55.00%	40.00%
Closed management – solely competent staff participate on the management	84.00%	45.00%	60.00%

A comprehensive view of gazelle dynamism factors of growth in selected service sectors can be obtained from cross-analyses (Table 7). We focus on the preferred management style, participation of business owners in management and average growth of gazelle expressed by increasing number of employee during the period of time of their existence as gazelles.

Based on the research results it can be stated that an open style of management together with the participation of the owner's on management is a major factor to dynamism growth of gazelles in tourism sector. On the contrary, if gazelles operating in the business services sector, than the more dynamism factor is closed management style with participation of business owners on management.

Table 7: Management style, owner's participation on management and average employment growth (in %) cross table

Values	Tourism gazelles			Business services gazelles		
	participate	not participate	Total	participate	not participate	Total
Open management	**441.72**	109.09	358.56	191.79	166.35	183.76
Closed management	259.51	120.00	245.55	**341.91**	126.99	265.15
Total	305.06	114.55	277.84	253.20	148.45	218.29

Three quarters of companies from our data set (see Table 8) are considered as a socially responsible company – they introducing a policy of corporate social responsibility, evaluating the level of social responsibility and training employees in this area. A quarter of companies from our data set are not considered a socially responsible company.

Table 8: The share of socially responsible companies – gazelles

Values	Tourism gazelles	Business services gazelles	Total gazelles
The company has a policy of corporate social responsibility	23.1%	52.6%	45.1%
The company trains employees in area of CSR	30.8%	31.6%	31.4%
The company evaluates the level of corporate social responsibility	15.4%	18.4%	17.6%
The company is not considered to be socially responsible	30.8%	23.7%	25.5%

Today, CSR activities globally shows 73% of companies. KPMG survey (2015) revealed considerable differences between Western European countries (CSR reports 79% of the 100 largest companies) and Eastern European countries (61%). In Slovakia reports their CSR activities 48% of the largest companies. In our data set up to 74.5% of companies stated that has a corporate social responsibility policy and train staff in this area, which is above the national average. In a group of KPMG performs better large businesses. In our survey a significant correlation between the size of the company and

the implementation of CSR was not evidence. If we focus on the areas and concrete CSR activities, the situation is even more favourable for the gazelles.

Table 9: Activities in the field of working environment

Values	Tourism gazelles	Business services gazelles	Total gazelles
The company deals with the issue of gender equality	7.1%	13.2%	11.5%
The company employs people with disabilities	100.0%	31.6%	30.8%
The company regularly trains employees	57.1%	65.8%	63.5%
The company conducted employee satisfaction surveys	42.9%	10.5%	19.2%
The company evaluates employees' complaints	50.0%	21.1%	28.8%
The company carries out the evaluation of staff performance	57.1%	55.3%	55.8%
The company rewards employees according to performance	92.9%	71.1%	76.9%
The company rewards employees according to their loyalty	21.4%	5.3%	9.6%
The company encourages foreign staff mobility	—	34.2%	25.0%
The company considers the loyal work team as a key factor	28.6%	44.7%	40.4%

A high proportion of companies that are active in the working environment, employ people with disabilities (in case of tourism companies indicated that 100% of gazelles), evaluates complaints of employees, employee performance and rewards according to performance (in the case of tourism enterprises to 92.9% gazelles).

Extremely interesting could be working with local communities, which in final results lead to socio-economic and social benefits as well as benefits to the company. Despite the fact that 60 % of companies not cooperating with the local community, the level of cooperation surprised us in a positive way. More than a one third of enterprises financially supports community projects and promotes corporate volunteering. As positive effect we consider cooperation with the local community foundation, which indicated 31.8 % of the companies. Community foundation represent the type / form of foundation, which is important in terms of regional development and construction of social and economic cohesion in the region. The survey results provide an opportunity to promote development of cooperation with local communities such part of the public administration as well as the third sector.

Table 10: Gazelles cooperation with the local community

Values	Tourism gazelles	Business services gazelles	Total ga- zelles
The company financially supports community projects	33.3%	38.5%	36.4%
The company supports corporate volunteering	33.3%	38.5%	36.4%
The company works with local community foundation	22.2%	38.5%	31.8%
The company develops other activities	44.4%	7.7%	22.7%

5. Discussion and Conclusions

If we focus attention on existing surveys aiming at growth of businesses than the differences resulting from sectoral structure show us interesting facts. Jaumandreu (2003) researched Spanish enterprises in the period 1998 to 2000 and found that while busi-

nesses in the manufacturing industry grew by an average of 10% in service sector companies showed an average growth of level 12%.

Cella & Morrone (2008) during the research of Italian high-growing enterprises came to the conclusion that the same number of employees differently influences the growth of businesses operating in different sectors of the economy. It can be deduced that an important factor supporting the growth of businesses is rather a qualification and motivation of employees and ability of management to organize work in more effective way.

The research results of selected internal factors of growth in Slovak gazelles operating in service sectors have pointed out that there are differences, in the factors dynamics the growth of these enterprises, resulting from the sectoral classification. Sector of business services featuring higher knowledge intensity, which confirmed the results of our study. In these gazelles the representation of skilled workforce is higher. The representatives of those firms identified the qualification of employees as most important factor for achieving business growth. Representatives of gazelles in tourism sector, in our sample, identified motivation and involvement of the business owner / leader / manager as the most important factor of growth. Participation of business owners in the management and management style has a significant impact on the growth of gazelles in both sectors. We can say that the involvement of the company owners, their personal characteristics and traits and dedication to achieving excellent results with appropriate management style in relation to the proper structure and quality employees are the most important internal factors of business growth of Slovak gazelles operating in selected service sectors.

The future research in this area should be focused on a deeper understanding of the management characteristics and leadership in gazelle's enterprises.

Based on the analysis of research results can be assumed that the implementation of CSR has an impact on business growth due to the high shares of answers suggested socially responsible behaviour of gazelles. Almost half of them have established policies of social responsibility. Three quarters are considered to be socially responsible company, with wide range of CSR activities in various areas.

We consider CSR as an internal factor, but its presence encourages external factors. It is difficult to separate whether the company growth, increased demand and higher turnover is a consequence of presented and the population / customers, business partners or public and private institutions perceived social responsibility or other factors.

It would be interesting in further research to focus on the specification and measurement of growth indicators due to CSR. This could be support for socially responsible behaviour, which can lead to socio-economic social benefit.

Our focus was only on internal factors of growth because the external factors are the same for the whole business community. Therefore, the success and the growth of the company is mostly affected by the internal environment and factors. The research of Jim Collins (2001) also showed us that fact.

Although the study has reached its aim, there were some limitations. Because of the time limit to collect data and problems encountered in their collection, the sample size was only 65 respondents. On the other hand, if we look at the method of data collection (CAWI) the 32.83 % return rate can be considered as success. For this reason, the study results cannot be generalized to the entire services sector and other countries. They are valid only in Slovakia. More detailed and deeper analysis should be carried out by different research method, e.g. focus group. It was the first research study of the internal factors fostering the growth of the gazelle SMEs operating in selected service sectors in

Slovakia and the results show us interesting findings that can be better understand and explained in future researches.

Acknowledgements

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Technical efficiency of health care systems in CEE countries – DEA approach

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Abstract

The aim of presented research is to analyse the technical efficiency of health care systems in selected countries of Central and Eastern Europe (CEE). The following countries have been selected: Czech Republic, Estonia, Lithuania, Latvia, Poland, Slovakia, Slovenia, Hungary. We've set the following hypotheses: (*H1) the relative efficiency of health care systems in CEE countries improved during the analyzed period; (H2) differences in observed levels of relative efficiency shrunk during analyzed period.* Both hypotheses have been proven – we have found, that the effectiveness of health care system not only improved, but we can observe lower differentiation of relative efficiency in CEE countries. We have applied CCR DEA model.

Keywords: health care, effectiveness, DEA

JEL Code: I11, H40, C14

1. Introduction

Health costs show a continuous upward trend, primarily in developed countries. Reasons for this are numerous: technological progress, demographic change, medicalisation of everyday life, as well as rising social expectations. Regardless of a adopted model of health care system, the consumption of health care resources – both financial and non-

financial, should be rationalized, in order to achieve higher possible results. Therefore, the efficiency of health care system is of particular importance.

Efficiency in health care can be assessed both at the micro-level (e.g., assessment of the efficiency of health care units – hospitals, hospital's wards), as well as on the macro level, including international comparisons. Comparison of the effectiveness at international level allow to identify good practices and promote solutions, that contribute to a better use of scarce resources. Such studies are often carried out under the aegis of WHO or OECD.

The World Health Report 2000 defines three goals of the health system – to improve health, to be responsive to the legitimate demands of the population, and to lower the risk of medical debt by fairly distribution of financial burden (Evans et al., 2000). According to that, Murray and Frenk (1999) proposed a concept, which allow to compare the efficiency of different health care system by comparing obtained results (goals) and inputs which are necessary to produce a given goals (compare: Bem, Ucieklak-Jeż & Prędkiewicz, 2014). It should be also noted, that the efficiency assessment, in the case of health care system, is relatively difficult – some gains of health care system can be achieved both from health care interventions, as well as from policies in other sectors (McKee, 2001) and health outcomes are affected by diversified factors outside of health care (Gearhart, 2016).

Evan et al. (2001) summarized, that two strategies could be used for estimating the maximum productivity/efficiency. The first approach required identifying of costs and outcomes for medical intervention, in order to choose those that maximise health gains, what is almost impossible when we deal with macro-level analysis[1]. The second approach estimates the maximum effects from a basket of observed inputs and outcomes, but, according to Evan, requires the estimation of the relation between outcomes (population health) and specified inputs. The analyse of the efficiency of health care systems is also difficult due to the large number of potential inputs and outputs (Kujawska, 2014) and selection of variables influence, actually, the results of the study.

Literature review doesn't bring clear premises, concerning indicators that should be used as output variables in studies of the effectiveness of health systems (Gearhart, 2016). In order to assess the health care system efficiency it is crucial to choose health indicators, usually on a population's level, usually there are: death cases, years of life lost, morbidity days or quality of life (Yang, 2016), (Ucieklak-Jeż & Bem, 2014). This create the problem of undesirable outputs. In many studies those undesirable outputs were transformed in desirable outputs (e.g. infant mortality into survival rate) (Cheng & Zervopoulos, 2014). Hollingsworth and Wildman, in order to avoid this problem, composed desirable and undesirable outputs into an aggregated health index (Hollingsworth and Wildman, 2003).

The aim of presented research is to analyse the technical efficiency of health care systems, in selected countries of Central and Eastern Europe (CEE). The following countries have been selected: Czech Republic, Estonia, Lithuania, Latvia, Poland, Slovakia, Slovenia, Hungary.

We've set the following hypotheses:
H1: the relative efficiency of health care systems in CEE countries improved during the analyzed period;
H2: differences in observed levels of relative efficiency shrunk during analyzed period.

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[1] This approach can be successfully adopted on a micro-level, using QALY method

In this study we have employed Data Envelopment Analysis (DEA). DEA method is a non-parametric tool, which allows linear classification of analysed objects. Firstly proposed by Charnes et al. (1984) and went through many modifications (Seiford, 1996). DEA measures the relative efficiency by its relative distance from the frontier (Chilingerian & Sherman, 1996). This frontier groups objects characterized by the highest relative efficiency. DEA measures technical efficiency – this efficiency is higher when more output is produced from a given amount of incomes.

The relative freedom of shaping the input and output variables, corresponds with multiple input-output nature of health care provision (Hollingsworth, Dawson & Maniadakis, 1999). As a result, DEA is widely used in studies assessing the effectiveness of health care and can be applied both on micro and macro level (Silva et al., 2017). Finally, 8,65% of papers presenting DEA applications analyse health care industry, among all – the efficiency of hospital performance or primary care services (Liu et al., 2013).

In this study we have analysed time series from the years 1995–2014 from 8 CEE countries (Czech Republic, Estonia, Lithuania, Latvia, Poland, Slovakia, Slovenia, Hungary). Data were obtained from WHO Database and OECD Health Data Database. We used DEA-Excel Solver 2014 (https://webhosting.vse.cz/jablon/dea.htm).

2. Methodology and Data

DEA method is characterised by one important advantage – DEA is data-based, what means, that it doesn't require knowledge of functional dependencies, or weights, that are assigned to the inputs and effects (Kujawska, 2014). DEA method was created as a tool to measure the efficiency of organizations which not necessarily aimed to generate profit (Hady & Leśniowska, 2014). This method should be applied, primarily, in research characterized by small potential measurement error (Hollingsworth, Dawson & Maniadakis, 1999); (Hollingsworth, 2003).

DEA assesses relative efficiency of decision making units (DMUs) using multiple inputs and multiple outputs. Evaluation of the efficiency can be described as the ability to transfer inputs into outputs (outcomes) (Carrillo & Jorge, 2016). Inefficiency is defined as non-zero slacks – there is no distinction between "technical/pure" and "mix" inefficiency (Wen et al., 2015).

A major advantage of DEA is the ability to incorporate some environmental variables into the analysis. These variables reflect the factors beyond the DMUs, but affecting its efficiency (Nazarko et al., 2008). These variables can be incorporated directly, or using two-stage DEA, where in the second stage several environmental variables (like income, alcohol consumption, ect.) were included using Tobit regression analysis (Moran & Jacobs, 2003), (Samut & Cafri, 2016). Environment variables can have different nature: a level of education, a number of calories intake, CO_2 emissions (Rój, 2011).

DEA method is insensitive to outliers, but sensitive to the selection of decision making units (DMUs). The research sample should be homogeneous, grouping units characterised by very similar economic situation. Sample heterogeneity plays especially important role in case of cross-country comparisons (Gearhart, 2016). According to this premise we've decided to study the efficiency of health care systems in countries of Central and Eastern Europe (CEE). Initially our research sample included the following countries: Belarus, Bulgaria, Czech Republic, Estonia, Lithuania, Latvia, Ukraine, Poland, Slovakia, Slovenia, Croatia, Romania. In the absence of all required data, finally the following countries have been excluded: Belarus, Bulgaria, Croatia, Ukraine, Romania. All

those countries are characterized by very similar health care system's construction. Health system can be classified as Etatist Social Health Insurance – a form of social health insurance strongly influenced by the state (Czech Republic, Poland, Hungary, Slovakia), except of Slovenia, very a health care sector in more privatized – Social Health Insurance (Böhm et al., 2013), (Michalski 2016b), (Ucieklak-Jeż, 2012a).

In this study we have initially analyzed time series from the years 1995–2014 – finally it was decided to select the following time points: 1995, 2000, 2005, 2010, 2014, which created a matrix of observations in the country-year scheme (table 1).

Table 1: Characteristic of variables

Variable		Model	Characteristic	Source
(1)	Daily tobacco smokers – aged 15 and over (%)	input	lifestyle	WHO
(2)	Alcohol consumption – aged 15 and over (liters/capita)	input	lifestyle	WHO
(3)	Hospital beds per 100,000 inhabitants	input	resources	OECD Health Data
(4)	Professionally active physicians* per 1,000 inhabitants	input	resources	OECD Health Data
(5)	Practicing nurses per 1,000 inhabitants	input	resources	OECD Health Data
(6)	Current expenditure on health (all financing schemes) in % GDP	input	resources	OECD Health Data
(7)	Population aged 65+ (%)	input	demographic	WHO
(8)	Life expectancy (LE) at birth	output	health state	WHO
(9)	Life expectancy (LE) at 65	output	health state	
(10)	Reduction of life expectancy through death before 65 year	output	health state	WHO
(11)	Infant mortality	output	health state	OECD

* for Czech Republic, Hungary and Poland – Practising physicians per 1,000 inhabitants

Source: own study

Input variables represent primarily health care resources of various type: financial (6), human (4), (5) and infrastructure (3) (table 1). We have also included several external variables, which can't be controlled by DMUs, but strongly affect their activity and effectiveness (Ucieklak-Jeż & Bem 2014b), (Ucieklak-Jeż et al., 2015). These are of two types:

- demographic – in order to demonstrate an aging trend, a population was divided into several age categories – usually there are 0–14, 15–64, 65+. Based on Yang (2016), we can assume, that age group 65+ (7) – consumes a huge part of health resources (Ucieklak-Jeż, 2013);
- lifestyle – tobacco smoking and alcohol consumption are still un important health problem in CEE countries – according to this, those variables (1),(2) have been built into the analysis.

Based on literature review, we have chosen 4 output variables, characterizing population's state of health (7),(8),(9) (Ryć & Skrzypczak, 2011), (Michalski, 2016a) (Ucieklak-Jeż, 2011), (Cheng & Zervopoulos, 2014). Among them, life expectancy at the age of 65 is of special importance, according to the fact, that this age group consumes an important part of health care resources.

Part of variables (destimulants – 1, 2, 7, 10, 11) have been changed into stimulants using transformation $x_{stim} := 100 - x_{destim}$. (or $1000 - x_{destim}$ for 11).

Due to the fact that DMUs are countries, we've decide to create a CCR model, assuming constant economies of scale. Those models can be input-oriented or output oriented. According to the data structure, especially outputs (like Life Expectancy) we've been forced to build input-oriented model.

3. Results

We have estimated several models, using different outcome measures. Our models have shown, that average efficiency of health system was steadily increasing (table 2, 3, 4, 6). This effect can be seen for all outputs. Not only the average efficiency has been growing, also differences between countries measured by standard deviation of efficiency score were smaller.

Table 2: Country-year health system efficiency for output – life expectancy at birth (LE_0)

LE_0	1995	2000	2005	2010	2015	**Average**
Czech Republic	98.1%	100.0%	99.5%	99.9%	100.0%	**99.5%**
Estonia	88.1%	95.8%	100.0%	99.0%	100.0%	**96.6%**
Hungary	96.1%	94.8%	96.8%	96.0%	97.7%	**96.3%**
Latvia	90.5%	99.2%	92.6%	96.8%	100.0%	**95.8%**
Lithuania	89.1%	94.2%	94.3%	94.5%	99.9%	**94.4%**
Poland	100.0%	100.0%	100.0%	99.4%	100.0%	**99.9%**
Slovakia	97.3%	98.3%	95.7%	95.5%	98.3%	**97.0%**
Slovenia	100.0%	99.9%	99.7%	100.0%	100.0%	**99.9%**
Average	**94.9%**	**97.8%**	**97.3%**	**97.6%**	**99.5%**	
S. dev.	**4.9%**	**2.5%**	**2.9%**	**2.2%**	**0.9%**	

There are 3 high efficient countries in every year: Czech Republic (except 1995), Slovenia and Poland. The last efficient countries change every year and we couldn't point an ever-inefficient country (Table 2, Figure 1).
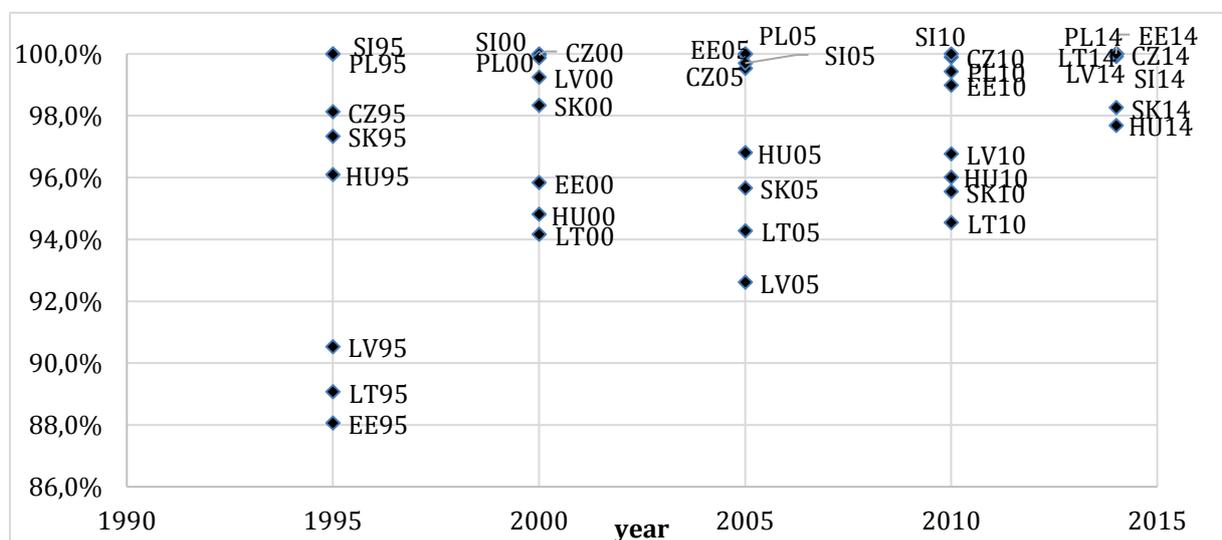
Figure 2: Health system efficiency – LE_0-model

For first estimated model we have chosen Life Expectancy at birth (LE_0) as the measure of outcomes. Almost that same results have been obtained for Life Expectancy at 65 (LE_{65} model) (Table 3).

Table 3: Country-year health system efficiency for output – life expectancy at 65

LE$_{65}$	1995	2000	2005	2010	2015	**Average**
Czech Republic	95.9%	100.0%	97.0%	97.2%	98.2%	**97.7%**
Estonia	90.9%	95.6%	100.0%	98.9%	100.0%	**97.1%**
Hungary	93.0%	95.5%	95.0%	95.5%	95.7%	**95.0%**
Latvia	89.2%	93.5%	93.8%	94.3%	100.0%	**94.2%**
Lithuania	90.6%	91.9%	92.4%	91.4%	98.3%	**92.9%**
Poland	99.9%	100.0%	100.0%	100.0%	100.0%	**100.0%**
Slovakia	93.2%	93.2%	92.6%	94.4%	98.5%	**94.4%**
Slovenia	97.8%	97.3%	96.1%	100.0%	100.0%	**98.3%**
Average	**93.8%**	**95.9%**	**95.9%**	**96.5%**	**98.8%**	
S. dev	**3.8%**	**3.0%**	**3.0%**	**3.1%**	**1.5%**	

We have achieved similar results also for single output measured by infant mortality, reduction of life expectancy before age 65 (not presented in this paper). In multi-output model, in which infant mortality and reduction of life expectancy have been included, we have obtained higher average efficiency, which is an effect of employed methodology – multiple outputs generate multiple choice of perfect (100% efficient) system. Another explanation can be a different approach to health system goals. We can conclude, that different countries focus on different aspect of health.

Table 4: Country-year health system efficiency for multi-output model

Multioutput	1995	2000	2005	2010	2015	**Average**
Czech Republic	100.0%	100.0%	100.0%	100.0%	100.0%	**100.0%**
Estonia	99.0%	99.5%	100.0%	100.0%	100.0%	**99.7%**
Hungary	100.0%	100.0%	100.0%	100.0%	99.9%	**100.0%**
Latvia	100.0%	100.0%	100.0%	100.0%	100.0%	**100.0%**
Lithuania	99.1%	99.2%	99.6%	99.7%	100.0%	**99.5%**
Poland	100.0%	100.0%	100.0%	100.0%	100.0%	**100.0%**
Slovakia	100.0%	100.0%	99.7%	99.8%	100.0%	**99.9%**
Slovenia	100.0%	100.0%	100.0%	100.0%	100.0%	**100.0%**
Average	**99.8%**	**99.8%**	**99.9%**	**99.9%**	**100.0%**	
S. dev	**0.5%**	**0.3%**	**0.2%**	**0.1%**	**0.0%**	

Results have confirmed our hypothesis H1 of improving relative efficiency of health systems. There can be seen the evidence of decreasing efficiency dispersion, measured by standard deviation of efficiency score in each year (Table 5). *That has allowed us to adopt the H2 hypothesis.*

Table 5: Standard deviation of efficiency score

Output	1995	2000	2005	2010	2015
LE$_0$	4.9%	2.5%	2.9%	2.2%	0.9%
LE$_{65}$	3.8%	3.0%	3.0%	3.1%	1.5%
IM	0.5%	0.4%	0.3%	0.3%	0.3%
RED65	2.8%	1.3%	0.9%	0.7%	0.3%
Multi	0.5%	0.3%	0.2%	0.1%	0.0%
Average	**0.5%**	**0.3%**	**0.2%**	**0.1%**	**0.0%**

In order to check, if there are significantly inefficient countries, we have determined, how many times country-year observation has been detected on efficiency frontier, taking into consideration all estimated models. The results are shown in table 6. Whole group can be divided into three groups: A – high efficiency (Poland and Slovenia) B – average efficiency (Czech Republic, Estonia, Latvia) and C lower efficiency (Hungary, Lithuania, Slovakia).

Table 6: Number of 100% efficiency appearance

	1995	2000	2005	2010	2015	**SUM**
Czech Republic (B)	3	3	2	1	3	**12**
Estonia (B)	0	0	5	2	5	**12**
Hungary (C)	3	2	2	0	0	**7**
Latvia (B)	1	3	3	0	5	**12**
Lithuania (C)	0	0	0	0	3	**3**
Poland (A)	4	5	5	2	5	**21**
Slovakia (C)	2	1	0	0	1	**4**
Slovenia (A)	4	3	3	5	5	**20**
SUM	**17**	**17**	**20**	**10**	**27**	

4. Discussion and Conclusions

Our research have confirmed, that the relative efficiency of health care systems in all analyzed CEE countries improved during the period 1995–2014. We can also observe that, along time, differences in the relative efficiency decreased. This phenomenon may be influenced by progressive transformation of economies of Central and Eastern Europe countries and the exchange of experiences and good practices, not only between the countries of the region, but also the countries of Western Europe.

It should be noted, however, that analyzed countries form a very homogeneous group (which is one of the assumptions of DEA method), both in terms of the organization of health care financing system, as well as the level of inputs consumed, what can be a source of small differentiation of results. These countries are also characterized by similar level of GDP, which affects the level of expenditure on health. We can observed that differences in income levels, represented by GDP, are also getting smaller.

During the next stage of the research we plan to use more sophisticated variation Data Envelopment Analysis, among all the introduction of two-step analysis, instead of using control variables, representing factors which cannot be controlled. This would allow the analysis of determinants, affecting the efficiency of health systems.

Acknowledgements

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Comparison of the hedging performance in crude oil and natural gas

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Abstract

The paper examines the issue of hedging against price risk of the key energy sources. The subjects of research are the spot prices of the West Texas Intermediate and the Henry Hub. The risk protection is provided by applying the future contracts of underlying assets. The hedge ratio is determined by using the OLS, Naive portfolio, Copula and Arch/Garch. Afterwards, the ability to reduce risk was measured by hedging effectiveness over twelve months period. The significance of distinct models was evaluated on the sum of residual risk. The results confirmed that the applied model for crude oil is irrelevant in comparison to the natural gas, where the employed models provided significant differences in hedging effectiveness.

Keywords: Risk, Hedging, Futures, Portfolio, Minimum variance

JEL Code: G11

1. Introduction

In the recent years, we can continuously notice an increasing pressure to focus on alternative energy sources. Partly, it is a legitimate effort. However, there is a large lobbying of clientelism or advocacy groups in many cases. But the truth is that according to the World Energy Outlook the fossil fuels represent more than 80% of primary energy sources in the world IEA (2015). And their role will not change in the future. Due to the interdependence of economic level and energy consumption their usage will increase, especially in the developing countries Covert et al. (2016).

A strong affinity to price instability is fundamental for the prices of both commodities. The price fluctuation is determined by various factors which include seasonality, level of inventory, strategic decision of major players on the market, economic policy, environmental policy, technological progress and geopolitical situation. All those, together with market liberalization, stimulate the need for price examination of the commodities, including hedging strategy.

Fossil fuels are a part of everyday life. Therefore, the price development of these commodities is reflected in the consumption of an ordinary person. However, such impact is gradual. Direct participants such as producers, processors or distributors are ex-

posed more to the price distortions. The protection against unexpected price movements, for instance in terms of ability to forecast cash flow, is crucial for them.

Assuming high efficiency of markets, there should be no possibility for arbitrage between spot and futures prices. In other words, markets should ensure full allocation of sources. Thus, a strategy based on a naive portfolio must guarantee a perfect protection against price risk. In fact, markets are not always sufficiently effective. We will show this circumstance on two seemingly similar commodities. Natural gas is a partial substitute for crude oil, but the efficiency on the market of natural gas is significantly weaker compared to crude oil. For this reason, it is advisable to find a model for optimal weights with respect to price risk reduction.

This paper analyzes the hedging performance on the main benchmarks for crude oil and natural gas. The examined markets are the US West Texas Intermediate and Henry Hub. The intention was to compare both commodities and select the optimal hedging tool for each of them. The US market for both commodities was chosen with regard to the same market environment and because of the pricing mechanism for natural gas. Henry Hub represents a market mechanism that should reflect the real needs of supply and demand Benada and Linnertova (2016).

Four models to estimate the weights for hedging instrument will be employed. Namely naive portfolio, classical regression with intercept, Arch/GARCH and t-copula will be applied to estimate the optimal weights for futures ensuring minimum variance of portfolio. Subsequently, the effect of price risk reduction will be measured. At the end the hedging performance of both commodities will be compared each other.

The paper is structured as follows. The hedging issue is discussed in form of literature review. The employed models are examined in detail in the following section. Also the metrics for measuring the hedging effectiveness is introduced there. In the section Results and Discussion the calculated weights and the impact on variance reduction is presented. The paper terminates with brief summary of the research and provides some recommendations for further investigation.

2. Hedging

2.1. Literature review

A serious interest of hedging among academic world dates back to the early 20th century. The primary research was focused on the protection against risk in agricultural products Howell and Watson (1938). The futures were applied for hedging purposes Yame (1951). The first hedging model was a naive portfolio, i.e. one unit of spot was hedged by one unit of futures Graf (1953). So, the eventual spot price slump could be replaced by income of short position held in the futures Howell (1948). A fundamental change in finance happened due to the emergence of modern portfolio theory caused by Markowitz (1952). The optimization technique introduced by Harry Markowitz was transferred to hedging Telser (1955). Hence, since this time more sophisticated methods could be used to over perform the naive portfolio.

The portfolio variance was taken as an objective function to find *"optimal"* weights of futures Johntson (1960). The same author introduced the metrics for measure the hedging performance. More specifically, the measurement was based on the Pearson correlation coefficient. However, the measurement of hedging effectiveness is sometimes ascribed to Ederington (1979). He brought some innovation, because he used the

classical regression model to determine the weights of futures, which is identical to the slope of regression. However, the determination of weights by optimizing a portfolio variance as well as the measurement based on coefficient of determinants are substantially identical with the approach of Johnson (1960). Later, more complex econometrics model for hedging was employed. It was, for instance, the GARCH model assuming instability in covariance matrix Baillie et al. (1991). Moshino et al. (2002) introduced a new multivariate Garch parametrization. A better protection against price risk was confirmed using the model with variable volatility in Yang et al. (2005) and Lee et al. (2007). Also other models working with joint distribution were introduced and applied for hedging. The application of copula function for hedging purposes is demonstrated by Cherubini et al. (2004). Further, copula with more sophisticated models is applied in Hsu et al. (2008) or Lee (2009).

2.2. Methodology and data

Given the complexity of physical delivery, we solely assume a financial form of hedging. Furthermore, we focus on short hedging. In other words, the object for hedging is the spot price that means we expect to sell the commodity in any time in the future for actual spot price. However, an application of long hedging would be analogous. To obtain an optimal ratio of spot and futures to close the exposed position we use the proposed methodology by Johnson (1960).

Thus the objective function is given by portfolio variance:

$$\sigma_p^2 = w_s^2 \sigma_s^2 + w_f^2 \sigma_f^2 + 2 w_s w_f \sigma_{s,f} \tag{1}$$

Where σ_p^2 is the portfolio variance, σ_s^2 and σ_f^2 is variance of spot price and futures, respectively. The term $\sigma_{s,f}$ is covariance of spot price and futures price with weights w_s and w_f. It is assumed $w_s = 1$. Then the optimal ratio $h^* = \frac{w_f}{w_s} = w_f$ must be obtained:

$$\frac{\partial \sigma_p^2}{\partial h} = 2h\sigma_f^2 + 2\sigma_{sf}, \quad h^* = -\frac{\sigma_{sf}}{\sigma_f^2} . \tag{2}$$

The negative weights indicate an opposite transaction to the spot, in our case it is short position of futures and hence we speak about short hedging. To confirm that the extreme of the objective function is minimum it should be provided the second derivation, which is really more than zero, because the second derivation with respect to the w_f is $2\sigma_f^2$, so the extreme of the function is really a minimum.

From the term $\frac{\sigma_{sf}}{\sigma_f^2}$ it is clear that the hedge ratio corresponds to the slope of a linear regression with an intercept. That means $\beta = h^*$.

In the model with autoregressive memory we apply the model Arch/Garch. Here the optimal ratio is according to Engle and Kroner (1995) given by following expression:

$$r_{st} = \mu_s + \varepsilon_{st}, \tag{3}$$

$$r_{ft} = \mu_f + \varepsilon_{ft}, \tag{4}$$

$$\begin{bmatrix} \varepsilon_{st} \\ \varepsilon_{ft} \end{bmatrix} |\Omega_{t-1} \sim (0, H), \quad \text{and} \quad H_t = \begin{bmatrix} h_{ss,t}^2 h_{fs,t}^2 \\ h_{fs,t}^2 h_{ff,t}^2 \end{bmatrix}. \tag{5}$$

And finally we can calculate the *h** in following way:

$$h^* = \frac{h_{fs,t}^2}{h_{ff,t}^2}.$$

(6)

The last methodology was based on utilization of joint distribution of spot and futures returns. For this purpose the copula approach was implemented. Sklar (1959) introduced a new function called copula. He supposed that this function can join multiple distribution functions to joint one-dimensional marginal distribution function Nelson (1991).

Let have cumulative distribution functions $F(x)$ and $G(y)$. Thus, using a copula function $C(.)$ the joint distribution function $H(.)$ could be expressed in following manner:

$$H(x,y) = C(F(x), G(y)) = C(u,v)$$

(7)

and also it is possible to derive the following relationship:

$$H(u,v) = H(F^{-1}(u), G^{-1}(v))$$

(8)

where F^{-1} and G^{-1} are the quantile functions of $F(.)$ and $G(.)$.

After fitting models, the t-copula was identified as the most appropriate from the elliptical copula family to correspond to the empirical distribution of spot and futures returns.

The formula for t-copula function could be introduced as:

$$C_{\delta,\tau}^t(u,v) = \frac{f_{\delta,\tau}^t(F_\tau^{-1}(u), F_\tau^{-1}(v))}{f_\tau^t(F_\tau^{-1}(u)) f_\tau^t(F_\tau^{-1}(v))}, \quad u,v \in (0,1)$$

(9)

$f_{\delta,\tau}^t$ stands for the joint density function.

The first step in the analysis was to calculate the hedge ratio from the analyzed data. In essence, that means to acquire the weights from three different models. First, it was the classical regression model carried out on perceptual changes of the closing prices, where the spot prices were the dependent variables and the futures prices were considered as the independent variables. Further, a model with variable volatility was employed. Subsequently, from the variances obtained previously, the weights for futures were calculated. The last approach primarily required to provide a pseudo-observation on the range (0,1) and after that to create a simulation. We did a simulation with 200 iterations. Then, the simulated data was processed again to estimate the h* in accordance with the minimum-variance approach.

To estimate which model provides the best performance with respect to the risk reduction, we measured a hedging effectiveness (HE) according to Johnson (1960). Then the hedging effectiveness is:

$$\mathrm{HE} = 1 - \frac{\sigma_p^2}{\sigma_s^2},$$

(10)

where σ_s^2 is variance of spot and σ_s^2 is variance of portfolio (combination of spot and futures). Another view on the risk may be an absolute value of deviation from a representative value. If the representative value is equal to one, then it is possible to look the results as a residual risk. Moreover, a cumulative sum of the partial results over the whole observed period can rank the models. Thus, the measurement could be expressed:

$$\sum_{i=1}^{12} |1 - \mathrm{HE}_i| \tag{11}$$

In order to draw a relevant conclusion, the data was selected from a representative homogenous market. Specifically, the US market for crude oil and natural gas was investigated. In addition, there is another significant advantage using this market, the fact that the data is given in the same currency. The weekly closing prices were employed for the analysis. The investigated period was 2012–2014, together 185 observations. Afterwards, the results of calculated weights were tested on the consequent period of one year. Together it means 52 weeks from 2014 to 2015. The verification (HE) was provided on monthly bases. The West Texas Intermediate was taken as the representative market for crude oil and the Henry Hub as a significant benchmark for natural gas. Both indices are traded in New York Commodity Exchange including their futures contracts.

2.3.   Results and discussion

In the following table are summarized optimal weights for each commodity according to the used model.

Table 1: Weights for all models and commodities

WTI	h*	HH	h*
ols	1.00097	ols	0.773418
naiv	1	naiv	1
arch/garch	0.997769	arch/garch	0.589148
copula	0.998992	copula	0.832684

It is clear that both commodities exhibit significant differences. The principal finding is that the weights for crude oil are, in fact, the same for all four models. That corresponds to the weight of a naive portfolio. However, the weights for natural gas are significantly different and vary from 0.59 in the Arch/Garch model to 1 in the naive portfolio.

Subsequent testing confirmed the ability of crude oil market to provide nearly perfect hedging. On the other hand, the performance of the natural gas market greatly lagged behind. And the ability to provide price risk reduction varies during the tested period.
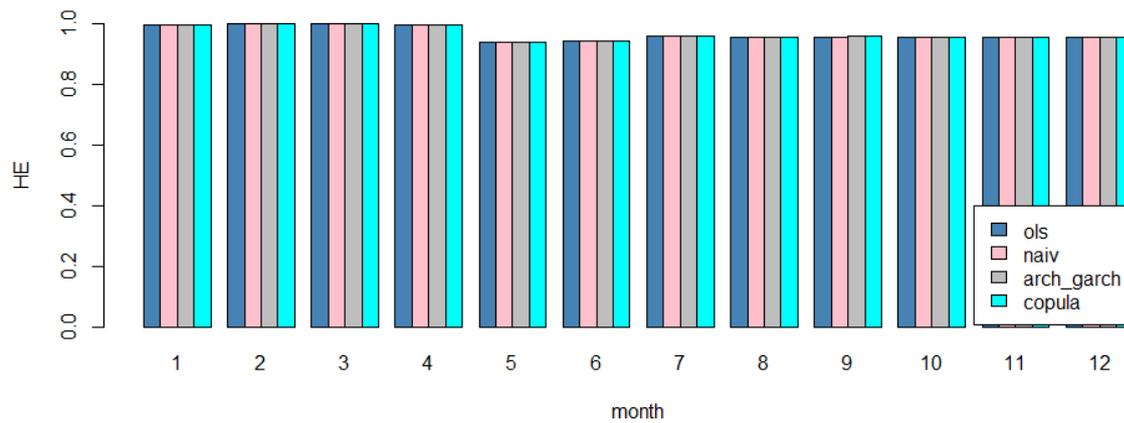
Figure 1: WTI – Hedging effectiveness by models over twelve months
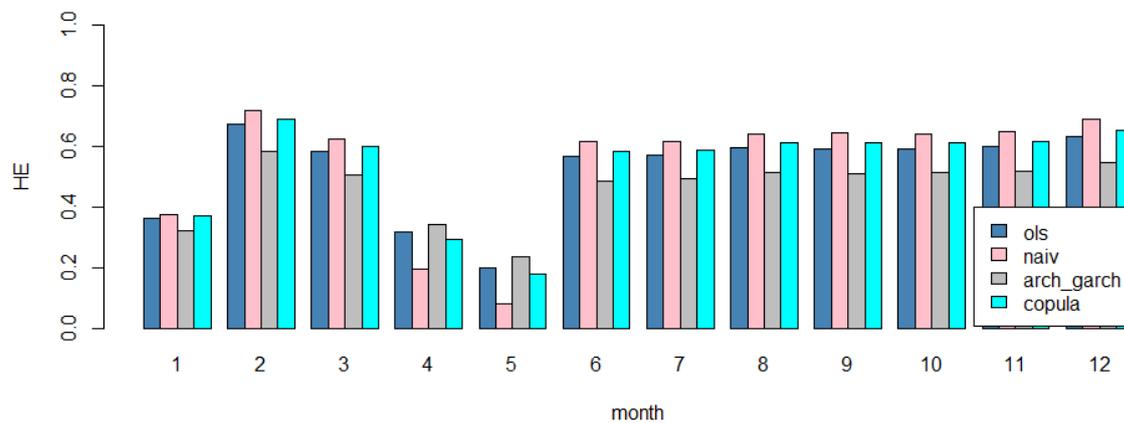
Figure 2: HH – Hedging effectiveness by models over twelve months

As can be seen from the figure above, in the first, fourth and fifth month the hedging effectiveness in natural gas was relatively low. In other months it was on average 60 %. Paradoxically, the best results were provided by the naive portfolio in the months with higher HE. During the same months, the worst results were given by Arch/Garch. However, it is essential to point out that the performance of this model was the greatest in the weak months (low HE).

The results for crude oil basically confirmed an irrelevance between the four employed models in respect to price risk reduction. The obtained weights do not differ and the hedging effectiveness of the methods is relatively the same over all months. But the situation is distinct in the natural gas market. Here, it is reasonable to select an optimal model, as the performance of HE is significantly different over the examined twelve months. The fact is illustrated in the matrix of cumulative differences of residual variances.

Table 2: Cumulative differences of residual variance

WTI	naiv	arch	copula	HH	naiv	arch	copula
ols	0.000915	0.002972	0.001853		0.6869604	0.843403	0.216978
naiv		0.002057	0.000938			1.530363	0.469983
arch			0.00112				1.060381

As it is evident from the results, the largest difference in HE is between naive portfolio and Arch/Garch model.

And the overall summary and comparison of the both investigated commodities is depicted in the next figure.
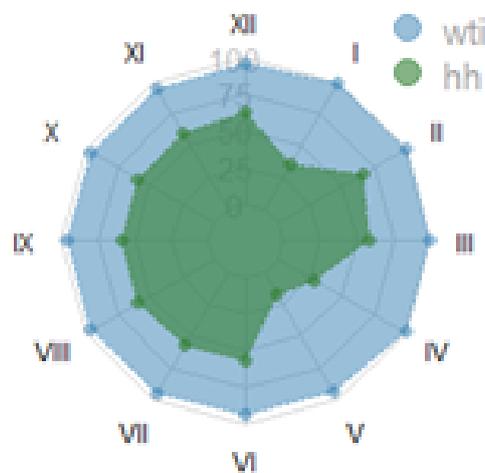
Figure 3: Overall view of HE performance

3. Conclusions

The paper investigated the issue of hedging against the price risk on the markets of the two most important fossil fuels. Crude oil and natural gas are crucial for the modern society and will be extensively important in the future, too. Since both commodities are traded on the market, where the price is largely determined by the interaction of supply and demand, and it is also very sensitive to many factors, there is an eminent price uncertainty for all market participants. With the growing market liberalization the price risk will rather increase. This is true especially for natural gas. Such prerequisites justify even more the role of active hedging policy. The hedging issues were examined in the US markets, which can be considered benchmark for crude oil as well as for natural gas. The methodology used the minimum-variance approach and the weekly closing prices were analyzed. To determine the optimal hedge ratio, four distinct models were employed, namely OLS, naive portfolio, Arch/Garch and copula.

The results of the analysis showed that the price risk for crude oil could be effectively reduced merely by application of naive portfolio. Basically, all employed models achieved the same results. This confirms the high correlation between spot and futures

prices. Conversely, the market with natural gas was not as effective in risk reduction. The reason was a lack of interdependence between spot and futures prices. Indeed, this is confirmed by distinct weights for each model. Paradoxically, the best model over the examined period of twelve month was again the naive portfolio. However, in the period of low hedging performance, the most powerful model was Arch/Garch.

For further research, use of other models such as the Mean Extended Gini coefficient, Cointegration or other model from the Garch family might be convenient followed by comparison among them. It would be also interesting to take into account the seasonality and the importance of marginal volatility. Given the static approach to correlation on examined data, the Dynamic Conditional Correlation could provide a better performance in the price risk reduction as well. Finally, it might be beneficial to estimate an optimal length for hedging.

Acknowledgements

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Rationality and paradoxes in consumer behavior

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Abstract

The theory of the expected benefits produced very elegant and compelling framework in explaining of economic choices. Quite soon it became clear that he could not explain some empirical research results and economic experiments, such as St. Petersburg paradox, Allais paradox, Ellsberg paradox, but also a wide range situations of normal economic life. Psychologists and economists gathered during the 60s and 70s of the twentieth century a large body of evidence that people decide otherwise, as they are requested normative theory of expected good.

In the practical part of the chapter the validity of selected examples from Behavioural Economics is tested. We decided to focus on the economic experiments and using Allais paradox in the context of consumer behaviour. For the gaining data we used questionnaire with the specific questions related on the risk and uncertainty. Subsequently, collected data was statistically tested.

Hypothesis that irrational people characterized by Allais paradox behave in the food consumption differently compared to a rational behaving consumers. Examination of respondents in the preferences did not differ according to the statistical test, although the graphical analysis pointed to some differences.

Keywords: Allais paradox, consumer behavior, rationality

JEL Code: C12, C15, D11.D12

1. Introduction

Every human decisions exclusively concern future events. But the future we can say with certainty only that it is uncertain. We never know how our decisions actually impact. It is logical that we try to describe the possible occurrence some future phenomena using by the probability theory.

Basically, we can encounter two basic situations. If the probability distribution we know our decision is going on in terms of risk (Berčík et al., 2016; Smutka et al., 2015)

If the probability distribution is unknown, we make decisions under conditions of uncertainty. An example of such a decision is to predict trends in interest rates, weather and technological advances in society over the next two decades. We can only rely on past data, which, however, do not know whether they are relevant to estimating the likelihood of future events.

Decision-making in the conditions of a risk and uncertainty is the work that accompanies humanity constantly.

The analysis and modeling of human choice and decision-making has a long history in the behavior research. Moreover, modeling consumer response to exogenous policies is essential in assessing the impact and effectiveness of transportation policies, captured in terms of changing attributes of the choice alternatives of interest. Finally, understanding how choice behavior co-varies with genders, income categories, age groups and other socio-demographics is crucial in evaluating consumer preferences. (Rasouli, 2014)
Over the last decades, the travel behavior research community has applied a variety of theories and modeling approaches to individual and household choice and decision-making processes. Until the mid-1970s, spatial interaction and entropy-maximizing models, based on the theory of social physics, dominated the field (Wilson, 1974 and Batty, 1976). Later, random utility theory (McFadden, 1974) and psychological choice theory (Luce, 1959) led to the formulation and application of many discrete choice models (Hensher, 1981 and Ben-Akiva and Lerman, 1985). Soon the multinomial logit model became the working horse of the profession, to be complemented by various more advanced, less stringent models, such as the nested logit model and generalized extreme value models, which avoided some of the rigorous assumptions underlying the multinomial logit model. Lately, the mixed logit model (Train, 2003), MDCV model (Bhat, 2005) and hierarchical choice models (Walker and Ben-Akiva, 2002) have become rather popular. In parallel, but less pertinent, researchers have also applied rule-based models to capture decision heuristics (e.g., Arentze et al., 2000).

Regardless of the modeling approach and the underlying theory of choice and decision-making, these models have in common the assumption that decision-makers have perfect knowledge about the attributes of their choice alternatives. At the moment of choice, the values of these attributes are invariant, while individuals are assumed to hold perfect and complete knowledge about these attributes. All these models relate to choice and decision-making under conditions of certainty.

Thus, the state of the consumer behavior and choosing of the foodstuff are inherently uncertain. Consequently, decision-makers always face conditions of uncertainty when choosing foodstuff on the base of price, taste, customs or recommendations. In that sense, it is surprising that applications of theories and models of decision making under conditions of uncertainty are relatively scarce in consumer behavior analysis. Moreover, the majority of studies, albeit also small in number, are concerned with uncertainty or variability in common view (Robinson et al., 2010 and Fudenberg et al., 2014), but do not address how individuals make decisions when facing such uncertainty and how it affects their consumer decisions. Considering the inherent uncertainty in the theory of the consumer behavior, the formulation and application of (improved) models of decision-making under conditions of uncertainty should be a field of research of high priority in behavior research. In the following contribution we would like to present analysis of the consumers, finding their rationality by using Allais paradox. On the base of results

Allais paradox following we will analyze preferences of the foodstuff which are concluded and tracked in the consumer basket.

2. Methodology and Data

On the base of the presented goal, we need define dataset. Data was gained by questionnaire and respondents were asked by social networks. Question are consist of very simple questions focus on the preferences in consumer basket and last two part of the questionnaire identified rationality of the consumers by using Allais paradox –lottery possibilities.

One of the earliest and best-known examples of systematic violation of linearity in the probabilities (or, equivalently, of the independence axiom) is the well-known Allais paradox (Allais, 1952). This problem involves obtaining the individual's preferred option from each of the following two pairs of gambles (readers who have never seen this problem may want to circle their own choices before proceeding):

$a_1: \{1.00$ chance of $\$1,000$ versus $a_2: \begin{cases} .10 \text{ chance of } \$5,000 \\ .89 \text{ chance of } \$1,000 \\ .01 \text{ chance of } \$0 \end{cases}$

and

$a_3: \begin{cases} .10 \text{ chance of } \$5,000 \\ .90 \text{ chance of } \$0 \end{cases}$ versus $a_4: \begin{cases} .11 \text{ chance of } \$1,000 \\ .89 \text{ chance of } \$0 \end{cases}$
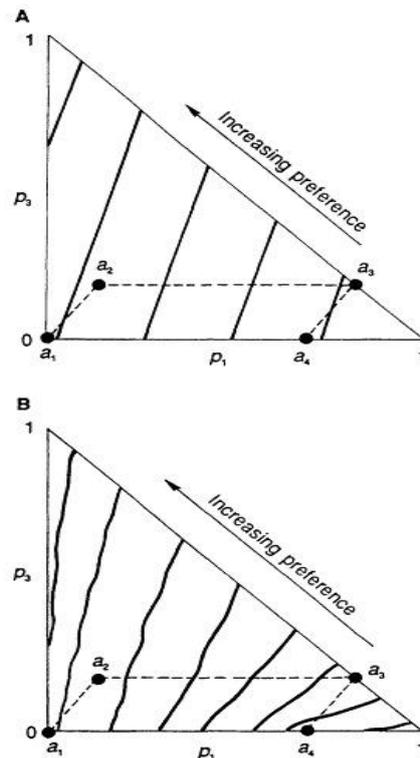
Figure 1 A: Expected utility indifference curves and the Allais Paradox. Figure 1 B: Indifference curves that "fan out" and the Allais Paradox.
Source: Allais, M. 1952.

Defining {x1, x2, x3} = {$0;$1 million;$5 million}, these four gambles are seen to form to a parallelogram in the (p1, p3) triangle (Figures 1A and 1B). Under the expected utility hypothesis, therefore, a preference for a1 in the first pair would indicate that the individual's indifference curves were relatively steep (as in Figure 1A), which would imply a preference for a4 in the second pair. In the alternative case of relatively flat indifference curves, the gambles a2 and as would be preferred. Yet, such researchers as Allais (1953, 1979a), Morrison (1967), Raiffa (1968), and Slovic and Tversky (1974) have found that the most common choice has been for a1 in the first pair and as in the second, which implies that indifference curves are not parallel but rather fan out, as in Figure 1B.

One of the criticisms of this evidence has been that individuals whose choices violated the independence axiom would "correct" themselves once the nature of their violations were revealed by an application of the above coin-flip argument. Thus, although even Savage chose a1 and a3 when he was first presented with this problem, upon reflection, he concluded that these preferences were in error. Although his own reaction was undoubtedly sincere, the prediction that individuals would invariably, react in such a manner has not been sustained in direct empirical testing. In experiments in which subjects were asked to respond to Allais-type problems and then presented with written arguments both for and against the expected utility position, neither MacCrimmon (1986), Moskowitz (1974), nor Slovic and Tversky (1974) found predominant net swings toward the expected utility choices.

3. Results

The output of the survey responses, we had classified into two groups according to criteria Allais paradox to those identified by the possibility of a lottery can be described as rational behaving, respectively behaving irrationally.

Table 1: Structure of the respondents – base characteristics

	Irrational behaviour	Rational behaviour
Total	33	25
Employee	17	14
Self-employed	1	2
Senior	1	0
Other	0	0
18–24 years	11	7
25–34 years	15	12
35–44 years	2	1
45–54 years	2	1
55–64 years	2	2
65 and more	1	1
200–400 EUR	0	0
401–600 EUR	4	1
601–800 EUR	8	4
801–1000 EUR	5	4
1001–1200 EUR	6	3
above 1200 eur	12	8

Source: Own calculation

An interesting finding was that approached the group of respondents was divided into 33 respondents are behaving irrationally and 25 respondents behaving rationally. This division was made on the basis of the preferences of winning the fictional lottery created by Allais. Another interesting aspect from our point of view the revenue. Respondents with higher incomes Allais paradox, according to the group is behaving irrationally. An important aspect of the entire analysis was to determine the preferences of consumers, who also identified possibilities Allais lottery.

■ every day ■ once a week ■ once a month ■ I do not buy it at all
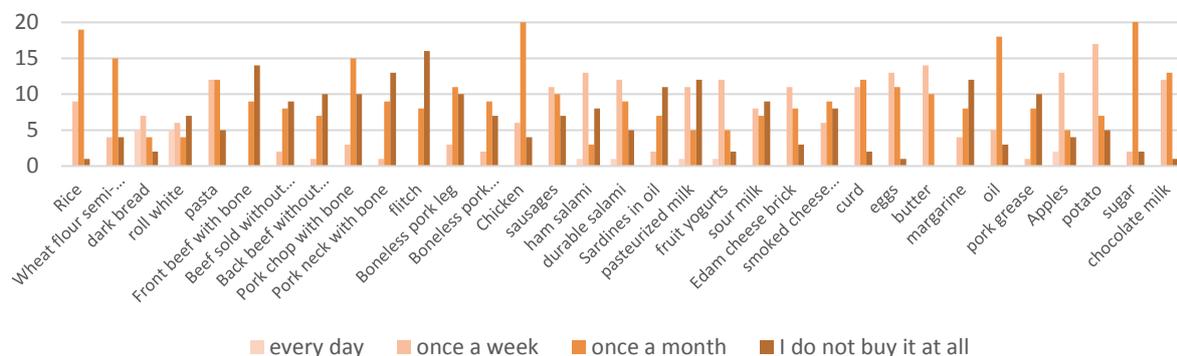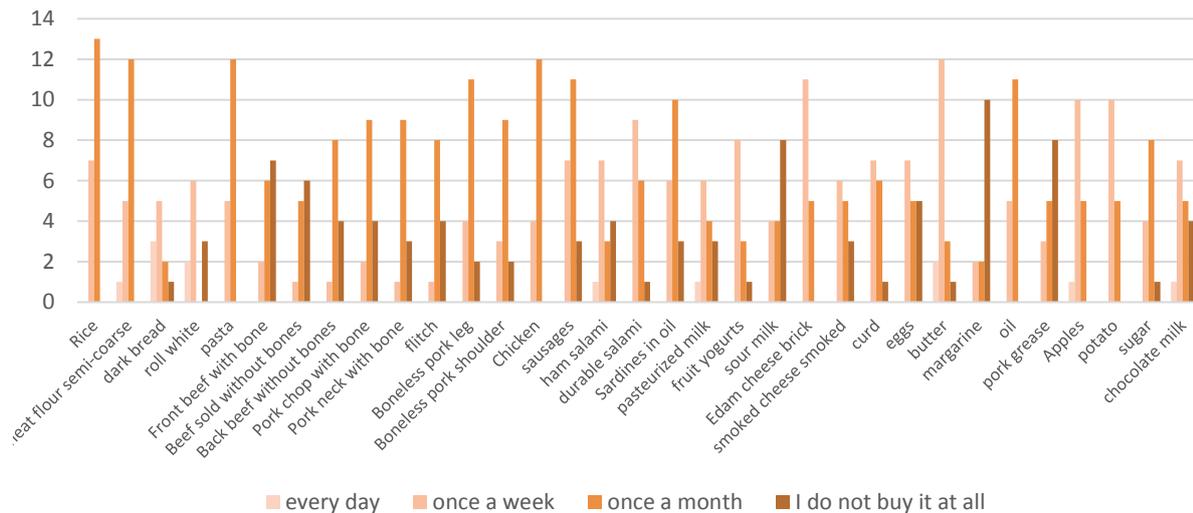
Figure 3: Comparison of preferences between respondents irrational and rational behavior
Source: Own calculation

The upper figure 3 presents the rational consumer preferences. We focused first on the reply "not to purchase at all" This answer surprised us with entries of beef and pork and salami, also in margarine and lard, cheese and oil. On the other hand, chocolate is bought item once a week and once a month. We came to the view that our rational respondents do not behave so rationally. Subsequently, we focused on the response once a month and there are signs of rational behavior. There are also respondents who buy once a month, some kind of meat.

When we look at the bottom graph showing respondents with the irrational behavior, we can follow significantly different preferences in the previous figure. Chocolate does not buy you even more irrational than rational respondents. It is also to the margarine. Took us also result in chickens. Irrational respondent buy it once a week or once a month. While the rational respondents find some who do not buy it at all. Pasta is more preferred, between irrational respondents.

Table 2: Comparison of preferences by using non-parametric Wilcoxon test

	t-Value	Pr > |t|	Result
Rice	0.13	0.8934	difference is not confirmed
Wheat flour semi-coarse	1.15	0.2545	difference is not confirmed
dark bread	−0.88	0.3834	difference is not confirmed
Bread roll white	−0.52	0.6047	difference is not confirmed
pasta	0.10	0.9193	difference is not confirmed
Front beef with bone	0.22	0.8259	difference is not confirmed
Beef sold without bones	−0.27	0.7894	difference is not confirmed
Back beef without bones	0.73	0.4701	difference is not confirmed
Pork chop with bone	−0.77	0.4419	difference is not confirmed
Pork neck with bone	0.73	0.4663	difference is not confirmed
flitch	1.20	0.2350	difference is not confirmed
Boneless pork leg	1.51	0.1378	difference is not confirmed
Boneless pork shoulder	1.43	0.1573	difference is not confirmed
Chicken	0.29	0.7713	difference is not confirmed
sausages	−0.68	0.4969	difference is not confirmed
ham salami	−0.04	0.9707	difference is not confirmed

	t-Value	Pr > |t|	Result
durable salami	0.02	0.9815	difference is not confirmed
Sardines in oil	2.29	0.0261	difference is confirmed
pasteurized milk	−0.55	0.5842	difference is not confirmed
fruit yogurts	−1.28	0.2063	difference is not confirmed
sour milk	−0.82	0.4163	difference is not confirmed
Edam cheese brick	−0.74	0.4606	difference is not confirmed
smoked cheese smoked	−1.11	0.2712	difference is not confirmed
curd	−1.93	0.0593	difference is not confirmed
eggs	−0.91	0.3681	difference is not confirmed
butter	1.16	0.2508	difference is not confirmed
margarine	−1.44	0.1561	difference is not confirmed
oil	−0.12	0.9079	difference is not confirmed
pork grease	−0.19	0.8474	difference is not confirmed
Apples	0.27	0.7852	difference is not confirmed
potato	−1.10	0.2764	difference is not confirmed
sugar	0.58	0.5636	difference is not confirmed
chocolate milk	−2.33	0.0238	difference is confirmed

Source: own calculations

Based on the pairwise comparison of preferences (using Wilcoxon test) in the basket between rational and irrational consumers we can be stated as following. Result of the Wilcoxon test hasn´t been confirmed for difference in preferences between the different items of the consumer basket, except for sardines in oil and chocolate. Hypothesis that irrational people characterized by Allais paradox behave in the food consumption differently compared to a rational behaving consumers. Examination of respondents in the preferences did not differ according to the statistical test, although the graphical analysis pointed to some differences.

4. Discussion and Conclusions

The Allais paradox has not escaped counterarguments. When it was first proposed by Allais, many adherents of expected utility argued that it was simply a failure to understand the nature of the choice being made. The Independence Axiom that underlies expected utility theory was seen as a simple "Pareto improvement" argument: If one of the lotteries in a compound lottery is replaced by a better one, the new compound lottery should rank higher in the person's preferences. The claim was that once this was properly explained, behaviour would conform to expected utility theory. However, this was found not to be the case, and it is now broadly accepted that behaviour conforming to the Allais paradox is perfectly consistent with the basic axioms of rationality, namely completeness and transitivity.

The next line of criticism says that paradoxical behaviour occurs only for extremes of probabilities. Many more people are likely to show behaviour conforming to expected utility theory. However, this counterargument does not quite rescue expected utility theory. For one thing, many actual choices do involve extreme probabilities; for example default risks on many bonds are quite small. And more basically, the counterargument only reinforces the basic Kahneman-Tversky argument that people's perceptions are importantly affected by their reference point. The general idea that equal changes in probabilities are evaluated differently starting from different initial probabilities entails

an overall utility function on random prospects that is not linear in probabilities, concludes Kahneman (2003)

In this article we have presented a example of the demonstration of analyze of the consumption behavior. The present work has been concerned primarily with the descriptive question focus on the finding of the consumption preferences, as well questionnaire consist of the psychology of choice is also relevant to the normative question which identify rationality of the respondents. In order to avoid the difficult problem of justifying values, the modern theory of rational choice has adopted the coherence of specific preferences as the sole criterion of rationality. This approach enjoins the decision-maker to resolve inconsistencies but offers no guidance on how to do so.

Applied to economics, rational choice theory is presumed to be ethically neutral, because it "does not question people's preferences; it simply studies how they seek to maximize them." However, McCumber argues that rational choice theory is not ethically neutral, because its parent philosophy is not ethically neutral. "Whatever my preferences are, I have a better chance of realizing them if I possess wealth and power.

Individual rationality is limited by their ability to conduct analysis and think through competing alternatives. The more complex a decision, the greater the limits are to making completely rational choice.

One of the principles of economics is that people respond to incentives. Rational choice theory attempts to provide an explanation why. Therefore, a criticism of the rational choice theory consists of either providing a better explanation of why people respond to incentives or of showing that people do not respond (only) to incentives. A legitimate objection to the argument of this paper is that it ignores uses of the rational choice theory outside the analysis of "generalized demand" such as in game theory. To what extent is the argument of this article applicable to these uses, remains an open question. But the general principle still holds: any evaluation of the theory needs to take into account what the theory professes to explain, reviewed Hudík(2011)

Acknowledgements

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Economic convergence of the post-Soviet countries

Irena Benešová, Zuzana Dlubalová, Lenka Rumánková and Adriana Laputkova

Abstract

The purpose of this paper is to analyse economic convergence of GDP per capita in the post-Soviet countries (except the Baltic States). The analysis has been conducted for the time period between 1995 and 2016 also divided into sub periods. These were selected not only according to the global economic situation but also Russian economic situation. Two types of convergence are calculated – beta that is based on the neoclassical growth theory, and sigma convergence. Panel data were used to estimate the parameters of the model. The method used was LS. All parameters are statistically significant. It can be stated that both sigma and beta convergence have occurred over the monitored period. However, the same is not true for different sub periods. Beta convergence that is a necessary condition for the existence of sigma convergence did not occur during the period 2000–2006 or 2006–2009. Due to this fact, economic convergence between the monitored countries for the given period of time cannot be discussed. The question that should be asked is whether convergence is also present in the sub groups of the post-Soviet countries.

Keywords: beta convergence, sigma convergence, Eurasia, regional integration.

JEL Code: F40, O40

1. Introduction

Economic convergence represents an essential precondition for successful regional integration (Siljak 2015). Utilization of comparative advantages of all participating countries provide a foundation for successful regional cooperation (Fathipour & Ghahremanlou, 2014) which enables the countries to present themselves at a global level as a whole and this way to defend their common interests. At the same time, functional regional integration encourages the influx of capital and enhances productivity (Kumar, 2015). The goal of regional integration is economic growth of the participating countries and their gradual conditioned convergence. Mutual convergence of their economies is one of the indicators of the countries' mutual convergence. Convergence comprises two interconnected con-

cepts. The first constitutes mutual convergence of the rate of growth and incomes of individual countries, the second institutional convergence connected with the already formed regional grouping.

Neoclassical growth models are based on the first concept (Barro & Sala-I-Martin 1992; Barro 2012). (Barro 1991) provides an extensive summary of regional convergence in the USA, selected European countries and Japan.

Economic convergence represents a concept based on the relationship between the current level of incomes and their steady state (Barro & Sala-i-Martin 2003). Individual theories presume that economic growth represents a nonlinear process (Lagerlöf 2006; Peretto 1999; Lewis 1955).

The concept of convergence is most frequently used to monitor regional differences (Ertan Özgüzer & Oğuş-Binatlı 2016; Szeles & Mendieta Munos 2016). One of the countries with the occurrence of divergence as well as the increase of inter-regional differences is Russia (Lessmann & Seidel 2017). However, there are differences in other economic indicators in Russia as well (Špička & Kontsevaya 2016; Smutka et al. 2014; Ishchukova & Smutka 2013; Balashova et al. 2015; Benesova et al. 2016). Economic convergence within individual regions might be negatively influenced by the business cycle, particularly in a short period of time (Lall & Yilmaz 2000). Common currency might also have a negative impact due to which financial integration negatively influences macroeconomic convergence (Van Ewijk & Arnold 2015). However, this economic concept can also be used for tender prices (Méjean & Schwellnus 2009), the impact of international trade (Rodríguez-Pose & Gill 2006) or market concentration (Blažková 2016; Maitah & Smutka 2016; Sanova 2013).

In their work, (Libman & Vinokurov 2012b; Libman 2011) have investigated regional integration and economic convergence of the post-Soviet countries in the period between 1999 and 2008. However, this mostly concerned convergence in individual economic areas.

The purpose of this paper is to analyse economic convergence of real GDP per capita in the post-Soviet countries. Two types of convergence are used – beta convergence that is based on the neoclassical growth theory and sigma convergence.

The analysis focuses on the post-Soviet countries, namely Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Uzbekistan and Ukraine. The analysis also contains Georgia which is no longer a member of the Commonwealth of Independent States (CIS), however, it is still a part of Eurasia, and therefore it is appropriate to include it in the analysis. The data are derived from the Passport database and concern the period between 1995 and 2016.

2. Methodology and Data

The convergence will be calculated using so called ß-convergence and σ-convergence. Whenever partial convergence of the rate of income growth in a certain period of time occurs and simultaneously the initial value is negative, this is referred to as Beta convergence.

$$\left(\frac{1}{T}\right)\log(\frac{y_{it+T}}{y_{it}} = \alpha - \beta(y_{it}) + \varepsilon_{it} \tag{1}$$

where: T − number of years

$y_{it} = \dfrac{Y_{it}}{Y_t}$ GDP per capita in the country i, correlated with the average of all the countries

$\left(\frac{1}{T}\right)\log\left(\frac{y_{it+T}}{y_{it}}\right)$ annual growth of GDP per capita in the country i during the time period

ß-convergence derives from the principle that poorer economies tend to grow faster than wealthy countries. Using the conditioned beta convergence is appropriate in some cases. This concerns for instance a situation in which the countries are dissimilar in the structure of their economy, or their welfare or output level do not converge to the same level (Lall & Yilmaz 2000).

Sigma convergence signifies a reduction in the dispersion of the real per capita income value (Barro & Sala-I-Martin 1992; Barro & Sala-i-Martin 2003). ß-convergence represents an essential although not the only precondition for the existence of σ-convergence (Koo et al. 1998). When the author's original approach deriving from a standard neoclassical function and regression growth is maintained, the natural logarithm of the national income can be approximated:

$$\ln(y_{it}) = \alpha + (1-\beta)\ln(y_{i,t-1}) + u_{it} \tag{2}$$

where $0 < \beta < 1$ a u_{it} has an average value equalling zero with limited dispersion σ_u^2 and is independent of time t and economy i. The adjustment results in:

$$\ln\left(\frac{y_{it}}{y_{i,t-1}}\right) = \alpha - \beta\ln(y_{i,t-1}) + u_{it} \tag{3}$$

This implies that $\beta > 0$ which signifies a negative correlation between economic growth and the original logarithmic income value.

Dispersion of the value of logarithmic income in time t is given:

$$\sigma_t^2 = (\tfrac{1}{N})\sum_{i=1}^{N}[\ln(y_{it}) - \mu_t]^2 \tag{4}$$

where: μ average income log.

Substitution of equation (2) into equation (4) results in:

$$\sigma_t^2 \cong (1-\beta)^2\sigma_{t-1}^2 + \sigma_u^2 \tag{5}$$

The conclusion is that only if $0 < \beta < 1$ the difference of the equations is stable, therefore ß-convergence is essential for σ- convergence (Young et al. 2008).

Although the majority of economists prefer beta convergence, some authors incline to the view that sigma convergence is more important as it investigates distribution of income within a society.

The paper discusses convergence of the post-Soviet states between 1995 and 2016. The analysis itself is based on the econometric analysis of panel data of real GDP per capita in 12 states for the above mentioned period. The possibilities for panel data are described for example by (Hsiao 2003) or (Wooldridge 2010).

3. Results

Post-Soviet republics are characterized by a large number of common attributes. At the same time, there are a considerable number of differences among them. In the scope of international relations, the states are frequently assessed according to their economic performance. For this reason, regional integration of collaborating countries occurs in order to increase their economic potential and also to support their establishment in international markets. Post-Soviet countries also demonstrate a similar trend. One of the fundamental preconditions for successful regional integration is mutual economic convergence of individual states. However, in case of the post-Soviet republics, a large number of differences emerge (not only political) which hinder functional cooperation. The significance of the area lies in its location though – that is a link between the European and

Asian (Chinese and in the future Indian) geopolitical centre. The power of the region is based on the abundance of natural resources. Currently, it is a relatively stable region with a considerable number of autocratic leaders whose possible fall would mean deterioration of the economic and political situation in the whole region.

The research works on the assumption that regional integration can partially prevent this aggravation. However, functional regional integration is based on mutually converging countries. Table 1 presents a descriptive analysis of GDP per capita PPP in selected years. The increase of real GDP per capita is evident in the monitored period.

Table 1: Descriptive analysis of GDP per capita PPP

	Range	Minimum	Maximum	Mean	Std. Deviation
1995	7941.2	819.1	8760.3	2952.333	2319.8954
2000	9462.4	957.8	10420.2	3760.350	2845.8300
2005	14582.3	1529.0	16111.3	6437.067	4638.8734
2010	19171.0	2067.4	21238.4	9502.200	6683.2839
2015	21934.8	2710.7	24645.5	11863.383	7767.2882

Source: own calculation based on Passport data

3.1. Beta convergence

The model describing ß-convergence of the selected post-Soviet states between 1995 and 2016 is based on the previously mentioned relations. The dependent variable is thus presented as $\left(\frac{1}{T}\right)\log(\frac{y_{it+T}}{y_{it}})$, whereas the independent variable is represented by y_{it}. The parameters of the model were estimated based on the GDP panel data using the least square method in SW Gretl. The estimation results are presented in Table 1.

Table 2: ß-convergence of the Post-Soviet states between 1995 and 2016

	Coefficient	Std. Error	t-ratio	P-value
Constant	0.826187	0.006664	12.3981	<0.00001 ***
y_{it}	−0.016574	0.001799	−9.2086	<0.00001 ***

The model fulfils the precondition and its verification shows satisfactory results. All the parameters of the model are statistically significant at the 0.01 level. Likewise, the F-test has also demonstrated the importance of the estimated dependence (P-value reaches 1.38e-17).

Since parameter ß is negative, it might be concluded that considering GDP development the convergence of the selected states in the monitored period has been verified.

Although beta convergence has been verified in the whole monitored period (Figure 1), it was impossible to verify it for the period between 2000 and 2006 and for 2006 and 2009. In these time periods, beta parameter was positive (Figure 2).
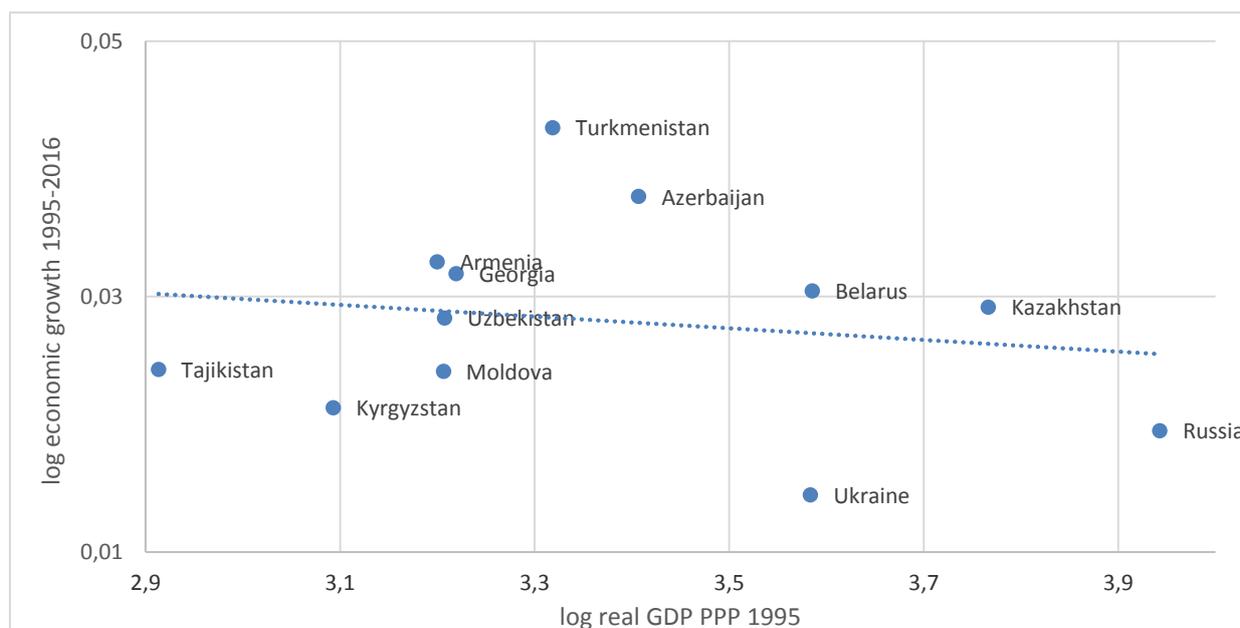
Figure 1: ß-convergence in the post-Soviet countries, 1995–2016

Beta coefficient was negative for the period between 2006 and 2009, however, its value is not statistically significant (Table 3). This could be cause by the high oil prices and the difference of the export structure of the monitored countries. For the periods 2000–2006 and 2000–2008 we can even talk about divergence. The differences between the monitored countries were increasing during these years.

Table 3: ß-convergence of the Post-Soviet states for chosen periods

	Coefficient	Std. Error	t-ratio	Convergence
2000–2006	0.204316	0.0122212	0.660028	NO
2000–2008	0.180276	0.0117437	0.579579	NO
2000–2014	−0.029978	0.0092832	−0.094842	YES
2006–2009	−0.008293	0.0115620	−0.026227	NO*
2009–2014	−0.194639	0.0081171	−0.627504	YES

Note: * the results are not statistically significant

Based on the relations (1-6) illustrated in the methodology, sigma convergence alone has not been calculated. The speed convergence was different in individual periods of time, however, it might be concluded that it was very low.
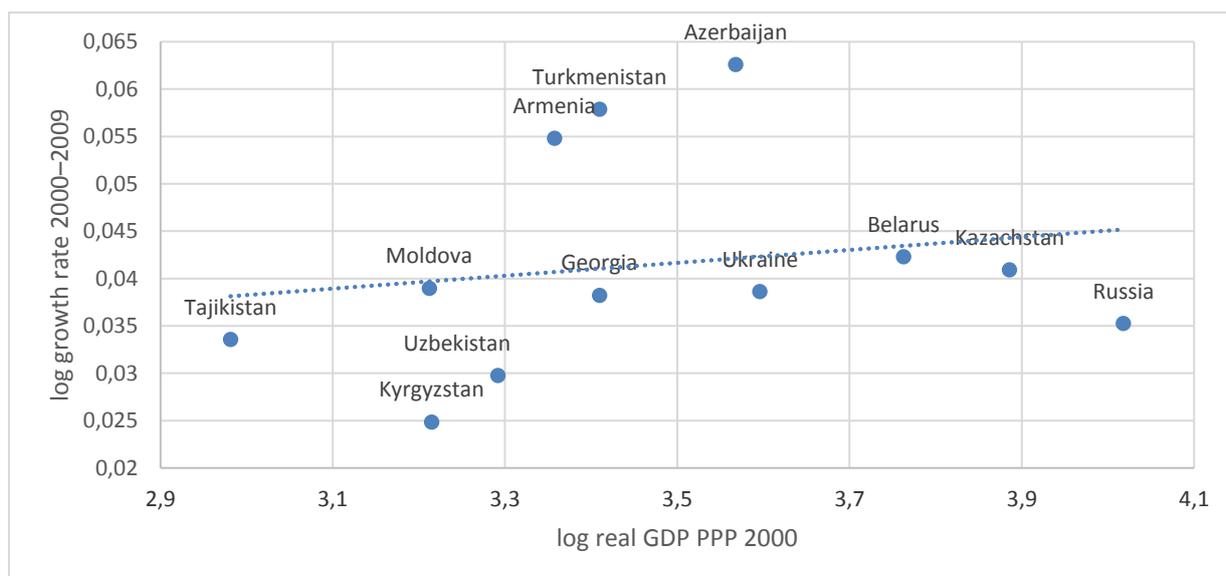
Figure 2: Non-existence of ß-convergence in the post-Soviet countries, 2000–2009

Sigma convergence is another indicator of convergence which measures the dispersion of real GDP per capita throughout individual countries. It is evident from Figure 3 that the post-Soviet countries tend to converge. The coefficient of variation displays a long-term declining tendency.
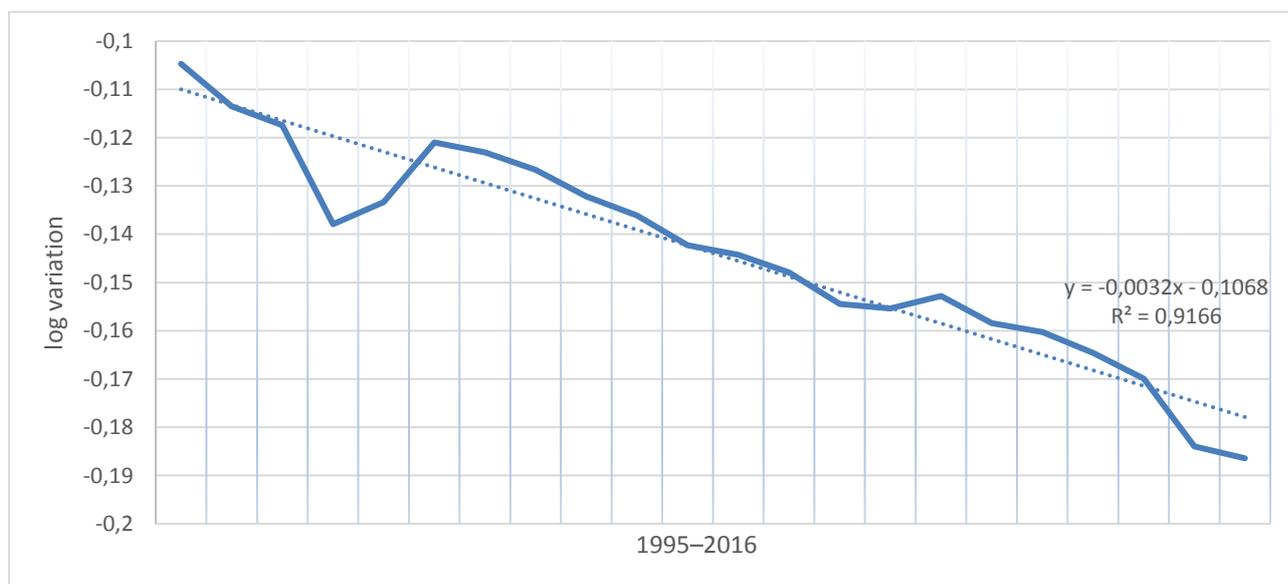
Figure 3: Sigma convergence

However, there are time periods in a short space of time in which no convergence occurs. This concerns for example the period between 1998 and 2000, in which the inter-regional differences were larger. This period of time is connected with the economic transformation of the post-Soviet countries, followed by the financial crisis at the end of the 1990s. The period of rapid economic growth ensued, which strongly influenced economic and political relations of the post-Soviet countries and enhanced regional cooperation of the

monitored countries. The cooperation was evident in the increase of the number of multinational corporations in economically most powerful countries as well – Russia and Kazakhstan, extending to other post-Soviet states.

A slight increase of divergence has been recorded after 2009 as well – once again in connection with the economic crisis. In the recent years, the monitored countries have again recorded economic growth and at the same time the differences between them have diminished.

4. Discussion and Conclusions

As is evident, economic convergence occurs within the post-Soviet countries and is essential for further regional integration. The connection between economic convergence and regional integration within the post-Soviet countries has been emphasised by for example (Hartwell 2013; Libman & Vinokurov 2012a; Vinokurov & Libman 2012). However, some authors remark that the economic situation in Russia and its political and economic power will be crucial in the process (Kirkham 2016; Atik 2014; Libman & Vinokurov 2012a; Hale 2010; Sevim 2013; Benesova et al. 2016). The nature of individual countries' economies also plays a vital role (Benešová & Smutka 2016).

Based on the conducted analyses, it might be concluded that the post-Soviet countries recorded economic convergence in the period between 1995 and 2016. Both beta and sigma convergence have been verified in the monitored period. However, when individual time periods are analysed, the convergence has not been verified for the period between 2000 and 2009.

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Revealed comparative advantage: a case study for Austria versus the Czech Republic and Slovakia

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Abstract

Trade in Services is a rapidly growing phenomenon. In this paper we describe patterns of competitiveness for Austria over the period from 2006 to 2015, with differentiation among 12 individual service activities. To study Austria's competitiveness and its progress, the applied index – the revealed comparative advantage (RCA) – is calculated. This Index was developed by Balassa and has evolved through several studies. With the use of analysis, we consider whether Austria is a rival for these two countries. Austria's competitiveness lies in traditional, yet globally declining sectors such as travel, transport, other business services, financial services and construction, while the country is weak in telecommunications, computer and information services, insurance, royalties and licence fees, personal, cultural and recreational services.

Keywords: revealed comparative advantage, trade in services, competitiveness, Austria

JEL Code: F14

1. Introduction

One of the most powerful propositions of classical trade theory is that the pattern of international trade is determined by comparative advantage. That is, a country with the comparative advantage in a given commodity exports, and the other with the comparative disadvantage imports. Thus, the first question has been where then the Austrian comparative advantage in services originates from and the second in which sectors is Austria a rival for Czech Republic and Slovakia. Faced with increasing competition from low-wage economies, Austria has to specialise in even more sophisticated nomenclature. It is evident that foreign trade is more or less important to countries. Services account for the majority of economic activities in the world with 70.5 % of GDP in 2013 (The World Bank, 2013). The importance of services to modern economies is already well

known. In this paper, we focus on Austria, a country which represents a small open economy. RCA analysis is extensive in the economic literature (Hinloopen & Marewijk, 2001) and discussed somewhat critically (Bowen, 1983; Bowen, 1985; Vollrath, 1991). We used the RCA index to evaluate comparative advantage on the basis of the country's specialisation in export and import of services and the advantage of export, relative to the Czech Republic and Slovakia, as they have a common historical development. This is a universal method of analysing trade data. We collected the data from various sources (e.g. Austrian National Bank, Statistics Austria, ITC and OECD). Given that we are interested in the competitiveness of Austria versus both neighbouring states, we have chosen to calculate RCAs of both the Czech Republic and Slovakia as the comparator, using total trade flows. This paper is divided into two sections. The first section is dedicated to Austria's Trade in Services over the period from 2006 to 2015 and its structure. The second section describes the competitive position within the two neighbouring states by the trade of services. The analysis commences with two RCA measures and their results, which are discussed.

2. Methodology

Comparative advantage is the ability of the production of goods and/or services at lower opportunity costs than others. In other words, if a country can produce goods or services at lower relative costs than other countries, and then trade in them, that country should devote more of its scarce resources to the production of those particular goods or services. In literature, several formulas are used to measure the weak and strong sectors of a country. One of the most generally used methods involves the concept of revealed comparative advantage developed by Balassa (1965). Alternatively, as the actual export flows *reveal* the country's strong sectors, it is also known as Revealed Comparative Advantage. The Balassa Index basically measures normalised export shares, with respect to the exports of the same industry within a group of reference countries. Here we find the pros and cons of the Balassa Index, but this index is most generally used to identify the country's strong sectors (Borbély, 2004; Gherke, Krawczyk & Legler, (5); Utkulu & Seymen, 2004; Vollrath, 1991). The Index is not a cardinal or ordinal measure, but provides a useful tool for detecting the comparative advantages of Austria in services. Despite the fact that the trade of services is less obvious to measure, we use the aforementioned data to calculate these RCAs for the analysis of services. In this case, the Index is calculated as follows:

$$RCA_{srt} = \ln (X_{srt}/M_{srt})/(X_{rt}/M_{rt}), \tag{1}$$

where X_{srt} and M_{srt} denote the global export (X) and import (M) volume in region r and services s in year t. X_{rt} and M_{rt} represent the total global export and import volume in region r in year t.

$$RCA_{est} = \ln (X_{esA}/X_{etA})/(X_{esR}/X_{etR}), \tag{2}$$

where X_{esA} denotes Austria's exports of services and X_{etA} Austria's total exports.
X_{esR} represents the rival country's exports of services and X_{etR} the rival country's total exports.

A positive Index reveals a comparative advantage, whereas a negative Index reveals a comparative disadvantage.

3. Results

3.1. Austria's Trade in Services

Trade data from 2006 to 2015 were provided by the Austrian National Bank, together with the Statistics Austria at the end of June 2016. A review of the data is presented in Figure 1 and Table 1. This demonstrates that Austrian trade was steadily increasing from EUR 8.379 million in 2006 to EUR 12.210 million in 2008, influenced by the global financial crisis that caused a decline of EUR 10.345 million until 2010. The next increase from EUR 10.661 million began in 2011 and continued to EUR 11.629 million in 2015.
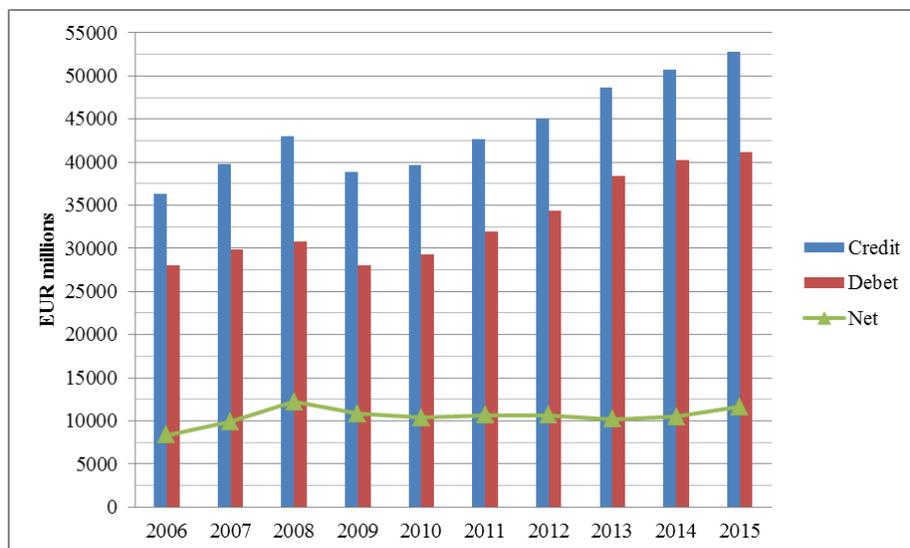
Figure 1: Austria's Trade in Services, 2006–2015.
Source: author's own calculation based on OENB (2016a)

Table 1: Austria's Trade in Services, 2006–2015 (in € million). Source: author's own calculations based on OENB (2016b)

Export	Exported Value in 2006	Exported Value in 2007	Exported Value in 2008	Exported Value in 2009	Exported Value in 2010	Exported Value in 2011	Exported Value in 2012	Exported Value in 2013	Exported Value in 2014	Exported Value in 2015
All services	36357	39758	42977	38825	39664	42611	45053	48611	50710	52761
Subcontracting fees	609	606	675	727	389	471	255	664	755	854
Maintenance and repair services n.i.e.	208	149	172	160	199	253	287	487	473	503
Transport	9364	10079	10605	8943	10099	10827	11028	11798	12341	12868
Travel	13255	13641	14677	13895	14027	14267	14706	15237	15676	16497
Construction	772	1001	1167	1006	884	550	584	657	587	661
Insurance	602	984	922	895	917	724	929	869	704	723
Finance	1386	2222	2704	1940	1868	2332	2235	2371	2483	2340
Royalties & Licence fees	561	686	804	717	698	748	853	810	815	777
Telecommunications, computer, and information services	2374	2598	2847	2779	2783	3220	3904	4367	4892	5054
Other business services	6698	7156	7738	7092	7143	8521	9484	10442	11131	11584
Personal, cultural, and recreational services	181	201	248	223	234	264	320	413	370	381
Government services	347	436	418	447	422	432	468	497	483	519
Import	Imported Value in 2006	Imported Value in 2007	Imported Value in 2008	Imported Value in 2009	Imported Value in 2010	Imported Value in 2011	Imported Value in 2012	Imported Value in 2013	Imported Value in 2014	Imported Value in 2015
All services	27978	29871	30767	27970	29319	31950	34382	38420	40200	41132
Subcontracting fees	1068	1117	1207	806	876	1004	878	1713	1806	1836
Maintenance and repair services n.i.e.	113	111	113	202	119	243	213	457	461	556
Transport	8328	9053	9529	7855	9375	10728	11177	12016	12603	12701
Travel	7641	7699	7721	7744	7718	7531	7825	7737	8149	8124
Construction	612	878	1044	792	677	571	659	690	689	671
Insurance	876	1296	784	869	800	843	800	750	842	882
Finance	1029	1104	1066	943	1086	1203	1273	1302	1427	1568
Royalties & Licence fees	1268	1305	1441	1220	1212	1344	1522	1319	1207	1364
Telecommunications, computer, and information services	1873	2153	2273	2149	2152	2288	2600	3086	3334	3356
Other business services	4453	4450	4853	4678	4471	5378	6519	8392	8743	9100
Personal, cultural, and recreational services	634	615	649	627	748	722	827	862	844	880
Government services	84	89	87	84	86	94	90	96	95	92

The value of exports rose by 49 % over the period, imports expanded by 41 %. Three of the services shrank steadily from 2009 onwards (see Fig. 2); these are **travel** (e.g. business trips, seasonal workers, commuters, private trips, holidays, study and health tourism), **telecommunication**s, **computer and information services** and **other business services** (e.g. research and development, marketing, auditing, tax consultation, recycling, etc.) in this group. The expansion of exports was particularly strong in travel too, and Austria is stronger in exports than imports. Over time, other services have become more important, and the structural change in Austrian services' trade has been significant. Transport also dominated exports, but compared to imports, we can state a falling share. However, we can not state that transport has lost its importance for Austria.
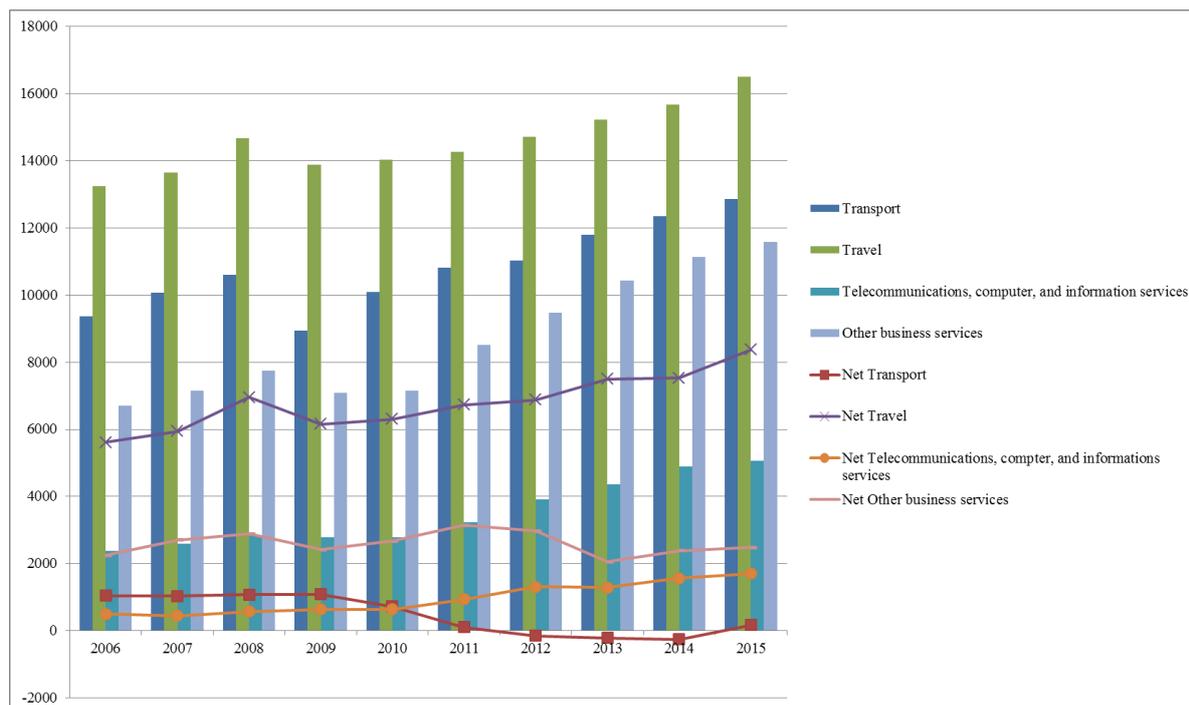
Figure 2: Sectoral Structure Trade Services, 2006–2015.
Source: author's own calculations based on OENB (2016b)

3.2. Competitiveness as Revealed Comparative Advantage

In this section, we describe Austria's competitive position within two states of the European Union as revealed by trade flows, by comparing the country with the competitors in services. As a result, the calculations in this section are based on data drawn from the Austrian National Bank and International Trade Centre. We implement the principle of comparative advantage mentioned in the methodology. Table 2 and Figure 3 show that Austria's advantages in services were generally rising. However, *transport* rose until 2009, but weakened and returned to zero in 2014; *finance* grew steadily until 2008, with a second peak reached in 2011; thereafter it weakened; *telecommunications, computer and information services* increased until 2012, followed by a brief decline and again growth; *other business services* increased until 2011 and decreased in 2013, before remaining constant; *travel* and *government services* steadily increased.

Table 2: Austria's Relative Comparative Advantages of the Services in Trade, 2006–2015 (rounded to two digits). Source: author's own calculations based on ITC (2015a, 2015b), OENB (2016b)

RCA$_{srt}$	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Subcontracting fees	-0.56	-0.61	-0.57	-0.07	-0.77	-0.68	-1.17	-0.90	-0.85	-0.75
Maintenance and repair services n.i.e.	0.62	0.29	0.44	-0.20	0.55	0.12	0.37	0.11	0.05	-0.08
Transport	0.12	0.10	0.12	0.17	0.11	0.09	0.06	0.03	0.00	0.03
Travel	0.55	0.57	0.66	0.62	0.64	0.71	0.70	0.72	0.68	0.73
Construction	0.23	0.13	0.12	0.28	0.31	0.04	-0.05	0.00	-0.16	0.00
Insurance	-0.37	-0.28	0.18	0.07	0.18	-0.08	0.22	0.19	-0.16	-0.18
Finance	0.30	0.70	0.95	0.76	0.58	0.74	0.63	0.64	0.57	0.42
Royalties & Licence fees	-0.81	-0.65	-0.57	-0.49	-0.51	-0.51	-0.51	-0.44	-0.37	-0.55
Telecommunications, computer, and information services	0.23	0.18	0.24	0.29	0.30	0.42	0.48	0.39	0.40	0.43
Other business services	0.41	0.47	0.48	0.45	0.51	0.54	0.44	0.26	0.26	0.26
Personal, cultural, and recreational services	-1.25	-1.12	-0.95	-1.00	-1.12	-0.93	-0.88	-0.69	-0.80	-0.82
Government services	1.41	1.59	1.59	1.71	1.63	1.60	1.72	1.69	1.65	1,75
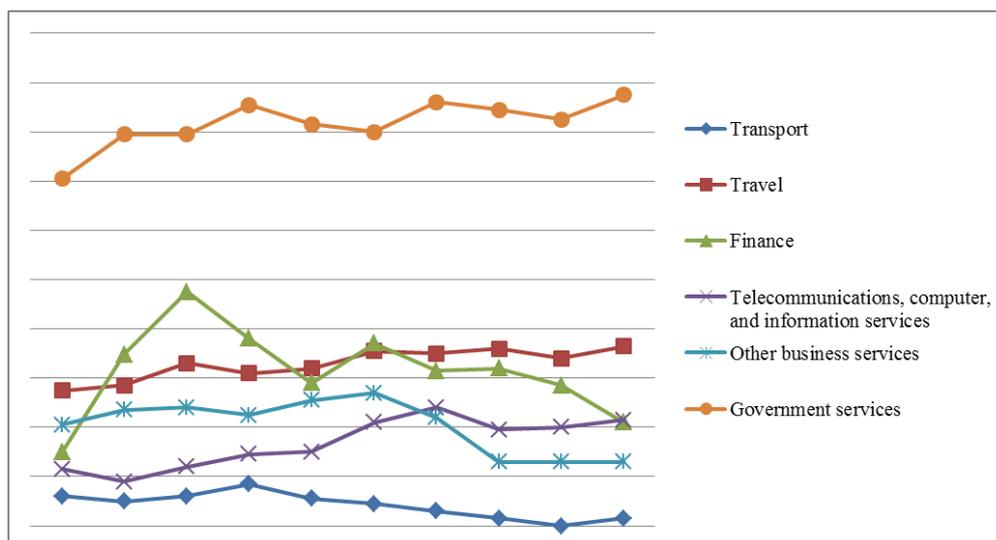
Figure 3: Austria's Advantages, 2006–2015.
Source: author's own calculations based on ITC (2015a, 2015b), OENB (2016b)

A positive value of RCA is interpreted as an indication of Austria's comparative advantage versus the two rival states. Table 3 lists the RCA$_{est}$ Index values calculated for 9 instead of 12 services, because of different statistical data in the selected countries. The green marked fields indicate a comparative advantage of Austria in that service category. Both competing states have a significant comparative advantage over Austria according to the Index in *telecommunications, computer and information services*. Austria had a comparative disadvantage versus the Czech Republic in *insurance and pension services,* but had a comparative advantage over Slovakia, excluding in 2012. The Czech Republic had the upper hand over Austria in *government goods and services n.i.e.* until 2012. It lost

its edge, starting in 2013, but Austria had a significant advantage in this service. Austria had the advantage over the Czech Republic in *personal, cultural and recreational services* until 2012; after this period, Austria lost its position compared to Slovakia, which had the comparative advantage, except for the year 2009.

Table 3: Austria's Relative Comparative Advantages of services versus two rival states, 2006–2015 (rounded to two digits). Source: author's own calculations based on ITC (2015a, 2015b), ITC (2015c).

RCA versus rival	Year	Travel	Transport	Other business services	Tele-communications, computer, and information services	Financial services	Insurance and pension services	Construction	Government goods and services n.i.e.	Personal, cultural, and recreation-al services
Czech Republic	2006	0.70	0.40	1.15	-0.23	3.38	-1.08	2.56	-0.04	0.70
Slovakia		1.23	0.46	2.13	-0.73	2.44	1.80	0.62	1.95	-1.57
Czech Republic	2007	0.74	0.26	1.19	-0.48	4.33	-1.75	3.19	-0.38	0.73
Slovakia		1.23	0.45	2.05	-0.41	2.10	1.94	0.49	2.19	-2.34
Czech Republic	2008	0.85	0.18	0.93	-0.14	5.01	-3.21	4.46	-1.97	3.05
Slovakia		1.22	0.42	2.06	-0.05	2.10	1.33	0.91	1.45	-0.39
Czech Republic	2009	0.87	0.07	1.03	-0.25	5.67	-4.04	5.10	-2.28	3.10
Slovakia		1.26	0.60	2.28	-0.28	3.11	0.73	2.72	0.77	0.63
Czech Republic	2010	0.87	0.06	0.96	-0.31	5.89	-4.45	4.64	-1.76	2.24
Slovakia		1.30	0.67	2.18	-0.03	3.28	0.12	1.86	2.07	-0.58
Czech Republic	2011	0.86	0.11	0.98	-0.29	5.96	-4.80	4.69	-2.05	2.44
Slovakia		1.29	0.67	2.25	0.36	3.30	0.29	0.73	3.31	-1.84
Czech Republic	2012	0.92	0.06	1.12	-0.42	6.41	-5.11	5.01	-2.14	2.65
Slovakia		1.37	0.55	1.95	-0.25	3.43	-0.48	1.33	2.72	-1.07
Czech Republic	2013	0.95	0.09	0.88	-0.13	2.97	-1.54	1.87	1.09	-0.03
Slovakia		1.35	0.45	1.52	0.22	2.85	0.47	0.81	3.71	-1.02
Czech Republic	2014	1.09	-0.02	1.08	-0.29	2.93	-1.76	1.80	1.52	-0.62
Slovakia		1.36	0.43	1.65	0.26	2.64	0.17	1.16	3.99	-1.05
Czech Republic	2015	1.15	-0.13	1.16	-0.39	2.92	-1.78	1.76	1.56	-0.45
Slovakia		1.36	0.45	1.67	0.21	2.28	0.37	1.20	3.09	-0.41

For 5 of the services (*travel, transport, other business services, financial services and construction*), Austria had the comparative advantage in general terms, except for transport in the Czech Republic in 2014 and 2015. However, we can assert that Austria was superior.

4. Discussion and Conclusion

We suggest further researches at disaggregated (NUTS2) level, as they are rare. To date, we have found only one dataset compiled by the Netherlands Environmental Assessment Agency, Thissen, Diodato & Oort (2000). Furthermore, there should be a focus on the rest of Austria's neighbours. Both the Czech Republic and Slovakia reveal more and less successful performances at the industry-regional level. We think that this improves understanding of the regional aspect of competitiveness, including a future point of view of the economic development of the region.

Trade data allow, inter alia, the identification of industries or products in which the regions realise their trade specialisations. Trade in Services is a rapidly increasing phenomenon, deserving of more focus. In this paper, we added two new aspects to this discussion. The first is the provision of an overview of Austria's performance in trade services according to the data from 2006 to 2015, and the second is the use of own RCA indices to analyse the advantage or disadvantage and competitiveness in the services. To sum up, Austria is a region with 5 strong services in trade that are typical of their export

commodity. This raises the question whether Austria should be concerned about this situation. There is no clear-cut answer in these hard times. Of course, the answer should be "YES", because there is the impression that Austria is losing out in telecommunications, computer and information services; partly in insurance and pension services and, since 2012, in the personal, cultural and recreational services sectors. Such a lack of competitiveness in these categories may have negative consequences for economic growth and employment in the long term. This research does not include a special reference to tourism, which could better show us the major competitiveness of these regions. The empirical findings suggest that Austria has comparative advantages over the two rival countries, thus the revealed comparative indices measure the observed data of trade. The observation itself does not prove that there are significant problems in Austria, Slovakia and the Czech Republic. Moreover, we observe that Austria's advantages and disadvantages are mostly determined by the structural features of the economy and of the individual service sectors. We can only confirm that Austria gains from its strategic position as a gateway between the East and West.

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Dependence between selected perspectives in the Balanced Scorecard

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Abstract

Balanced Scorecard (BSC) is one of the methods for measuring of the company's performance, strategy formulation and subsequent management leading to improving competitiveness. Nowadays company performance has an important role because the competitive environment is much more changeable and more difficult to predict because of the influence of globalization.

BSC is worldwide used both in large, medium and small businesses regardless of the field of business. According to Knápková, Homolka and Pavelková (2014), this model is used only by 13% of the enterprises in the Czech Republic.

BSC monitors business performance from four perspectives: Financial, Customer, Internal Process, Learning and Growth. The main aim of this paper is to verify whether there is a correlation between Learning and Growth and Financial perspective. Data were obtained from the database Albertina Gold and from quantitative research in companies in 2015. As sample small and medium enterprises in Czech Republic were chosen by random selection. Data were analysed by using regression analysis. Based on the analysis the dependence of some financial indicators on the attitude of the company to the risk and on long-term or short-term orientation was proved.

BSC is spread in 30–50% companies all over the word, in Australia this method is used even in 88% companies (Al Sawalqa, Holloway and Alam, 2011). Due to proven dependence it would be appropriate to raise Czech companies´ awareness of advantages of this method.

Keywords: BSC, competitiveness, efficiency, SMEs, cultural dimensions

JEL Code: M14, G30, M21

1. Introduction

Balanced Scorecard (BSC) is a method for measuring of the company performance, which was developed with the realization that the explanatory power of aggregate financial indicators is very limited and the business environment is facing many changes, such as market segmentation, globalization, innovation, knowledge, etc. This method is used to formulate new strategies and communication in society. This method has evolved since its formation. Initially it was presented as a performance evaluation system (Kaplan and Norton, 1993). However In the final concept, BSC is taken as a strategic management system (Kaplan and Norton, 1996).

According to Mooraj et al. (1999) BSC is an essential tool for companies, as it provides important information for management in a concise form, and creates a favourable environment for organizational learning. It's also a comprehensive management system that provides limits and explains the four perspectives and their key problematic factors of company. BSC is interactive due to the relationship of cause and effect as well as diagnostic, because it includes long-term indicators.

Authors such as Kanji and Sá (2001, 2002) conclude that the BSC is used in two different forms: as an information system that supports targeting senior managers and as a strategic system based on the criteria presented by Kaplan and Norton.

This method swaps frequently used financial indicators of business performance focused on the future for measures that include driving forces of future performance. BSC is based on the vision and strategy of the company and monitors its performance from four perspectives i.e.: Financial, Customer, Internal Process and Learning and Growth. BSC is considered as a mechanism for implementing of strategy, not for its formulation (Kaplan and Norton, 2001).

Model BSC should be understood as a template. Every business can choose more or less perspectives according to its surrounding. Indicator in the BSC should be integrated into the chain of causation, which defines the strategy of the company (Kaplan and Norton, 2005).

1.1. The Financial Perspective

The Financial Perspective uses traditional accounting indicators with the aim of assessing the short-term financial results of the company (Voelpel et al, 2006).

The indicators are focused on the past and usually include indicators relating to the profitability of the enterprise. Among the most commonly used indicators are included Growth in Sales, Gross Profit, Net Profit, Return on Sales, Cash Flow, Profit per Employee, EVA, Earnings per Share and Return on Equity or Earnings before Interest and Taxes (Al Sawalqa, Holloway and Alam, 2011). All the above mentioned indicators are focused on profitability. Net Working Capital is another used indicator. This indicator determines the available operating funds remaining after payment of short-term liabilities. According to Knápková, Pavelková and Šteker (2013) this indicator is one of the most important differential indicators and has a significant influence on the solvency of the company.

During setting of financial objectives related to income it is also necessary to consider the risk. The yield strategy should be complemented by strategies determining the degree of risk of the enterprise (Kaplan and Norton, 2005).

Benchmarks in the Financial Perspective differ from company to company, so there is no clear criterion that would be applied across organizational framework and environment (Abdalkrim, 2014).

Financial indicators and targets should define financial performance expected from the strategy and serve to evaluate goals and measures of all other perspectives BSC (Kaplan and Norton, 2001). Petera, Wagner and Menšík (2012) and Tapanya (2004) agree with the opinion of Kaplan and Norton (2001) that it is the most important perspective.

Each strategy according to lifecycle phases correspond to three financial areas that supported by them. It is: an increase in sales mix of products / services (marketing mix), reducing costs / increasing productivity and resource utilization / investment strategy. The first area is influenced primarily by new products, new applications, new customers and markets, new relationships, new mix of products and services, new pricing strategy. Higher Turnover, Lower Unit Costs, Improving of the Mix of Sales Channels and reducing of Operating Costs act in the second area. The final area is dependent on improving resources utilization and cycle cash-to-cash, which represents the time from the payment for inputs to receiving payment from the customer (Kaplan and Norton, 2001).

1.2. The Customer Perspective

In this perspective, the company must define market segments and customers for who should be their product designated (Kaplan and Norton, 2005).

This perspective includes four key areas namely time, quality, service and performance. Market share, customer retention, new customer acquisition, customer satisfaction and customer profitability can be included to a group of basic indicators. The value of indicators reflects meeting customer needs and includes price levels, time of the order realisation, market share, percentage of new and existing customers, or customer satisfaction (Al Sawalqa, Holloway and Alam, 2011).

Hoque and James (2000), customer satisfaction survey, the number of customer complaints, market share, percentage of mail returned because of poor quality, delivery time, warranty costs, customer response time and cycle time from order to delivery considered an indicator.

1.3. The Internal Process Perspective

This perspective is based on the concept of the value chain – including processes required to implementation the desired product or service (Voelpel et al., 2006). According to Kaplan and Norton (2005) besides operational processes and after-sales services, innovative processes might be included into the evaluation of the perspective. Core business processes enable the organization not only to provide value to the customer, but also to satisfy shareholder expectations about the high financial performance (Al Sawalqa, Holloway and Alam, 2011).

In general, the key indicators of this perspective are: Material Efficiency Variance; Ratio of Good Output to Total Output at each production process; Manufacturing Lead Time; Rate of Material Scrap Loss; Labour Efficiency Variance; Product Defects; introduction of new products, the Efficiency of Product Design (Al Sawalqa, Holloway and Alam, 2011).

1.4. The Learning and Growth Perspective

The Learning and Growth Perspective identifies the intangible assets that are most important to the strategy. The objectives in this perspective identify which jobs (the human capital), which systems (the information capital), and what kind of climate (the organization capital) are required to support the value creating internal processes (Kaplan, 2005). Indicators belonging to this perspective are: employee skills, the way of leadership, organizational learning, employee satisfaction (Abdalkrim, 2014).

Opinion on employees has changed in recent years. Suggestions of improving processes owing to customers have to come primarily from employees who are close to customers. The satisfaction in the job affects loyalty, commitment and employee productivity (Kaplan and Norton, 2005). Activities of Learning and Growth Perspective are aimed on a strategy for increasing the organization's ability through its employees (Thompson and Mathys, 2008).

According to researches, satisfaction of employees is connected with various factors (for example suitable surrounding in workplace, creating good atmosphere and climate in workplace, communication between subordinates and superiors, attitudes of employees, development of employees, etc.). Most of these factors are connected with organizational (corporate) culture. Communicating the BSC throughout the organization creates shared understanding and commitment about the organization's long-term objectives and its strategy for achieving them. Adherence to values and cultural norms can be measured within the learning and growth's organizational capital component (Kaplan, 2005).

"The literature further points to organizational culture as being a key mediating factor in BSC effectiveness as measured by performance improvement (Kaplan and Norton; Rigby and Bilodeau in Deeam et al., 2010)." Organizational culture and organizational learning are closely related: "culture ultimately reflects the group's effort to cope and learn and is the residue of learning process" (Schein in Sørensen, 2002); "organizational culture also define for future organizational learning" (Sørenson, 2002).

"Culture is the glue which keeps organization together as a source of identity and distinctive competence" (Bass in Yildrim and Birinci, 2013). "To achieve a global vision is no question of the importance of using organizational culture" (Muscalu, 2014). Desirable and strong corporate culture is a crucial factor in the successful development and improving of the enterprise (Krninská, 2002).

Culture is often difficult to measure. Qualitative approaches are preferable (Acar and Acar, 2014). For the paper was chosen dimensional approach of G. Hofstede (G. Hofstede, 1994) to diagnostic of organizational culture.

1.4.1. Cultural dimensions according G. Hofstede

According to Hofstede and Hofstede (2005) we perceive values as a general trend to differ some facts from other states, and thus it is possible to define the core of the culture.

The small power distance can express cohesion between subordinates and superiors, and enables the development of the human capital. It generally allows contributing ideas to the development of the company and working with an innovative potential of the company to all employees. It also supports the transfer of information and it is a prerequisite for their better utilization (Krninská, 2014). **Within large power distances** superiors and subordinates consider one another to be existentially unequal. It is felt

that the hierarchy of power is based on this existential inequality (Hofstede and Hofstede, 2005).

Collectivism opens a possibility of cooperation and teamwork, since the individual is encouraged to give their unique individual abilities for the benefit of the society (Krninská and Duspivová, 2014). The employees in an **individualistic society** are considered to be act in accordance with their own interest and the work should be organized so that their interest and the interest of the employer match.

Femininity is focused on the care of mutual interpersonal relationships guaranteeing an openness and trust. Caring for the quality of the environment is also associated with a responsible attitude towards the concept of corporate social responsibility (Krninská, 2014). In a **masculine society** men are socialized in the direction of assertiveness, ambition and competition (Hofstede and Hofstede, 2005).

The small uncertainty avoidance, change management and risk allow easier dealing with discontinuous changes in a global society (Krninská, 2014). In an environment in which people **avoid uncertainty** there is a number of formal laws and informal conventions that determine the rights and obligations of employers and employees (Hofstede and Hofstede, 2005).

Long-term orientation is the cultural dimension of corporate culture, fulfilling the principles of sustainability (replacement of immediate profit by optimal profit) and related with objectives and long-term perspective of business, which is based primarily on invest to the human capital development and its potential (Krninská, 2014). Considering **short-term orientation**, extreme personal peace and stability can discourage from initiative, exploration risk and willingness to change, which requires from the entrepreneur to change market conditions (Hofstede and Hofstede, 2005).

2. Methodology and Data

Data set for empirical analysis consists of randomly chosen companies in the Czech Republic and includes information about the Learning and Growth and the Financial perspectives. Values of indicators were gained in different ways in both perspectives. Data set contains 67 companies from the year 2015.
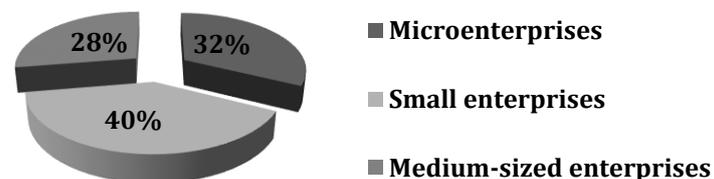
Figure 1: Distribution of the sample by size of enterprises

Enterprises were divided into microenterprises (0–9 employees), small enterprises (10–49 employees), and medium-sized enterprises (50–249 employees). These categories of enterprise sizes defined by the number of employees were determined by Commission Regulation No. 800/2008. In the examined sample, the following sectors are represented: trade 29%, services 30%, construction 8%, and manufacturing 33%.

First of all, companies filled out a questionnaire VSM 94. VSM 94 was evaluated according to the methodology for data processing of VSM 94 (Hofstede, 1994). According

to this methodology, individual indices of the dimensions take values from 0 to 100, but it is not an exception that it takes lower or higher values. From the questionnaire were gain values for Hofstede´s cultural dimensions (Hofstede, 1984), where dimensions reflect structure of cultural system. Information about the Learning and Growth Perspective was gained by index of cultures dimensions that are defined in table 1 below.

Table 1: Cultural dimensions

Index	Value of dimension	
	< 50	> 50
Power distance index (PDI)	Lower power distance	Higher power distance
Individualism vs. collectivism (IDV)	Collectivism	Individualism
Masculinity vs. femininity (MAS)	Femininity	Masculinity
Uncertainty avoidance index (UAI)	Risk-taking	Uncertainty avoidance
Long-term vs. short-term orientation (LOT)	Short-term orientation	Long-term orientation

Secondly for each company, that had provided the filled questionnaire, information about The Financial Perspective was searched. Financial data were collected by database Albertina Gold and contains financial reports of given companies. The financial reports were used for computation of financial performance of companies. As indicators of financial performance were chosen Earnings after Taxes (EAT), Earnings before Interest and Taxes (EBIT), Return of Equity (ROE), Net Working Capital (NWC) and Cash Flow (CF). Formulas used for chosen indicators are defined in table 2. These indicators were chosen because of simple computation and recommendation of Al Sawalqa, Holloway, and Alam, (2011).

Table 2: Indicators of financial performance

Indicator	Formula
EAT	Given in financial report
EBIT	EBT + interest
ROE	EAT / shareholders' equity
NWC	Current Assets – Current Liabilities
CF	EAT + depreciation

The study of the Financial and the Learning and Growth perspective independence is based on multiple regression analysis that is tool for description of statistical dependency between the dependent variable Y and independent variables $X_1, X_2, \dots X_k$.
The general formula for prediction function is: $y = f(x_1, x_2, \dots, x_k; b_0, b_1, \dots, b_m)$, where $b_0, b_1, \dots, b_m$ are parameters that specify the functional form. To find out parameters $b_0, b_1, \dots, b_m$ the least squares method is used. The suitability of models was evaluated via the coefficient of determination (R^2).
The regression model was estimated by STATISTICA 12 software with the significant level 5%. Values of financial performance of companies were subsequently chosen as the dependent variables (Y) and indices of the cultural dimension were chosen as the independent variables ($X_1, X_2, \dots X_k$).

3. Results

The analyses reveal dependences between some cultural dimensions and some financial performance indicators of companies. In the table there are showed relationships be-

tween significant indicators of corporate culture and financial performances of companies.

Results show the existence of positive linear relationship between cultural dimensions and EAT and also EBIT, where these indicators are statistically dependent on the Uncertainty avoidance index in both cases. The scatterplots in the figure 1 depict relationship between Uncertainty avoidance index and Earnings after Taxes and Earnings before Interest and Taxes.

Table 3: Estimated models

Estimated models (t-ratios)	F-test	Coefficient of determination
$EAT = -18516.2 + 468.3\,UAI$ $(-0.798)\quad(2.644)$	6.807	0.1935
$EBIT = -20831.4 + 220.82\,UAI$ $(-0.772)\quad(2.564)$	6.445	0.186
$ROE = 0.1918 - 0.0019 MAS$ $(1.186)\quad(-2.033)$	2.077	0.110
$NWC = -141387 + 4706 LOT$ $(-0.635)\quad(2.064)$	3.776	0.152

As emerged from the analysis when companies try to avoid uncertainty they achieve better economic results. In that case companies create a number of formal laws and informal practices that determine the rights and obligations of employers and employees. This result is inconsistent with Hofstede and Hofstede (2005) who argue that to be afraid of uncertainty is not desirable state of the cultural dimension of the knowledge economy that allow easier coping with discontinuous changes in global society.
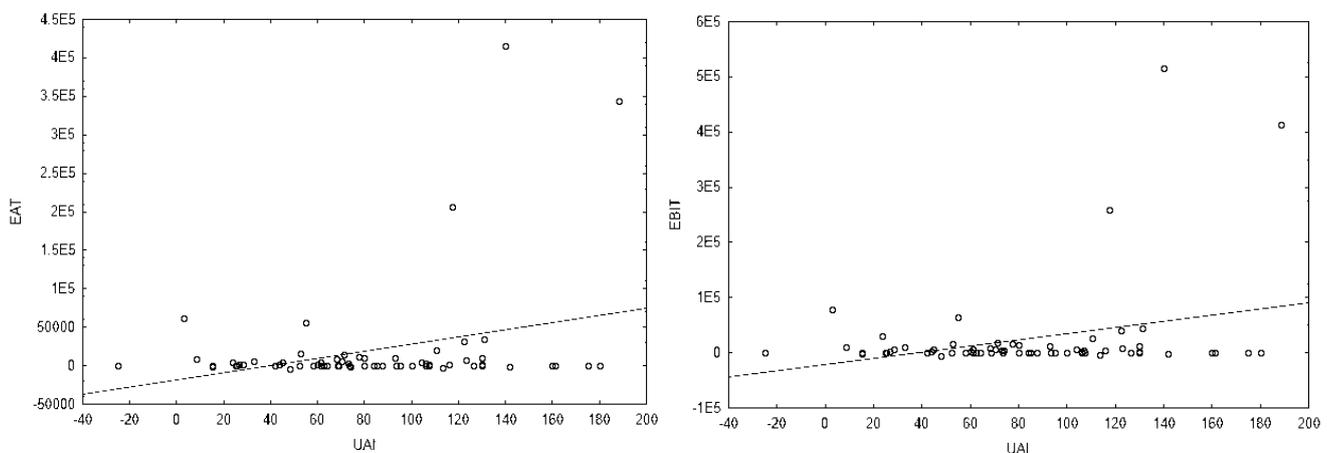
Figure 2: Relationship between UAI and EAT (on the left), EBIT (on the right)

Further it was found out negative linear relation between Return of Equity and the Learning and Growth Perspective where the Masculinity vs. femininity index is statistically significant. In the figure 2 there is depicted the scatterplot of relation between Masculinity vs. femininity index and Return of Equity.
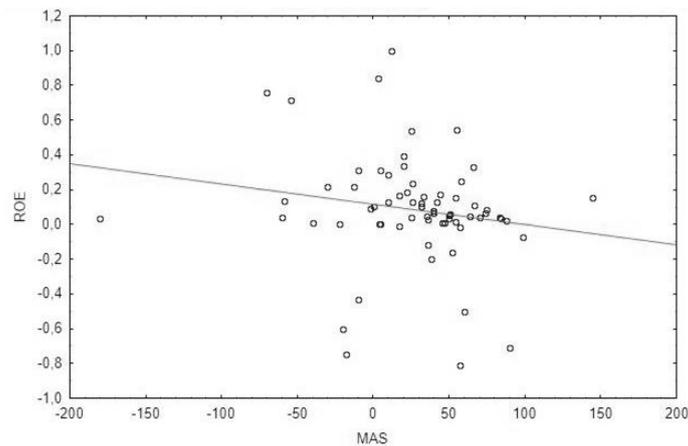
Figure 3: Relationship between MAS and ROE

According to the research companies are more profitable in case more feminine culture. This kind of companies prefers to reward people on the basis of equality, i.e. according to their needs. Hofstede and Hofstede (2005) claim that femininity is desirable cultural dimension of corporate culture for the knowledge economy that takes care of mutual relationships, guarantees openness and trust as a prerequisite for self-knowledge and self-developing processes. Therefore it is essential for the development of human capital. This atmosphere is the strongest factor that guarantees the continuity of knowledge and thus the performance of the organisation (Krninská, 2014).
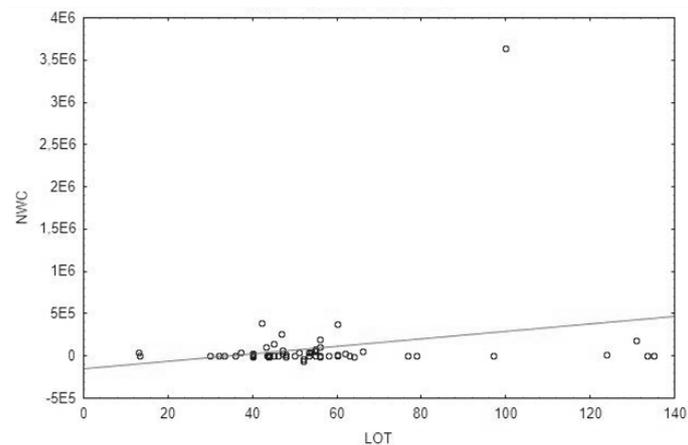
Figure 4: Relationship between LOT and NWC

The estimated model shows significant relationship between Net Working Capital and the Learning and Growth Perspective. This relationship is illustrated in the figure 3.

The result shows that the amount of the NWC is positively affected by the long-term orientation of the company. This result is consistent with the assumptions of a successful company by Krninská (2014) who argues that the long-term orientation is a required cultural dimension for a knowledge economy, fulfilling the principle of sustainability and related to long-term objectives and sustainable business that is primarily based on investments in human capital and its potential.

Last it was tested if there is any relation between Cash Flow and the Learning and Growth Perspective. There were not found out any statistically significant relations. Thus, corporate culture has no direct significant impact on Cash Flow, it can be determined by many factors.

4. Discussion and Conclusions

In this paper, relationships between chosen perspectives BSC were analysed. These perspectives were chosen with regard to their meaning. The Financial Perspective is generally considered the most conclusive. It reflects the financial performance in the fastest, most easy and most accurate way. The Learning and Growth Perspective was chosen as the second dimension, because it gets to the forefront with an emphasis on innovation capacity of enterprise and related competitiveness in recent years. Earnings after Taxes, Earning before Interest and Taxes, Return of Equity, Net Working Capital, and Cash Flow have been used in the financial analysis.

Within the Learning and Growth Perspective, diagnostic of corporate culture has been selected. Diagnostic of corporate culture is not included in most frequent indicators according to BSC authors, but it is crucial according to its definitions and practice managers. It is crucial for BSC and promotes the implementation and operation of this model as a whole. The dimensional model of the G. Hofstede was chosen. All by Hofstede specified dimensions are related to learning and growth in the company, whether by investing in human capital, building an environment for learning, sharing information or encouraging innovative behaviour of employees

Analyses showed dependences between the Learning and Growth and The Financial perspectives. The positive statistically significant relations were observed between UAI and EAT and then UAI and EBIT. Similar results are caused primarily by slight differences in method of calculation EAT and EBIT. Coefficient of determination in the model with EAT is 0.1935 and in the model with EBIT is 0.1858. It can be said that the variability of companies´ earns is explained by Uncertainty avoidance index from 19%. Then it was found out that MAS has an influence on ROE where the relation is explained from 11% and LOT affects NWC where the model can explained from 15%.

Low coefficient of determination of estimated models can be explained by another factors that can influence values of financial indicators such as customers' needs and behaviour, operational processes and innovation, etc., that are included in other perspectives. For more plausible capture of relationship in the BSC model it would be appropriate to work with other perspectives: Customer and Internal Process, which is another line of research.

Acknowledgements

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The impact of organisational trust on the functioning of Polish accredited testing and calibration laboratories

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Abstract

This study tackles the issue of the impact of organisational trust on the organisation's performance. The research covers special organisations – testing and calibration laboratories functioning in Poland. The credibility and reliability of their services is based on standardisation of methods, ensuring reproducibility and repeatability of research processes, which is usually achieved by means of implementation of accredited management systems. The implementation of accredited management systems results in the increase in the level of formalisation and control. However, in the traditional view, control is treated as the antagonist of trust. Nevertheless, the most recent literature reports prove that the relations between these two categories are not quite so obvious. Both of these elements always coexist in some form, affecting not only one another, but also the organisation's performance. In this context, the purpose of this study is to discuss the impact of the culture of trust on the performance parameters of special organisations – testing and calibration laboratories functioning in Poland.

Keywords: trust, control, management, organisation

JEL Code: D21, D22

1. Introduction

The literature more and more often emphasises the fact that a change in the functioning conditions of contemporary organisations makes trust one of the key factors determining their effectiveness. It can be expected that the shaping of culture based on mutual trust in

an organisation will be reflected in improvement in various aspects of its functioning, especially improvement in its effectiveness. This issue has not yet been the object of comprehensive scientific research.

This study tackles the issue of the impact of trust on the performance of organisations. The object of research will cover special organisations – testing and calibration laboratories functioning in Poland. The main distinguishing mark of their operation is the credibility and reliability of their research services, based on standardisation of methods, ensuring reproducibility and repeatability of research processes. It is most often achieved by means of implementation of accredited management systems, which is nowadays treated as the basic condition for competitiveness of such organisations. The implementation of accredited management systems results in the increase in the level of formalisation and control, which also favours higher organisation effectiveness. However, in the traditional view, control is treated as the antagonist of trust. Nevertheless, the most recent literature reports prove that the relations between these two categories are not quite so obvious. Both of these elements always coexist in some form, affecting not only one another, but also the organisation's performance. In this context, the purpose of this study is to discuss the impact of trust on the performance parameters of special organisations, strongly based on control – testing and calibration laboratories functioning in Poland. However, we should begin by defining the basic notions: the notion of trust, relations between trust and control, and the importance of trust for the functioning of organisations, as well as the adopted method of measuring the organisation's performance.

2. Trust vs. control in the context of the organisations' functioning – theoretical depiction

2.1. Trust

The notion of trust is not easily categorised; it is of an interdisciplinary nature, and hence particular scientific domains have different ways to define it. Psychologists and sociologists defining this term usually emphasise the relational and cognitive nature of this category. In this context, trust is most often defined as "a general promise of an individual that a word, vow, oral or written promise of another individual or group is credible" (Rotter 1967, p. 651, after: Politis 2003, p. 57), or an attribute, which reflects the expectation that others are trustworthy (Rotter 1971, after: Paliszkiewicz et al. 2014, p. 32–33), based on the previous experiences of the individual or social relationships. On the other hand, P. Sztopmka treats it as a special type of resource, which allows for making a certain type of assumption concerning the future, uncertain actions of other people (Sztompka 1999, p. 96). It is a social resource, embedded in interpersonal relations and shaped by social interactions. Trust can be also understood as a certain mental model – a belief or a set of beliefs concerning the way these relations "function" (Dovey 2009, p. 313). The economic approach mainly stresses the calculating nature of trust and the related risk (Paliszkiewicz et al. 2014, p. 33). From this perspective, trust is built upon an assessment of credibility of the people/system, in which the trust is placed, and assessment of the benefits of trusting. The aforementioned definitions of trust are successfully transposed from the general level to the world of organisations. From the point of view of management, the definition of F. Fukuyama seems particularly interesting, stating that trust means expecting fair, repetitive behaviour of the local environment or system, based on the norms commonly acceptable in this environment/system (Fukuyama 1995, after: Grudzewski et al.

2007, p. 33). In this context, the culture of a given social system has a tremendous impact on building of the "climate" of trust (or lack thereof).

The literature provides many classifications and varieties of trust. It most commonly distinguishes types of trust with regard to the characteristics and values underlying building of trust between individuals, or the entities, to which this trust is addressed. Thus, we can distinguish, among others, intra- and inter-organisational trust (Dovey 2009, p. 313–314), pertaining accordingly to relationships inside an organisation (superior – subordinate, employee – employee, individual – group), as well as between the organisation and its stakeholders (clients, suppliers, providers of capital, etc.), and also between organisations in various cooperation systems.

The object of interest in this article is intra-organisational trust, the aspects of which include trust towards the superiors (managers), trust towards the subordinates, trust towards the co-workers, and finally trust towards the organisation itself (organisational trust). The latter will be understood as a general belief that the organisation is trustworthy; a conviction that it will undertake actions that are beneficial for it, or at least consistent with its interests (Tan, Tan 2000, p. 243, after: Rusu, Babos 2015, p. 176).

Trust is strictly related to the system of values shared by the members of a given system. Thus, the literature sometimes defines the notion of trust also as "a combination of values, attitudes and beliefs shared by the members of a given population" (Rusu, Babos 2015, p. 176). In this perspective, it seems to have much in common with the idea of organisational culture (according to E. Schein, the basis for culture is formed by "sets of basic patterns of orientation and ideas (ideology), controlling perception and actions" (Steinmann, Schreyoegg 2001, p. 472). However, trust should not be identified with organisational culture. Trust (also in organisations) is culturally determined, although (organisational) culture is only one of many factors affecting its shaping. On the one hand, culture affects trust – "the underlying foundations of trust vary depending on the culture, both at the level of organisations, as well as nations" (Grudzewski et al. 2007, p. 41), and cultural diversity determines the tendency to trust and defines the source (calculation or familiarity) of trust (Grudzewski et al. 2007, p. 61). On the other hand, trust may underlie shaping of a specific culture in an organisation. When it is treated as the most important of the basic assumptions underlying organisational culture, it is possible to refer to evolution of a specific type of organisational culture – the culture of trust (culture based on trust).

2.2. Trust vs. control in an organisation

Change in the functioning conditions of contemporary organisations and the growing importance of trust as the basis for building effective cooperation systems inevitably resulted in a discourse on the relations between trust and control. From the point of view of an organisation, they are ascribed a very similar role – building the organisation's effectiveness, and often opposing effect. Increased control may lead to a smaller space for development of employees, which, in turn, they sometimes interpret as lack of trust (Bolwerk, Groot 2016, p. 274–275). On the other hand, offering "the benefit of the doubt" releases from the continuous monitoring and control, gives a wider margin for non-conformist, innovative and original actions (Sztompka 2012), and lack of trust creates the need for continuous surveillance – control. In this perspective, the focus on control mechanisms inevitably leads to a decrease in trust (Edelenbos & Eshuis 2011, after: Bolwerk, Groot 2016, p. 275–276). Even though the above observations are commonly noticeable, the relations between control and trust are not as simple and linear, and control cannot be treated only as the antagonist of trust. In fact, the literature is engaged in an animated

discussion on whether these notions are "... mutually substitutional, supplementary, complementary or antagonistic" (Grudzewski et al. 2007, p. 63-64). J. Edelenbos and J. Eshuis believe that control and trust affect one another, often in unpredictable and uncontrolled manner, and the relations between them result from the process of co-evolution and are difficult to foresee (determine) until they occur (Edelenbos & Eshuis 2011, after: Bolwerk, Groot 2016, p. 276). The key to understanding the multidimensionality of this relationship may be the observation that control mechanisms may be based on various sources. Traditionally, we distinguish control based on results and control based on processes/preservation. They correspond to external (formal) control, the sources of which are ascribed to formal principles, procedures and policies. At the same time, we can also refer to internal control, based on organisational standards, social values and culture (the so-called social control), as well as self-control (Grudzewski et al. 2007, p. 65–66). The factor influencing the shape of control-trust relations may also involve the initial level of trust in the organisation (Bieńkowska, Zabłocka-Kluczka 2017). In organisations with higher initial trust level, "application of rigid rules (...) in the form of performance and process control may undermine the trust, creating the atmosphere of mistrust" (Grudzewski et al. 2007, p. 69), whereas in organisations with low initial trust level, control based on formal principles and procedures, by giving a sense of order and making organisational behaviours more predictable, may paradoxically build trust to the organisation. On the other hand, social control, based on common values, systems of beliefs and preferences, may be an element strengthening trust, practically regardless of its initial level in the organisation.

However, a situation, when cooperation within the organisation is based solely on control or solely on trust, is purely hypothetical. An organisation always has specific structural conditions ("control dynamics") and variable social interactions ("trust dynamics") (Reed 2001, p. 216, after: Kalkman, Waard 2016, p. 3). Therefore, in practice, both these elements always coexist in some form, affecting not only one another, but also the organisation's performance. Furthermore, the relation between these categories may vary over time, even within a specific organisation.

2.3.   Trust and control vs. organisation's operational performance

"Generally, trust and control help reduce the perceived risk to an acceptable level, make the behaviour of the actors more predictable" (Grudzewski et al. 2007, p. 64).

The literature more and more often emphasises that trust is the key factor determining the operational efficiency of contemporary organisations (Galford, Seibold-Drapeau 2003, p. 89), facilitating, among others, learning, implementation of changes and overcoming of crises, determining the quality of interpersonal relations and the scope of internal consistency and integration (Bugdol 2013, p. 75). The comeback of "soft", cultural values, noticeable in the world of management, as well as the development of cooperation methods in organisations, based on multi-dimensional, network cooperation and the need to build permanent relations, result in the increase in the importance of trust. It aspires to the role of a strategic resource of an organisation (Collis, Montgomery 1997, after: Grudzewski et al. 2007, p. 32), it is also considered to be the source of sustainable competitive advantage and unique competences of the organisation (Grudzewski et al. 2007, p. 31; Zanini, Migueles 2013, after: Alaarj et al. 2016, p. 731). Trust limits transaction costs, "has a highly measurable pragmatic value (...). It is an extremely efficient instrument; the possibility to trust the promises of a business partner allows for avoiding many

problems" (Grudzewski et al. 2007, p. 11). Thus, trust certainly influences the effectiveness of functioning of contemporary organisations. It is a factor strengthening the employee commitment in achieving the organisation's objectives, positively affects "… the quality of group communication, the ability to cooperate and solve problems, the commitment, the tendency to share knowledge, which is reflected in the effectiveness of teamwork" (Walczak 2012, p. 34).

Nowadays, more and more often "… a company is treated as a joint venture, under which the providers of capital (credits), knowledge, capacity, and work and services (interest groups or stakeholders) cooperate to achieve success. The purpose of the organisation's operations is to pursue the interests of all the involved groups. The effectiveness of their operation depends on generation of positive relations between them, based on mutual trust. In this context, the issue of maintaining balance between the represented interests also becomes an important challenge. It requires conduct of continuous negotiations and constant search for a compromise" (Tyrańska 2000, p. 98), but also constant verification of the quality of the decisions made in the company, from the point of view of significant stakeholder groups. This, in turn, is supposed to be achieved through control, understood as a process leading to the desired effectiveness of the organisation. Its essence involves, as written by B.R. Kuc, "adoption of a homeostasis mechanism, in which feedback serves as the guardian of threshold values" (Kuc 2011, p. 56). It is also irrefutable that "good management needs effective control. A combination of well-planned objectives, a strong organisation, competent management and motivation is unlikely to succeed, unless it has a sufficient control system. (…) Its goal is to indicate the weak points and errors, so that they could be repaired, or even avoided in the future" (Kuc 2011, p. 56).

Both with regard to control, as well as trust, it is thus expected that they would have positive impact on the organisation's performance. The method of their measurement still remains controversial. Nowadays, assessment of the organisation's operations is more and more often performed from the point of view of its possibility to achieve the goals of its various stakeholder groups. Therefore, for evaluation of the organisation's performance, it is suggested to use different criteria and various measures, representing the interests of particular stakeholder groups. The process of evaluating the efficiency and effectiveness of the organisation's operations is nowadays the subject of wide scientific disputes (e.g. (Braz, Scavarda, Martins 2011, p. 752; Neely, Gregory, Platts 2005, p. 1229)), with multiple-criteria approach applied most often. This study uses the synthetic index for evaluation of the organisation's performance, under which the author distinguished performance parameters referring to quality, customers, processes and economic performance.

3. The functioning of accredited testing and calibration laboratories in Poland

Accredited testing and calibration laboratories are an integral part of the economic system in Poland. Furthermore, "the sphere of accredited laboratories is one of the pillars of the attestation and certification system for products and companies everywhere in the world" (Nowostawska, Filipiak 2000). Accredited testing and calibration laboratories can have various organisational and legal forms, be of various sizes, and operate in various structures. Regardless, the purpose of their functioning involves effective fulfilment of the confirmed and expected customer needs by provision of reliable and credible results of

the conducted research and/or calibrations, in accordance with the arrangements made with regard to the date and method of their execution (applied research methods and calibration methods). When pursuing the goal so assumed, laboratories aim to:

- recognize and satisfy the future and current customer needs in a regulated manner,
- clearly document the procedures of tests and calibrations, reliably record the results to the full extent, and then practically and legibly present them in test reports and calibration certificates,
- ensure full reproducibility of all the results constituting the basis for the test reports and calibration certificates,
- detect and adjust the weaknesses of the management system, so as to prevent any irregularities,
- ensure that the system documentation, the records and the test and calibration objects are correctly used and properly stored,
- ensure that the effectiveness of the functioning of all elements of the management system is tested and assessed (Quality Manual, 2016).

This way, they become units that stand out among other organisations functioning in Poland. It should be emphasised that one of the fundamental requirements for measurements and tests performed by the testing and/or calibration laboratories is credibility and reliability of their research services. This credibility is based on standardisation of methods, ensuring reproducibility and repeatability of research processes. The reference standard of research laboratories is the international standard ISO/IEC 17025, adopted in Poland as PN-EN ISO/IEC 17025. Having an accredited management system in place in testing and/or calibration laboratories, due to the benefits directly resulting from its implementation, is more and more often perceived not as the necessary evil, but as a requirement of the contemporary conditions of competition, or as a prerequisite for conducting transactions on today's markets.

However, it is worth noting that a natural consequence of implementation of accredited management systems based on the PN-EN ISO/IEC 17025 standard in laboratories involves gradual adoption of the way of thinking consistent with the Total Quality Management (TQM) philosophy by the employees of these laboratories (Bieńkowska 2014). Even though implementation of an accredited management system determines the credibility and reliability of the offered research services, above all relying on standardisation of methods, ensuring reproducibility and repeatability of research processes, actions consistent with TQM (conscious and systemic, or even intuitive) affect actual continuous improvement of quality in the organisation. Therefore, it increases the organisation's credibility on the market and implies increase in the customers' trust. It is thus an important factor for competitiveness in the conditions of the dynamically changing environment (Bieńkowska, 2014).

4. Research methodology and results of the study on the impact of trust on the functioning of testing and calibration laboratories

4.1. Purpose and method of the study

The research, the results of which will be presented in the present article, is a continuation of the works carried out since 2008 by A. Bieńkowska (2012, 2013, 2015), A. Bieńkowska

and P. Bieńkowski (2008, 2010), and A. Bieńkowska, P. Bieńkowski and A. Zabłocka-Kluczka (2016, 2017). The purpose is to examine the impact of the culture of trust on the performance parameters of testing and calibration laboratories functioning in Poland. In the light of the above presented theoretical considerations, taking account of both the general statements relating to trust and its impact on an organisation, as well as the determinants of functioning of testing laboratories, three main research hypotheses have been assumed:

- H1: *The higher the level of trust in the laboratory, the higher the performance parameters of the organisation.*
- H2: *The higher the level of control in the laboratory, the higher the level of trust in the organisation.*
- H3: *The higher the level of control in the laboratory, the higher the performance parameters of the organisation.*

The described research works were conducted in September 2016. The research tool was a questionnaire sent mostly by mail to employees of testing and calibration laboratories existing in Poland and having an accredited management system. The respondents were asked to state their opinion, using the 5-grade Likert scale (1-5, from "No" to "Yes"), on the statements contained in the questionnaire, with regard to the examined laboratory. 22 questions concerned trust, 8 – control. The subsequent 12 questions concerned the performance parameters of the laboratory, with distinguished performance parameters referring to quality (2 questions), customers (1 question), processes (3 questions), and economic performance, competitiveness, management efficiency and timeliness (4 questions). Additionally, the questionnaire contained 4 questions concerning maturity of the accredited management system in the laboratory. The questionnaire also contained demographics questions about the size of the organisation, the length of the accreditation period, as well as the type of laboratory. As a result of the undertaken actions, 104 filled-in surveys were obtained. All of them – as correctly filled in – underwent research analysis. The statistical analysis of data was conducted by means of the IBM SPSS Statistics package. The profile of the research sample is presented in Table 1.

Table 1: The profile of the research sample. Source: (Bieńkowska, Bieńkowski, Zabłocka-Kluczka, 2017).

The profile of the research sample		Lab. No.	[%]
Organisational form of laboratory (n=104)	Independent unit	35	33.7
	Operates with higher education	3	2.9
	Functions withing the unit R&D	29	27.9
	Other solution	37	35.6
Intership laboratory accreditation (n=93)	Up to 10 years	32	34.4
	Above 10 years	61	65.1
Employment in the laboratory (n=102)	Up to 5 people	24	23.5
	6–10 people	14	13.7
	11–20 people	14	13.7
	Above 20 people	50	49.0

4.2. Studied variables

Taking account of the purpose of the empirical analysis and the assumed hypotheses, the following studied variables have been set out:

- trust level,
- control level,
- maturity level of the accredited management system,

- general performance parameter, including:
  – performance parameter for quality,
  – performance parameter for customers,
  – performance parameter for processes,
  – economic performance parameter.

The scale measuring **the trust level** included 22 scales, determining subsequent aspects proving high/low level of trust in the organisation, distinguished based on the subject matter literature. The items have been analysed on the basis of the Cronbach's α reliability coefficient. It amounts to 0.920, which proves high internal consistency of the scale and reliability of the measurement. The scales for all the studied variables have been determined in the same manner. Table 2 presents the Cronbach's α coefficient values and descriptive statistics for particular variables.

Table 2: Cronbach's α coefficient values and descriptive statistics for particular variables. Source: Own study.

Variables	number of scales	α Cronbacha	N	Min.	Max.	M	SD
trust level	22	0.920	104	1.95	4.91	4.04	0.54
control level	6	0.602	104	2.50	5.00	4.36	0.51
general performance parameter	10	0.865	104	2.40	5.00	4.20	0.55
performance parameter – quality	2	0.802	104	2.00	5.00	4.52	0.64
performance parameter – customers	1	–	101	1.00	5.00	4.04	1.09
performance parameter – processes	3	0.814	104	2.33	5.00	4.44	0.56
economic performance parameter	1	–	99	1.00	5.00	3.22	1.19
maturity level of the accredited management system	4	0.939	103	1.25	5.00	4.47	0.66

4.3. Verification of research hypotheses, scientific conclusions

To verify the H1 hypothesis: *The higher the level of trust in the laboratory, the higher the performance parameters of the organisation*, an analysis was conducted using the Pearson's correlation. The analysis covered the relation between the level of trust and the performance parameters of the organisation (in the general perspective, as well as pertaining to quality, customers, processes and economic performance). The values of Pearson's non-parametric correlation coefficients are presented in Table 3.

The value of the correlation coefficient in all analysed cases demonstrates positive relationship between the level of trust and the performance parameters of laboratories. At the same time, the direction of the variables' impact is obvious: the higher the level of trust, the higher the values of performance parameters. It is worth noting that the management maturity, understood as the combination of high-quality management and flexibility of the organisation's functioning, also remains under strong positive impact of the level of trust in the organisation. In view of the above, the H1 hypothesis should be assumed as correct.

To verify the H2 hypothesis: *The higher the level of control in the laboratory, the higher the level of trust in the organisation*, an analysis was conducted, again using the Pearson's correlation. The analysis covered the relation between the level of control and the level of trust. The value of the correlation coefficient amounts to $(104) = 0.380$ ($p <$

0.001) and demonstrates a strong relationship between the level of trust and the level of control in the examined laboratories, which means a strong positive relationship between the studied variables. The direction of the impact of the variables also seems to be clear: the higher the level of control in testing laboratories, the higher the level of trust. Control thus seems to be a factor supporting formation of the culture of trust. This may be caused by the high level of standardisation and formalisation in the accredited testing and calibration laboratories imposed, as described above, by the restrictive requirements of the ISO 17025 standard. As a result, control is not perceived as a necessary evil, but as... something natural. In the above context, the H2 hypothesis can be assumed as correct.

Table 3. Trust level vs. a performance parameters of laboratory. Source: Own research.

r-Pearsona	Trust level
general performance parameter	$r(104) = 0.696^{**}$
	$p < 0.001$
performance parameter – quality	$r(104) = 0.606^{**}$
	$p < 0.001$
performance parameter – customers	$r(101) = 0.310^{**}$
	$p = 0.002$
performance parameter – processes	$r(104) = 0.670^{**}$
	$p < 0.001$
economic performance parameter	$r(99) = 0.307^{**}$
	$p = 0.002$
maturity level of the accredited management system	$r(103) = 0.691^{**}$
	$p < 0.001$

** Correlation is significant at 0.01 (both sides).

Finally, verification of the H3 hypothesis: *the higher the level of control in the laboratory, the higher the performance parameters of the organisation*, has been for the third time conducted by analysis using the Pearson's correlation. The analysis covered the relation between the level of control and the performance parameters of the organisation. The values of Pearson's non-parametric correlation coefficients are presented in Table 4.

Table 4. Control level vs. a performance parameters of laboratory. Source: Own research.

r-Pearsona	Control level
general performance parameter	$r(104) = 0.425^{**}$
	$p < 0.001$
performance parameter – quality	$r(104) = 0.444^{**}$
	$p < 0.001$
performance parameter – customers	$r(101) = 0.178$
	$p = 0.075$
performance parameter – processes	$r(104) = 0.501^{**}$
	$p < 0.001$
economic performance parameter	$r(99) = 0.157$
	$p = 0.121$
maturity level of the accredited management system	$r(103) = 0.470^{**}$
	$p < 0.001$

** Correlation is significant at 0.01 (both sides).

In most cases, the value of the correlation coefficient demonstrates positive relationship between the level of control and the performance parameters of the laboratories. However, it is slightly weaker than in the case of trust and the culture of trust (lower values of correlation coefficients). Nonetheless, it appears that the higher the level of control in the laboratory, the higher the general performance level with regard to quality, processes and

maturity of the accredited management system. Unfortunately, no statistically significant dependencies have been recorded with regard to the relations between control and performance parameters for customers and economic performance. As a result, the H3 hypothesis can be assumed only partially.

5. Conclusion

The conducted research allows for ascertaining a clear strong relationship between the performance of testing and calibration laboratories functioning in Poland and the level of trust. Even though the correlation coefficient does not indicate a cause-and-effect relationship, it shows that higher levels of trust are accompanied by growth in the organisation's operational parameters. Analysis of the subject literature allows for specifying the direction of the impact: the higher the level of trust, the better the performance of the organisation. Furthermore, the research findings demonstrate a similar positive dependence with regard to control in laboratories: the level of the performance parameters increases along with the growth in the control level. This is, on the one hand, surprising (in the light of the literature reports), while on the other hand, obvious. Accredited testing laboratories operate under conditions of high standardisation and formalisation, and therefore also control, in the context of certified solutions for the management system. Since the high level of control is the norm in these organisations, it does not disturb (and even favours) building of the culture of trust.

   Building of the culture of trust in an organisation seems to be an important challenge for managers, especially since it is usually a long lasting process. With regard to the society, P. Sztompka indicates historical, structural and entity-related factors shaping the culture of trust (Sztompka 2012, p. 346–352); they seem valid also for organisations. Historical conditions result from prior experiences and are in a way coded in the current culture of the organisation, which may constitute both a barrier, as well as a catalyst for building the culture of trust, due to the fact that organisational culture is usually characterised by a specific degree of inertia. Among structural conditions we distinguish normative integrity (sustainability of the system of binding rules), transparency of the organisation (simplicity and ease in understanding the binding rules), stability of social order, the authorities' compliance with the law, as well as the responsibility of people and institutions (Sztompka 2002, p. 318–319), while entity-related conditions include: personality traits and capital resources (Sztompka 2002, p. 320). According to P. Sztopmka, only structural and entity-related factors can be modelled in the process of shaping the culture of trust, as historical factors already belong to the past.

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Differences in living standards between Town and Country in the Czech Republic

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Abstract

Currently very topical and heavily debated is the problem of depopulation of the countryside. Many authors document that the process has stopped, that it is a myth associated with human development. Other authors regard this issue as pressing and are looking for ways to solve it. The present authors consider the problem very closely linked to the quality of life and standard of living of the local inhabitants. The standard of living derives from the extent to which human needs are met. This is not just a case of material needs but of overall living conditions, formed by the quality of housing, the environment, how to spend leisure time, educational attainment, health care availability, etc. The standard of living is often expressed in terms of money spent, in the form of prices for goods and services. This way of measuring the standard of living is especially suitable when making living standards comparisons (between countries, regions, etc.). The aim of this paper is to compare the standard of living of countryside and city dwellers, (in municipalities, towns and the metropolitan capital city of Prague). This comparison is done by expenditure on each of the items comprising the COICOP, corresponding to the factors significantly implicated in the standards of living (housing, education, recreation, availability of medical care, etc). To allow the time factor to be considered, the findings of the 2007–2014 surveys were analyzed. The evaluation of the findings was done by testing for significant differences and using cluster analysis.

Keywords: expenditure, consumption, COICOP, region

JEL Code: D12, I32

1. Introduction

The living standards of the world's population are currently a monitored subject. There are visible differences between continents; however considerable differences in living standards are also noticeable within one country. The living standard is an important factor which needs to be monitored globally. Each society demands a certain level of living standard which contributes to contentment and social peace. A certain living standard accepted by a given community enables economic and social development in society in any spatially defined area.

At present, a highly topical and greatly discussed problem is rural depopulation. Many authors document the fact that the process has stopped as in their opinion it is a myth which is associated with the evolution of humanity. Other authors see the problem of the countryside as current and are looking for solutions. To ensure a fair living standard for rural areas was already one of the fundamental principles of the Common Agricultural Policy in the European Economic Community under the Treaty of Rome of 1957. The present EU approaches the Rural Development Policy as an instrument for dealing with the economic, social and environmental problems of the 21st century. The *Rural Development* Programme of the Czech Republic for the period of 2014–2020, as the fundamental programming document, was approved by the European Commission on 26 May 2015.

The authors of the article assume that the problem of rural development in its economic, environmental and social aspect is very closely linked to the quality of life and living standard of people living in given locations. The living standard is derived from the rate of satisfaction of human needs. This is not merely a question of material need, but of the overall living conditions which consist of the quality of housing, the environment, spending leisure time, gaining an education, availability of healthcare and the like. The living standard is often expressed in monies in the form of the price of consumer goods and services. This method of measuring the living standard is convenient above all when comparing the living standard (in various countries, regions, etc.). The aim of the article is to compare the living standard of people living in the country and people living in towns. This comparison is made by applying the expenses per individual items according to methodology of the COICOP classification.

Eurostat (2015) shows that while the gross domestic product is a very useful way of measuring production in the market and provides a rough outline of the economy in the given time, it does not provide a complete picture of how good the living standard is of the population of a given country. Stiglitz, Sen and Fitoussi (2009) also agree with this, therefore they recommend using income and household consumption to measure the living standard. As does Keeley.

INSEE (2016) defines household expenditure for final consumption as the expenditure of population on goods or services which is used to meet needs or wishes. Products are considered consumed once they are purchased even when these are consumer durable goods (cars, household electrical appliances, furniture, etc.). A considerable share of expenditure for final household consumption consists of healthcare, education and housing expenditure. It also includes imputed rent, which is the amount that households living in their own home would pay if they did not own their own home, but rented it instead.

OECD (2009) adds that final household consumption includes all purchases made to meet daily needs, which means food, clothing, accommodation (rent), energy, transport, consumer durable goods (especially cars), healthcare, leisure and various services ex-

penditure. Apart from imputed rent, it includes further imputed expenditure – for example the value of agricultural products produced for personal consumption or the value of goods or services that the employee receives freely or at a very low price from the employer.

Varlamova and Larionova (2015) explain that the expenditure of households is closely linked to the concept of their living standard and wealth. In terms of the European Union household consumption among member states differs considerably. Factors such as culture, income, weather, household structure, economic structure or level of urbanisation can have an impact on consumption in each country (Eurostat, 2013).

Giarchi (2006) explains the situation in the countryside in Europe in his study and speaks about four socio-economic and socio-political parameters that can affect older people in rural countryside. One of them are accessible services that are more local and there are more opportunities for willing volunteering. Another parameter is about transport costs and the additional time for providing goods, health and social care. It is less accessible because of living in scattered, isolated dwellings.

Pašakarnis et al. (2013) are also aware of the importance of care of countryside. On the other hand Giarchi (2006) reminds countryside resistance to urban-rural developments in globalization. Old rural residents view new infrastructures as a threat to their peaceful countryside. However, the improvement of living conditions in the countryside involving aspects of housing, the environment, infrastructure, communication, employment possibilities, land management, etc. are welcome in many Central and Eastern European countries. (Pašakarnis et al., 2013)

There is a research (Rimkuviene, 2013) which revealed no statistically significant difference among the disposable income of rural and urban population. However, urban and rural inhabitants face different problems. Rural inhabitants have more problems related to general condition of their houses; moreover, they find it harder to afford such durables as colour television sets, mobile phones or meat whereas urban residents face problems with environmental pollution, noise or crime. Geyer and Portnov (2007) also speak about danger of crime and violence in big cities. Urban society reaps the benefits of agglomeration, culture and education opportunities but incomes and ethnics backgrounds of people are very different. That is why crime has become endemic in economically advanced societies.

The aim of the article is to compare the living standard of people living in the country and people living in towns. The survey conducted every year by the CZSO in the form of Family Budget Statistics which contain data on Czech household expenditure itemised according to the methodology of the COICOP classification is used in this comparison. The surveys for 2007–2014 were used for data analysis while applying statistical methods and reaching conclusions.

2. Methodology

The basic unit of the survey are expenditure items of Czech household consumption. Eurostat monitors consumption by the Classification of Individual Consumption by Purpose), which was developed by the United Nations Statistics Division (Eurostat, 2016). The COICOP classification includes consumption expenditure in fourteen categories which are: food and non-alcoholic beverages, alcoholic beverages, tobacco, clothing and footwear, housing and housing-related expenditure (water, electricity, gas and other fuels), furnishings, household equipment and routine household maintenance, health,

transport, communication, recreation and culture, education, restaurants and hotels, miscellaneous goods and services, individual consumption expenditure of non-profit institutions serving households and individual consumption expenditure of general government (The United Nations Statistics Division, 2016). The last two categories are presented as joint categories for households as expenditure not classified as consumption expenditure and as such are not commented further on in the text. The article continues to work with only 13 commodities.

The issues applying to household consumption in the Czech Republic are monitored by the Czech Statistical Office which regularly processes Family Budget Statistics for this purpose. The task of these statistics is to provide information about the management of private households and the structure of their consumption. A total of 300 households are monitored which are identified on the basis of purposive quota sampling. The basis for determining the quotas are the results from the Living Conditions survey carried out as the national survey module EU-SILC (European Union – Statistics on Income and Living Conditions). The Family Budget Statistics are basically the only source of information in the Czech Republic which monitors the structure of income-related household expenditure (Czech Statistical Office, 2015).

The basic sampling unit is a house-keeping household, which means a group of people living together and sharing in covering basic food expenditure, running of the household, household maintenance, etc. For international comparison, expenditure items in the Family Budget Statistics (FBS) are classified according to Classification of Individual Consumption by Purpose, which represents the Czech version of the international standard of COICOP. Household expenditure and consumption of the Family Budget Statistics can be monitored in the following areas: according to the position of the head of a household, according to the size of a municipality and according to cohesion regions (Czech Statistical Office, 2014). The FBS serves as the basis for social and economic research, for international comparison, as well as for determining further statistics such as the creation of a consumer basket in periodical reviews of the consumer price index (Czech Statistical Office, 2015).

The survey of the Statistical Office for the purpose of monitoring individual expenditure items of COICOP was conducted on a sample of Czech households in individual years in the number as shown in table 1.

Table 1: Number of sample households in years 2007–2014 FBS

Year	2007	2008	2009	2010	2011	2012	2013	2014
No. of households	3334	3271	1545	3251	2904	2896	2910	2889

In terms of the contents and goal of the article, the subject of interest are households living in the country or towns. The Municipalities Act No. 128/2000 Coll. contains the basic definition of a municipality as when defining the type of municipality the key indicators are not just the size of the population, but also the indicator applying to the urban and socio-professional structure and status of the municipality. The CZSO considers a rural area (rural municipality) to be all municipalities with a population under 2,000 and municipalities which have a population under 3,000, but the population density to be less than 150 people per 1 km2. These are small, scattered municipalities connected together in one bigger central municipality. An urban municipality is a human settlement which has been awarded the status of a town or city. It is specific for its demographic, professional and social population structure. A statutory town or city is a town or city which has the right, by municipal decree, to organisation its own administration.

The results of the surveys for years 2007–2014 were analysed as a possibility of monitoring the time factor. When evaluating the results, methods are used to demonstrate the difference between expenditure per individual commodity according to the type of municipality (the Kruskal-Wallis test), to verify the difference in consumption over time of the test of the homogeneity of the guidelines of regression function and the cluster analysis for finding consumption similarity of individual regions of the Czech Republic.

3. Results

Table 2 is used to express the economic trend of households in the Czech Republic, above all in relation to the possibility of expressing the living standard in monies in form of the debt.

Table 2: Selected household characteristics

Characteristics	2007	2008	2009	2010	2011	2012	2013	2014
GDP/popul. in CZK	369.114	383.560	373.265	375.367	383.968	386.065	389.837	409.345
Household debt (%)	44.13	48.03	50.65	51.60	54.44	55.82	57.23	55.92

Household debt is expressed as a ratio between household debt and disposable household income. The average Czech household in 2007 had a debt of 44.13% of its income. There is an increasing trend in household debt. In 2014 it was already almost 56%. In comparison with other European states, Czech households were among those with a lower debt. The average debt in the European Union in 2007 was 85.63% and in 2014 even 94.67%.

According to data from the Family Budget Statistics (FBS) and the survey conducted on sample households, the total expenditure of Czech households constitutes almost half their total income. The category of housing, water, electricity and fuels make up the highest share of household expenditure in all monitored years. In the monitored period, the items of this category make up an average of 20.12% of all household expenditure, which on average is approximately 174 mil. CZK. In contrast, the 10th category of education makes up the lowest share of total expenditure which is about 0.64%, and is roughly equivalent to 5.5 mil. CZK. As shown in the pie chart (Figure 1) another considerable category of household expenditure is food and non-alcoholic beverages which made up 13.52% in 2014. Their share of expenditure is similar for the following years and on average is about 13% and roughly equivalent to 115 mil. CZK. Another downward trend of expenditure items is transport expenditure (88 mil. CZK) and recreation, culture and entertainment expenditure (78 mil. CZK). In contrast, healthcare or education do not make up such a big share of household expenditure.
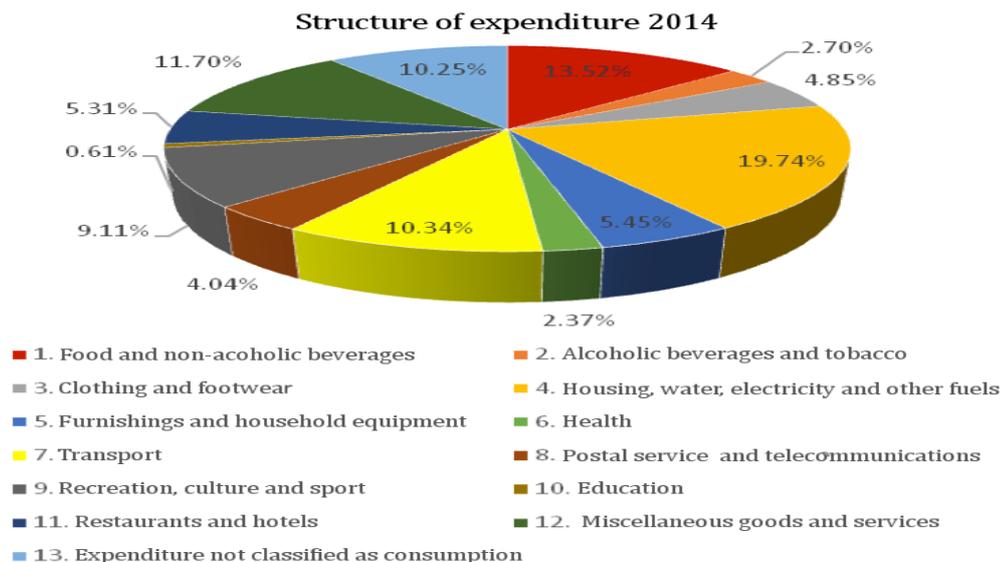
Figure 1: Structure of expenditure of Czech households in 2014

The sequence of expenditure items for individual commodities is as follows:

Housing, water, electricity and other fuels – the only household expenditure to show a significant difference in the size of expenditure according to the type of municipality. Households in town and cities and urban municipalities spend more than 20% of total household housing expenditure, rural municipalities spend between 16–18% on housing. An increase in this expenditure is recorded in towns and cities and expenditure stagnation is recorded in rural municipalities in the monitored years 2007–2014.

Food and non-alcoholic beverages – the second biggest expenditure item of Czech households in all types of municipalities. This finding does not meet the assumption that rural municipalities spend less on food and supplement their food from their own resources. The reasons for this also need to be looked at in the price policy, food availability in rural areas, etc. Surprising negligible differences can be found in the size of expenditure in regional towns and cities (between 11–12%), in urban municipalities (between 12–14%) just as in rural municipalities (between 13–14%). No change in the trend but stagnation was recorded in the 8-year timeline.

Miscellaneous goods and services – which contain expenditure that can not be clearly classified under any of the monitored commodities, is the third biggest expenditure item in all types of municipalities and has not changed over time.

Recreation, culture and sport – expenditure which takes fourth place and only in regional towns and cities. The causes of the difference in expenditure in absolute values in contrast to urban municipalities and rural municipalities must be looked at not just in the financial possibilities, but also in the availability of cultural, sport and other facilities for spending leisure time. These factors prove to be crucial reasons as to why some households abandon their homes in rural and urban municipalities.

Transport – for households living in towns and cities this expenditure comes in fifth place. Those households living in urban municipalities must spend more on holidays, culture and sport and this expenditure comes in third place for households living in rural municipalities. In contrast to other household categories, the lower housing expenditure of households living in rural areas compensates for higher transport expenditure spent on commuting and other services (healthcare, education, etc.).

Furnishings and household equipment – an expenditure that makes up about 5% of total household expenditure, regardless of the type of municipality. This is an important finding to state that households living in rural areas have the same sort of furnishings as households in towns and cities. Over the course of years the percentage of expenditure for this item has not changed.

Clothing and footwear – an expenditure that comes up to the same level in all types of municipalities, i.e. the same finding as was stated for the home furnishings item. Likewise ranges between 4–5% of total expenditure. The place of residence is not decisive for the choice of clothing.

Restaurants and hotels – are the third biggest expenditure item of about 5% of the total household expenditure. This item also does not record any significant differences in household expenditure according to the type of municipality, and also does not record changes over time.

Postal service and telecommunications – a household expenditure item which, regardless of the type of municipality, makes up about 4% of total expenditure. It has been a standard expenditure item throughout the eight-year timeline.

Alcoholic beverages and tobacco – an expenditure item made up of the consumption of two commodities, i.e. alcohol and tobacco, two commodities whose consumption presents a big social problem since their consumption and overconsumption lead to health, family, economic, cultural and political consequences with a legislative context. Despite these facts, expenditure for these commodities in Czech households ranges, regardless of the type of municipality, between 2.5–2.9%. It must be stressed that Czech households are willing to spend greater amounts on this item than on healthcare services.

Healthcare – in the Czech Republic this is an expenditure item which reaches values ranging between 1.85–2.55% of total expenditure. It is the second lowest item of household expenditure. No differences are recorded in household expenditure according to the type of municipality or changes in expenditure over time. This statement raises the question of how long quality healthcare is sustainable and under what conditions.

Education – the absolute lowest expenditure item. It does not even reach one percent of household expenditure (0.5–0.8%), regardless of the type of municipality and monitored years. The same question arises of how society will evolve in this area, and what standard can be expected in this commodity. It must also be stated that the perception of a hierarchy of financially expressed values still applies. So has education been pushed into last place on the scale of social values?

This commented fact is presented is the column graph in figure 2.
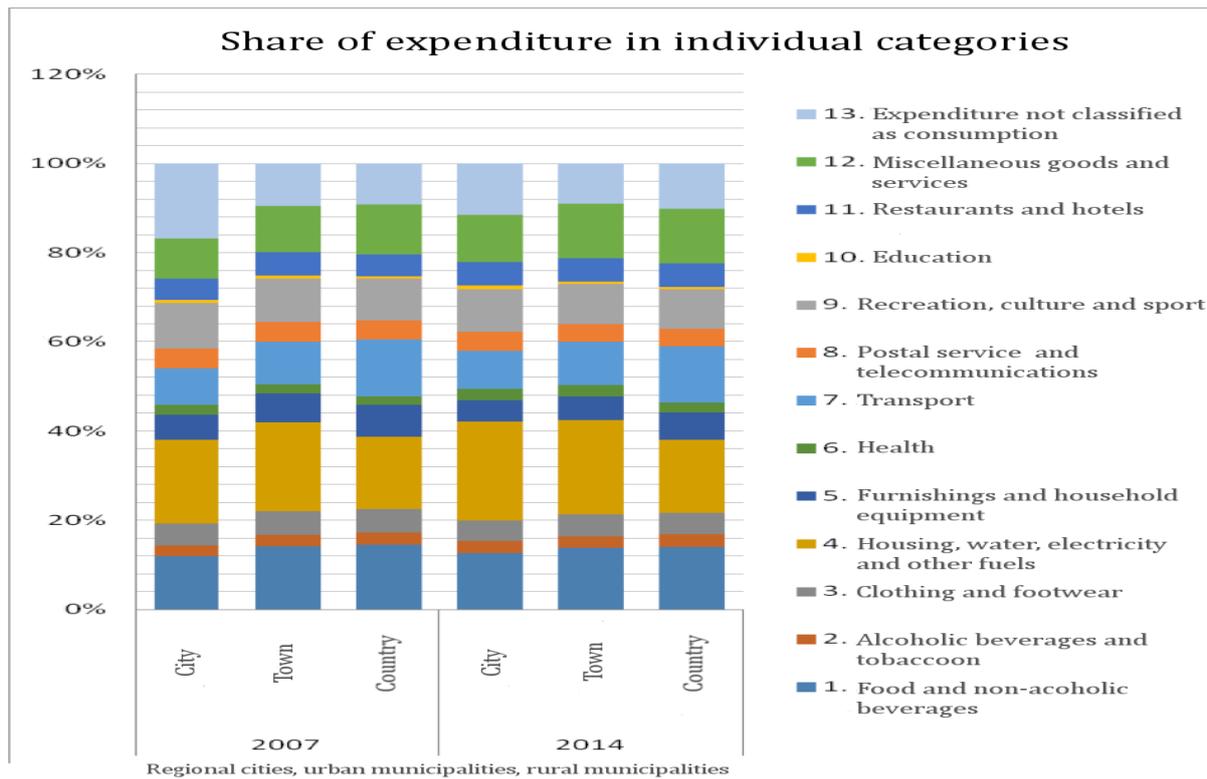
Figure 2: Share of expenditure in individual categories

The results of the cluster analysis carried out by regions draws attention to the structure of expenditure of individual commodities according to CIOCOP.
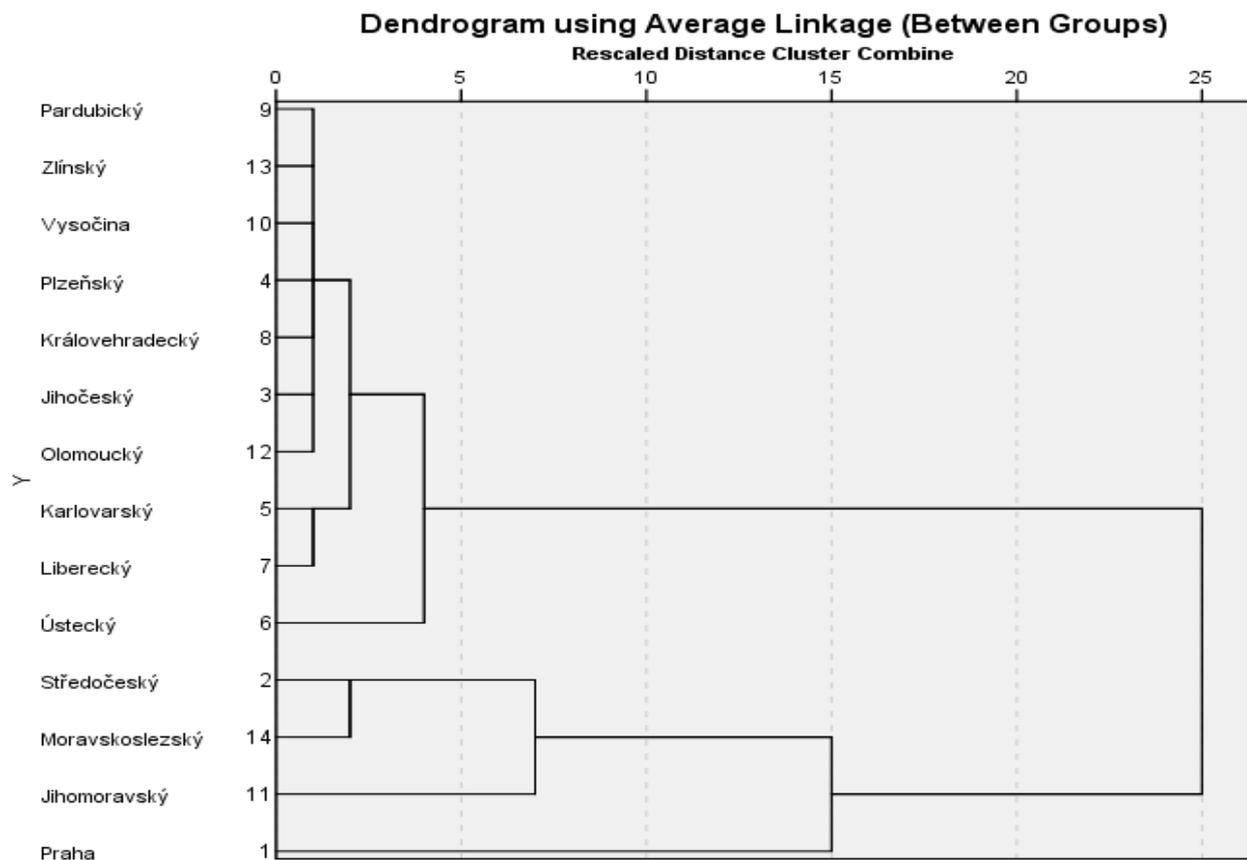
Figure 3: Dendrogram

Table 3: Cluster Membership

Case	3 Clusters
Praha	1
Středočeský	2
Jihočeský	3
Plzeňský	3
Karlovarský	3
Ústecký	3
Liberecký	3
Královehradecký	3
Pardubický	3
Vysočina	3
Jihomoravský	2
Olomoucký	3
Zlínský	3
Moravskoslezský	2

It must be stated from the conducted analysis that regions with regional towns and cities with the biggest populations and Prague have a different structure of expenditure of households living in these regions than households living in other regions. This concerns Prague, the regions of Central Bohemia, South Moravia and Moravia-Silesia. More detailed monitoring and search for differences in individual expenditure items did not prove this finding using any of the applied tests for differences between expenditures according to the type of municipality (with the exception of housing expenditure), just as trend differences over time were not verified.

4. Conclusion

A simplified method of expressing the living standard in the form of financial means for the purpose of satisfying one's own needs in the structure of one's own priorities analysed above all for the purpose of determining the difference between the living standard of the population in towns and cities and in rural regions. The analysis used data of FBS surveys – expenditure for individual items according to COICOP for years 2007–2014. It was possible to state from the survey conducted that there was no significant difference between categories of households created according to the type of municipality in which they live (cities/towns, urban municipalities, rural municipalities) in expenditure for individual commodities, with the exception of housing, water, electricity and fuels expenditure. This statement is a very simplified conclusion. A more detailed analysis can determine, for example that transport expenditure, above all in rural but also in urban municipalities, is higher due to commuting as well as due to satisfying their leisure activities. Likewise, there are certain differences in food and non-alcoholic beverages expenditure, not just in the sense of the assumption that rural households spend higher amounts on food due to the price for which food is sold in rural municipalities.

The similarity of consumption expenditure in towns and cities also arises from the conducted cluster analysis for individual regions of the Czech Republic. Regions with the highest population – Prague, Central Bohemia, South Moravia and Moravia-Silesia, whose households differ in their expenditure from households living in other regions of the Czech Republic. A high concentration of the range of consumer goods and services, and strong competition appears which also affects the price limit of products and services.

The secured structure and level of household expenditure in the Czech Republic as a whole also deserves attention. The increasing housing expenditure, increasing transport expenditure of households living in urban and rural municipalities, which is a sign not only of commuting but also of travelling for more affordable shopping and for leisure activities, cultural and sport activities. Alcoholic beverages and tobacco expenditure also deserves attention which is higher in households than health expenditure, and the consequences need to be considered of the fact that the lowest expenditure of households in the Czech Republic is education. These are findings which deserve attention and need to be taken into account when creating government economic and social measures.

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City brand management strategy

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Abstract

The present article deals with city branding, the main aim of which is to draw the attention of various target groups (investors, tourists, etc.) by revealing the uniqueness of the city, its cultural and historical heritage. City branding is explained as a controlled (deliberate) development of favourable images of the location to its potential users, investors and residents.
Aim of the article is to identify the main principles of city branding.
The article is based on theoretical methods of research – systemic, comparative and logical-critical analysis of scientific literature.

Keywords: city marketing, city branding, city branding strategies.

JEL Code: M310

1. Introduction

In scientific literature city branding is more and more broadly analysed topic, there are some discussions concerning different approaches towards city marketing, different terms are given (for instance, *destination marketing, location marketing,* or *place marketing*). Cities and territories are increasingly seeking to introduce themselves to the general public, to participate in fierce competition not only for the investments, but also for the revenue from tourism and other services which the city offers to its visitors.

Relevance and novelty of the article shall be linked with increasingly popular insights into city branding as a separate branch of science. One of the main factors which influenced the application of marketing practice to cities is globalisation, which has boosted competitiveness, when even the smallest towns or locations can successfully introduce themselves to the society. Another factor, which influenced the development of city branding, is evolving potential of the internet, when information about the most remote corners of the world becomes available to everyone. The main aim of city branding is to reveal the uniqueness of a city, its cultural, historical heritage, however, a precondition for a successful functioning of a city, which is no less important, is the improvement of quality of its services, focusing on the attraction of users.

Researchers of city branding highlight, that the concept of city brand management is based on the idea, that it is necessary to develop a controlled (deliberate) favourable location images to their potential users, investors and residents. City branding allows to realise the potential of city's residents and enterprises to contribute to the development of the city. The objective to develop city branding by itself does not bring results in the short term, only in the long term (e.g. when city branding is being developed for several decades) it works as it attracts the desirable new residents, business enterprises or tourists. Therefore, it is important to identify proper directions of city branding, which allow to identify the advantages of a city as early as possible. **Problem:** What are the main aspects of city branding strategies?

Subject of research is the strategies of city branding.

Aim of the article is to analyse the main principles of city branding strategies.

In order to achieve the aim, the following **objectives** have been formulated:
1. To discuss the origins of city branding.
2. To name the main aspects of city branding conception.
3. To present the analysis of the main aspects of city branding strategies.

The article is based on the theoretical methods of research – systemic, comparative and logical-critical analysis of scientific literature.

2. Conception of city branding

City branding differs from a product or service branding and is considered to be a developing branch of science, which integrates and covers the topics of several already known research works, the problems of the following academic fields: marketing, economic development, public relations, development of trading and tourism, international relations, history, etc. (Ashworth, Kavaratzis, 2010). J. Lionikaitė (2013) distinguishes several development trends of branding thought, which reveal the general development tendencies (brand as a means of differentiation, brand as a cognitive construct, brand as added value, brand as identity, brand as personality, brand as relations, brand as community, brand as a cultural artefact).

Researchers (Baker, 2007; Hankinson, 2009; Jacobsen, 2009, Mayes, 2008, et al.) discuss city branding by distinguishing the main but different accents:

1) *city branding is a rational management process of a city brand.* Researchers note that these are primarily the planning procedures related with the satisfaction of the needs of target groups in two cases: a) meeting the needs of residents and enterprises when they acquire the products and services which are provided by the city, b) satisfaction of the expectations of potential target groups when products and services, provided by the city, are the exactly the ones they had expected to get (P. Kotler et al).

2) *city branding is the effort and joint actions (working in collaboration) of different organisations and enterprises in a restricted geographical area to achieve common goals* (Vernon et al.; 2005).

3) *the process of city branding revolves around a city/territory/location, and its result is an attractive image of a city.* City is a complex and multidimensional organism, which can be defined as an area defined by clear geographical borders, possessing distinctive characteristics. However, city branding as a process is also related with the self-perception of city's residents and entrepreneurs which is communicated outwards (Baker, 2007).

City branding can be defined as a rational process of city brand management, which is not only adapted to a particular city, but also integrates a collection of many-sided marketing tools / instruments. The essence of city branding process is the identification of the concerned groups and their goals.

2.1. Conception of city branding strategy

P. Kotler and D. Gertner (2002), S. Rainisto (2003), P. Kotler and D. Gertner (2002) define city branding as a process of strategic planning, the goal of which is to create a location which would meet the needs of a target audience (the clients).

Researchers analysing city branding (Baker, 2007; Hankinson, 2009; Jacobsen, 2009, Bakanauskas et al. 2012; etc.) discuss the following three strategies of city branding the most widely:
- Strategy of product marketing;
- Corporate branding strategy;
- Strategy of destination branding, place branding.

2.2. Aspects of the strategy of city as a product branding

B. Baker (2007), when analysing city branding, claims that *product marketing* is the whole of processes and actions, intended for communicating, developing the product, determining the price and promoting the product to its end-users (see table 1).

Table 1: Main features of the strategy of city as a product branding

Main goal	Main actions	Main clients (target audience)	Expected result
Developing city's identity as a product	Developing the infrastructure for local residents and tourists; Presence of entertainment and business attraction objects; Supporting local residents.	Potential clients as the buyers of a city as a product.	City sold as a product.

Source: drafted by the author of this work, based on Baker, 2007; Hankinson, 2009; Jacobsen, 2009, Mayes, 2008

Main aspects of this strategy:
- In B. Baker's (2007) opinion, the application of concept of product marketing for the branding of a location allows to use the elements of brand's personality, i.e. the city can be presented / introduced as a person with its character, personality traits, appearance, etc.
- Having defined specific actions and developing this strategy, the first results can be traced rather soon, i.e. in a relatively short period of time.
- The drawback of this strategy is that it is difficult to apply to cities which lack clear unique characteristics.

2.3. Aspects of corporate city branding strategy

Researchers (Baker, 2007; Hankinson, 2009; Jacobsen, 2009, Bakanauskas et al. 2012; Kavaratzis, 2009; Kavaratzis, Ashworth, 2010) agree, that the origin of corporate branding is a developed product branding conception, which largely focuses on city identity and image as well as communication. On the other hand, corporate city branding strate-

gy can be defined as interdisciplinary synthesis of various fields (communication, culture, urban development, architecture, public management, politics, history, marketing, etc.).

Table 2: The essence of corporate city branding strategy

Main goal	*Main actions*	*Main clients (target audience)*	*Expected result*
Developing favourable relations with the concerned groups, which build the reputation of a city.	• Developing the infrastructure for local residents and tourists; • Presence of entertainment and business attraction objects; • Supporting local residents; • Formation of social responsibility in managing city brand for the involved target groups; • Creation of internal image – it is the formation of image for people who are connected to the city in certain ways (e.g. residents, city's entrepreneurs, etc.); • Formation of external image – it is the formation of image for people who have no relations with the city (e.g. tourists, investors, etc.).	Concerned groups	Increasing number of concerned groups

Source: drafted by the author of the present work, based on Baker, 2007; Hankinson, 2009; Jacobsen, 2009, Mayes, 2008

Researchers (Baker, 2007; Bakanauskas et al. 2012; etc.) note that corporate branding is becoming more popular, because it promotes a versatile development of the city. However, four essential conditions, when this strategy can be considered to be successful, are named:
- When city's identity, its main features and characteristics are clearly defined;
- When the concerned groups (residents, city's entrepreneurs, politicians, etc.), who participate or could participate in city brand management, are identified;
- A wide range of marketing communication tools is applied;
- Synergy and integrity of the whole strategy to achieve clear common goals and results.

Main aspects of this strategy:
- S. Anholt (2010) notes that the uniqueness of this strategy is a large number of the concerned participants, as it determines different identity of the city, it makes the process of city brand management complicated;
- A new city branding element appears – reference to so called country of origin of the brand (e.g. made in country X, culinary heritage of country X, geographical reference to product X, etc.).
- This strategy of city branding must be implemented only in the long term, foreseeing the main actions and the concerned people involved.
- The drawback of this strategy is that the groups, participating in city brand management, overlap – city's entrepreneurs, residents, etc. and sometimes they have different goals, e.g. a resident is at the same time a businessman who can be not interested in attracting new investors, etc.

2.4. Main aspects of tourist city branding strategy

The main goal of this strategy is to attract tourists to a particular city or location. Therefore, in scientific literature (Park, 2009) the latter strategy of branding is widely discussed using particular cases of cities or locations and good experience.

Table 3: Essence of tourist city branding strategy

Main goal	Main actions	Main clients (target audience)	Expected result
Developing the city as an object attractive for tourism	Providing exclusive and niche offers to potential visitors in the tourism sphere. Developing the infrastructure for local residents and tourists; Creation of entertainment and business attraction objects.	Tourists	Increasing number of tourists

Source: drafted by the author of the present work, based on Baker, 2007; Hankinson, 2009; Jacobsen, 2009, Mayes, 2008

Main aspects of this strategy:

Tourist city branding focuses on specific areas of the city (e.g. accommodation, catering, entertainment), trying to discover the niches in tourism sector and to offer unique products to potential visitors. It is necessary to find and highlight the emotional connections between the tourists and the city. This strategy is based on the attitude that the basis of tourism locations' economic welfare is the revenue from tourists, therefore the aim of the activity is to sell the location, like is case of product type city branding, but in the concept of tourist city branding this goal is to be achieved using tools of corporate branding (Ryan, Syvanto, 2009).

3. Discussion and Conclusions

The analysis of scientific literature has shown that city branding is a rather recent branch of science, including the use of marketing theories and practical knowledge for the management of city branding to achieve strategic goals.

The review of the research suggests the following summarising theoretical statements:

- Scientific literature lacks a clear definition of city branding management. Therefore, the conducted analysis of scientific literature implies that city branding can be defined as a rational process of city branding management, which is not only adapted to a particular city, but also integrates a versatile collection of marketing tools / instruments.
- The essence of city branding process is the identification of the concerned groups and their goals.

The strategies of city branding management discussed above (highlighting their main aspects) enabled the identification of the main theoretical and practical conclusions of the conducted analysis of scientific literature:

- Management of city branding strategy depends on the set aim: in case of tourist city branding, it is to attract tourists, while the goal of corporate strategy is to de-

velop favourable relationships with the concerned groups, which build the reputation of a city; the goal of product type strategy is to develop the identity of a city as a product;

- Each strategy covers different main actions, needed for its implementation: all three strategies include three main actions (developing infrastructure for local residents and city's guests; presence of entertainment and business attraction objects; supporting local residents).
- These main actions are completely sufficient in the strategy of product city branding, however, in tourist city branding one of the main actions is providing exclusive and niche offers to potential visitors in the tourism sphere (besides the ones mentioned above). The widest range of actions is provided in corporate city branding, as it includes the formation of social responsibility for the target groups involved in city brand management; initiated actions as formation of external image (creation of image to those who have no relations with the city (e.g. tourists, investors etc.) and internal image (formation of image to those who are related with the city in a certain way (e.g. residents, city's entrepreneurs, etc.).

According to the conducted analysis of scientific literature, it can be claimed that none of the city branding strategies mentioned above can be called universal.

In summary, the main circumstances can be named, which make one or another strategy the most favourable to apply in the management of city branding: in the short term – the product type branding; in order to attract the external concerned groups, specifically the tourists – tourist city branding; in the long term, in order to achieve harmony between the communication of identity elements and to achieve the goals of social responsibility, it is useful to apply corporate city branding.

When discussing and developing further scientific research it is necessary to make explicit, that the development of city branding management should be oriented towards the main aim with the help of diverse means of communication by identifying the participants (stakeholders) in city branding management.

On the other hand, the section also provides space for outlining the need for further potential solutions or the importance of scientific, societal and practical development.

The prevailing element of city branding strategy is city's identity and its communication to the concerned groups, therefore, it is important to periodically evaluate the results of the strategy.

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Economic growth and the level of emission of the Visegrad Group compared to other EU countries

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Abstract

The increasing threat of global warming and climate has been a main concern in recent years. Researchers point to the relationship between the emission of GHG and various economic phenomena. They point out that economic development and population growth in the EU have, among other things, an impact on the increase of GHG emissions. The aim of this article is to examine trends between the GHG emissions per capita and the real gross domestic product of the Visegrad Group compared to other EU countries. The results of the analysis indicate that in the Visegrad Group it was possible to achieve the economic growth measured by the GDP per capita while reducing CO_2 emission. Trend analysis shows that the population of EU in the 2014 increased only by about 2% in relation to 2006, while the GDP grew by almost 14.6%. On the other hand, at the same time, GHG emissions per capita decreased by nearly 19% and GHG emissions per GDP by as much as 20.5%. Similarly, in the Visegrad countries, the average economic growth as measured by GDP/capita amounted to 17%, while the average emission was reduced by 17.3%.

Keywords: GHG emissions, gross domestic product,

JEL Code: 01; 0520

1. Introduction

The economic growth means the amount of produced goods and services, which reflect the ability of the economy to meet the needs of its citizens. Economic growth is the main objective of business and national economies (Kijewska A. 2016). The increasing production and consumption of goods and services to ensure the well-being of the population with the increase of the number of people in the world are the main growth determinants for the electrical energy demand and natural resources, the exploitation of

which causes the degradation of the natural environment, pollution of air, soils, drinking water, as well as the emissions of greenhouse gases. Challenges in terms of sustainable development dictate the need to use the natural resources to the extent to meet the needs of the future generations. More in: (Burchart-Korol et al. 2014, Hąbek 2014; Krzemień et al. 2013, 2016; Lutyński 2014, Strozik et al. 2016, Brodny 2016ab).

Hence the important research problem arises, which is to answer the question whether it is possible to achieve further economic growth while reducing emissions, which impacts the climate change.

The main reason for studying CO_2 emissions is that they play a focal role in the current debate on environment protection and sustainable development. CO_2 has been recognized by most scientists as a major source of global warming through its greenhouse effects. Another reason is that CO_2 emissions are directly related to the use of energy, which is an essential factor in the world economy, both for production and consumption. Therefore, the relationship between CO_2 emissions and economic growth has important implications for environmental and economic policies. On the field studying the relationship between CO_2 emissions and economic growth, most literature focuses on the discussion of the environmental Kuznets curve (EKC). These studies argue that the relationship between the two variables is shaped as an inverted U-shaped curve. This means that at the relative low income level, as the income increases, the energy consumption increases also, which in turn, causes the growth of the CO_2 emissions and environmental pollution. Therefore, at the relative low income level, the CO_2 emissions and income are positively correlated. As the income increases to a certain high level, the awareness of environmental protections enhances, hence people and the government are more willing to spend more resources to enforce the regulation and conduction of the environmental policies. Therefore, environmental pollution and the CO_2 emissions will decrease (Wang K. 2013; Tapio P. 2005).

Considering the above the article presents the study of these dependencies in the level of emission of the Visegrad economies, energy mix, GDP per capita and the population based on the data presented on Eurostat websites. The aim of this article is to examine Pearson correlation coefficient between emissions and economic growth for the Visegrad Group countries in 2006-2012. Results of the analysis confirmed that developed countries achieve economic growth while decrease of emissivity was achieved.

2. Material and Data

To examine the relations between the level of emissivity of the economies, first, the analyses were conducted in terms of the scope of the consumption level of electricity in the V4 countries in relation to other EU countries. In the next stage, the levels of emissions were presented for some countries. The results of analyses were presented in Figure 3, where it has been indicated that in the Visegrad group countries it was possible to achieve the economic growth measured with the GDP per capita while reducing the CO_2 emission. The use of correlation Pearson index, confirmed that the decoupling between economic growth and the level of emission was reached by V4 countries.

2.1.   Energy production in V4 group and in UE countries

Production of electricity to the greatest extent determined the level of emissivity in each country, therefore, first of all the comparative analysis was presented for the V4 coun-

tries in terms of the energy mix. The demand for electrical energy is constantly growing due to the development of industry and growth of the population. The biggest producers of energy in the EU are: Germany 19.2%, France 17.7%, Great Britain 11%, Italy 9%, Spain 8.9%, Poland 4.8%, Sweden 4.8%, and the Netherlands 3.1%. These countries together produce 78.5% of energy in the EU. The share of the Czech Republic in the EU production is 2.6%, Slovakia 0.9% and Hungary 0.9%. In all EU countries (apart from Lithuania, Latvia, Estonia and Romania) the growth of the electrical energy production has been noted since 1990. Changes in electricity production in the V4 countries in the years 1990–2013 are presented in Table 1.

Table 1: Net electricity generation in V4 in 1990–2013 (thousand GWh)

	1990	2000	2010	2013	2013/1990
Czech Republic	58.1	68.0	79.5	80.9	39%
Hungary	25.9	32.3	34.6	28.0	8%
Poland	123.4	132.2	143.5	150.0	22%
Slovakia	23.0	27.7	25.4	27.2	18%
EU-28	2 432.1	2 872.9	3 199.3	3 101.3	28%

Source: EUROSTAT, 2016

The largest increase in energy production in the V4 countries was recorded in the Czech Republic (39%), followed by Poland (22%), Slovakia (18%) and Hungary (8%). On average, in the EU there was an increase of the electrical energy production by 28%. The EU states are characterised by a significant differentiation in terms of energy mix. For example, the greatest share in the energy mix of nuclear energy is in France 73%, Slovakia 62%, Hungary 48% and Sweden 39.3%. The largest share of coal fuels in the energy mix is in Poland 86%, Estonia 80%, Greece 48%, and Czech Republic 42%. Gas is the fuel most commonly used to produce electricity in Lithuania 85%, Luxembourg 77.9%, Netherlands 50%, UK 40.7%, Italy 48%, and Latvia 42.6%. Biomass has the highest share in the energy mix in Denmark 14%, Finland 14%, Luxembourg 11%, Latvia 10%, and Sweden 10%. Hydropower is the most commonly used in Croatia 48%, Sweden 42%, Latvia 41%, Romania 33%, Slovenia 25%, Slovakia 19%. Wind energy has the highest share in Denmark 29%, Portugal 26%, Ireland 21% and Spain 18.5%. Solar Energy is the most popular in Greece 8.3%, Italy 7.3% and Spain 5.3%. Geothermal has the highest share of 2% in Italy (EC, 2013). Figure 1 presents the energy mix of 4 countries of the Visegrad Group.

As shown in Figure 1, the Visegrad Group countries are significantly different due to the sources of the produced energy. Slovakia in its mix has the highest share of nuclear energy 62%, then of hydropower 19.4%, gas 7.6%, coal 5.4%, biomass 3.4%, wind energy 0.3%, solar energy 1.9%. In Poland, the energy sector is dominated by the use of coal in 86.1% (Korski J. et al. 2016; Jonek-Kowalska I., 2016), then biomass 5.2%, gas 3.9%, wind 2.4%, water 1.9% and oil 0.5%. In Hungary 48% is the nuclear energy, 18.9% coal, 21.9% gas, 1.8% oil, 6.6% biomass, and 2.2% wind. In the Czech Republic 40.3% is the nuclear energy; 42% coal, 5% gas, 5% biomass, 4.3% water, 2.7% solar and 0.6% wind. The structure of sources for electricity production directly impacts the level of generating emissions in the EU countries. The strategy for reducing the levels of emissions at the same time determines the directions of changes in the structure of generating energy. The member states show the highest energy share from renewable sources in the world, i.e. 20% of the energy produced in the EU is hydropower, 21.7% is the energy

from renewable sources (biomass, geothermal, solar, wind), 12.5% is the nuclear energy and 45.8% are non-renewable fuels – coal, oil and gas.
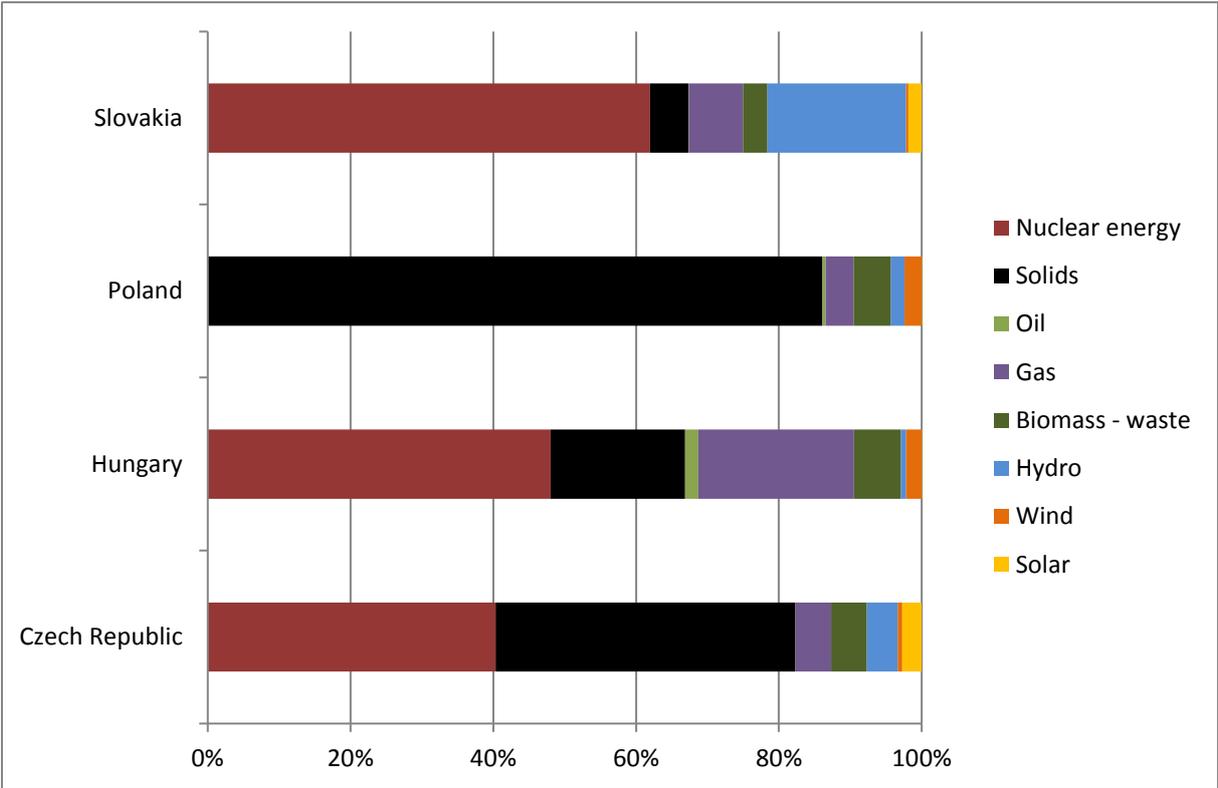
Figure 1: The energy mix of 4 countries of the Visegrad Group
Source: EC, 2013

Fuel with the highest level of CO_2 emission is coal and it amounts to 44% of global emission, then crude oil 35%, the third is natural gas 20% and 1% are the others (IEA, 2014). Therefore, a strategy of the EU's decarbonisation of the economy has been implemented, which aims to increase the share of renewable energy in the energy balance of the country. However, it should be stressed that the CO_2 emissions come not only in part from burning fossil fuels, but their level is also affected by the elements, such as: deforestation, emissions from agriculture, release of trapped polar methane, reduction of ocean capacity to store carbon dioxide.

2.2. The emissivity of V4 countries

Since 1990 there has been a significant reduction in the emission levels of the EU states. The total greenhouse gas emission (GHG) excluding LULUCF (Land Use, Land Use Change and Forestry) in the European Union countries (EU-28) in 2014 achieved the level of 4 419 Mt CO_2 eq. This means that this emission has been reduced since 1990 by 1 311 Mt CO_2 eq., i.e. by almost 23%. Such a drop has been achieved thanks to, among others, the growth of the use of renewable sources, decrease of the use of fossil fuels and the energy improvement of efficiency (Kijewska and Bluszcz, 2016a). There are different causes of this decline in GHG emissions in individual countries, as well as different is the level of emissions from various types of gases such as: carbon dioxide, methane, nitrogen oxides and nitrous oxide. Also, various sectors in varying degrees, contribute to GHG emissions. In 2012 the largest share of these emissions had 'energy excluding transport'

(57.9%), and 'transport including international aviation' (21.9%). The latter rose from 15% in 1990. Smaller share had 'agriculture' (10.0%), 'industrial processes' (6.8%) and 'waste' (3.0%). More details about emissions in UE countries are in (Kijewska and Bluszcz, 2016b). The emission levels of several countries with the highest share in the total EU emissions are presented in Table 2.

Table 2: The emission levels of several EU countries including V4

[Mt CO$_2$ eq]	1990	2000	2014	Emission change 1990–2014	Share in UE emission [%]	Share in EU population	Emissions per capita [tCO$_2$eq 2014]
Germany	1258	1060	925	−26%	20.9%	16%	11.42
United Kingdom	815	748	560	−31%	12.7%	13%	8.67
France	555	567	474	−14%	10.7%	13%	7.16
Italy	526	563	428	−19%	9.7%	12%	7.04
Spain	292	395	343	18%	7.8%	9%	7.37
Netherlands	226	230	198	−13%	4.5%	3%	11.73
Poland	474	393	382	−19%	8.6%	7%	10.05
Czech Republic	196	149	125	−36%	2,8%	2%	11.83
Hungary	95	74	58	−39%	1,3%	2%	5.85
Slovakia	75	50	41	−46%	0,9%	1%	7.52

Source: EUROSTAT, 2017
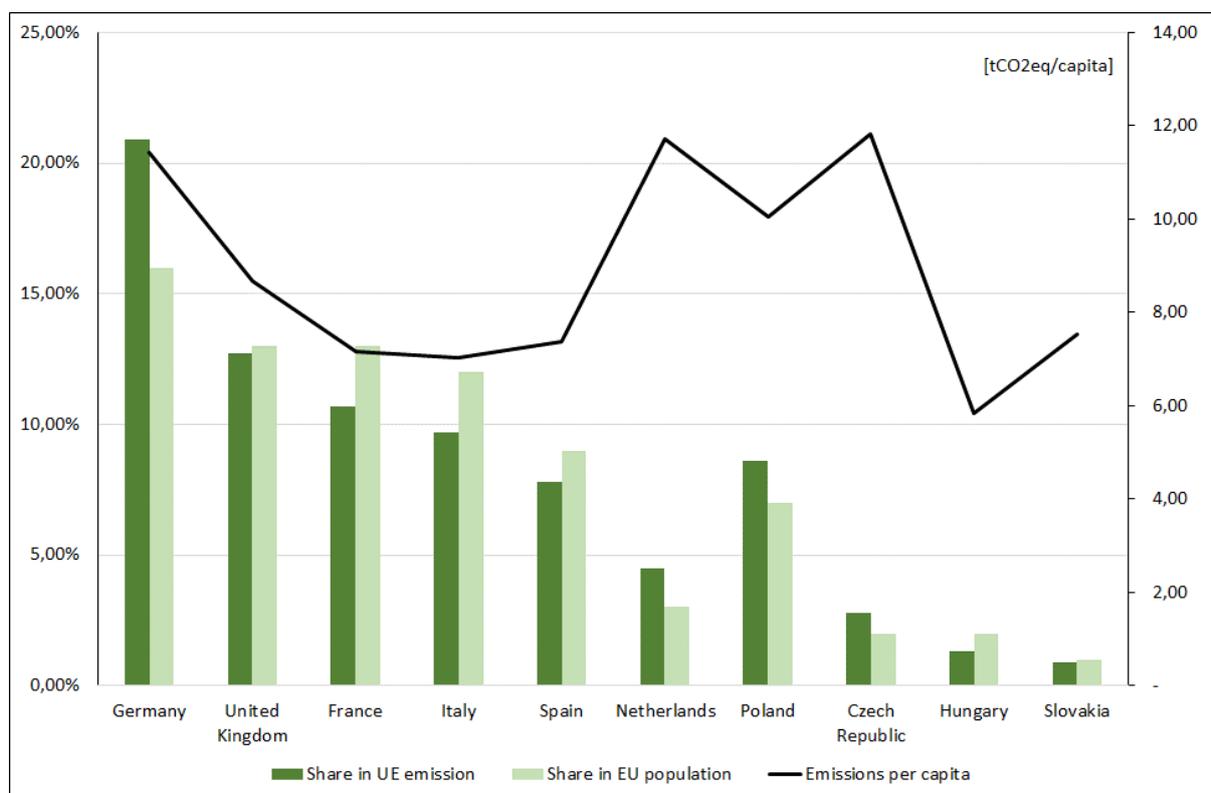
Figure 2: The emission levels per capita of several EU countries including V4 and their share of emission and population
Source: EUROSTAT, 2017

As shown in Table 2, the significant share in the EU emissions comes from 7 countries, such as Germany, UK, France, Italy, Poland, Spain, and Netherlands. Their total emission amounts to 74.9% of total EU emission, all other countries account for 25.1% of the EU emission in 2014. Among the biggest emitters only in Spain the emissions have increased, and they were caused mainly by the growth of the emission in the road transportation, in the electrical and thermal energy production, and in the manufacturing industries. In respect to the share of the emission and the share of the population of the given country, significant diversity of these levels can be seen. As already mentioned it mainly depends on the energy mix and on the level of development of each country. In 2014 the biggest emission CO_2eq per capita was recorded in Czech Republic, the Netherlands, Germany and Poland. The lowest emission was in Hungary (Table 2, Figure 2).

3. Results

The study of the relationship between the economic growth and the level of emissivity of the EU and V4 are presented at the Figure 3 and 4. Economic growth is an economic category, which means an increase of the value of the annual production of goods and services in the given country, thereby determining the level of the prosperity of the society. Figure 3 shows the GDP level per capita compared to 2006 as the base year and the level of CO2eq emission per capita of the V4 countries. In 2014, according to the data posted on the Eurostat websites, in 8 EU countries the decrease was noted in the population compared to 1990, these include Bulgaria (–18%), Estonia (–16%), Croatia (–11%), Latvia (–25%), Lithuania (–21%), Hungary (–5%), Romania (–15%), Poland (–0.5%). However, in Slovakia there was a growth in population by 2.7% and in the Czech Republic by 2%. Due to the small demographic changes, this fact had no significant impact on the level of emissivity of the V4 group.

As can be seen from Figure 3, Visegrad countries have achieved the economic growth, measured by GDP per capita, in the years from 2006 to 2014 while reducing the emissivity. The use of correlation Pearson index, confirmed that the highest level of decoupling between economic growth and the level of emission reached Slovakia (correlation coefficient level was –0.82) then Poland (–0.69) next Czech Republic (–0.30) and Hungary (0.06).

The studies presented in the work are of the microeconomic nature and cannot constitute the basis for the generalizations. The phenomenon of decoupling the economic growth from the emission level, therefore, has a very complex nature and the studies in this scope should, according to experts, include the economic phenomena on a global basis, because the decline in production in one region of the world, and thus the drop in the emission in the same region, may result, among others, from the increase of the production and emission in a different region of the world, which currently takes place in the world. Therefore, in the studies of the relationships between the economic growth and the level of emission it is proposed to recognise the level of real consumption rather than production in the given area of the country, which should give more detailed results. However, this issue needs to develop adequate estimation methods.
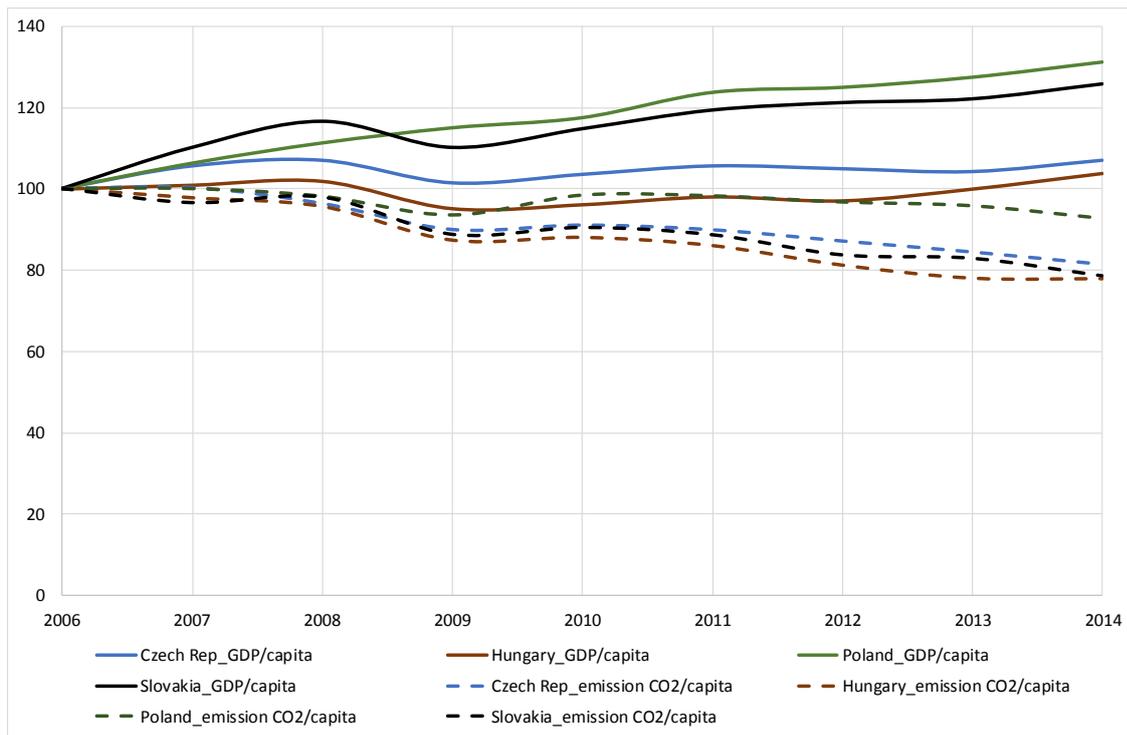
Figure 3: The relationship between the economic growth and the level of emissivity of the Visegrad Group
Source: EUROSTAT, 2017
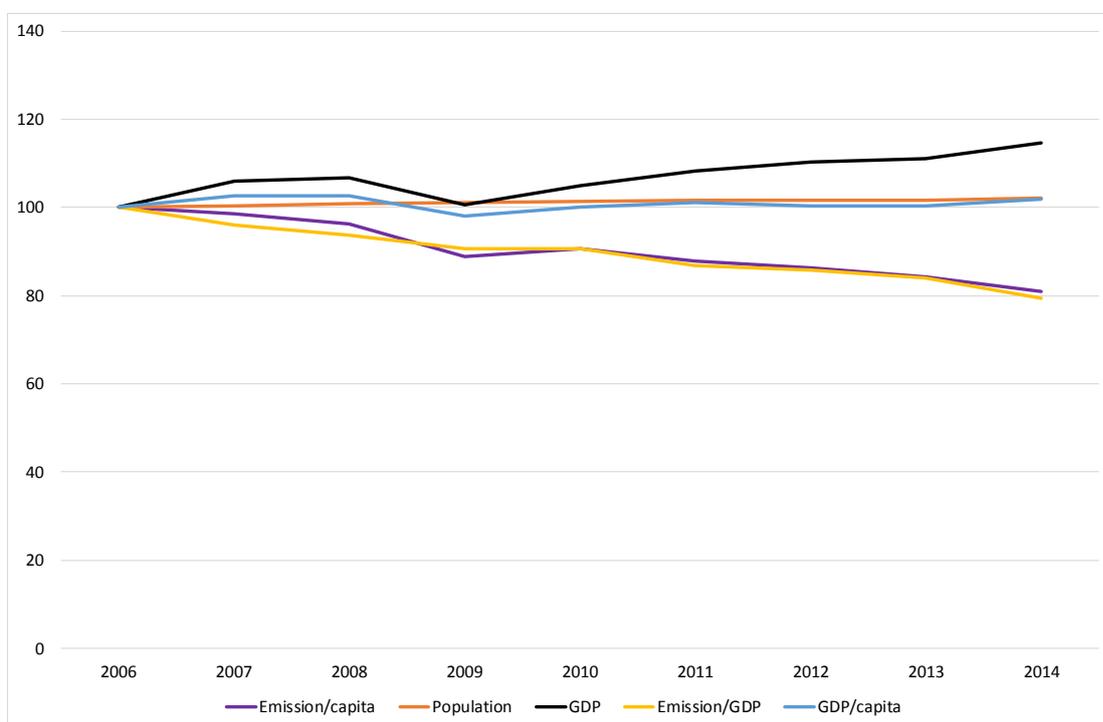
Figure 4: The relationship between the economic growth and the level of emissivity of the EU countries
Source: EUROSTAT, 2017

Total emissions per capita in European Union countries declined in 2014 in relation to 2006 by 18.96%. In the European Union, there has been a population growth of 2.11%.

Economic growth measured by GDP achieved in 2014 an increase of 14.57% and the level of emissions per GDP declined by 20.52% in 2014 in relation to 2006.

4. Discussion and Conclusions

The relationships between the economic development and the level of emissivity are a very topical research problem today. This study concerns the relation between the economic growth and the level of CO_2 emission in V4 countries, which shows that in these four countries since 2006, the economic growth has been recorded while reducing emissions. The highest growth measured by the GDP level per capita was reached by Poland – 31.25%, then Slovakia –25.93%, Czech Republic – 6.94% and Hungary 3.92% while reducing the emission level in Poland by 7.21%, Czech Republic 18.62%, Slovakia 21.32% and Hungary 22.1%. The use of correlation Pearson index, confirmed that the highest level of decoupling between economic growth and the level of emission reached Slovakia (correlation coefficient level was −0.82) then Poland (−0.69) next Czech Republic (−0.30) and Hungary (0.06).

It should be noted that this analyses should be deepened with the data in terms of the level of the real consumption from other countries, in which the levels of emission increased. However, this requires access to more detailed data. The time interval of the analyses is also very important, because the occurring trends in the studied period of the analysis do not mean the long-term dependencies. Therefore, the research material presented in the article becomes a contribution to further discussion in this regard.

Acknowledgements

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Google Queries as an Indicator of Mortgage Demand: Evidence from Wavelet Analysis

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Abstract

We apply Google query data as an alternative indicator of mortgage demand for households and individuals. The novelty of this paper is the employment of wavelet coherence with phase shift to identify the causality direction between the analyzed time series. Moreover, we apply Monte Carlo method to estimate the significance of results. The sample covers the mortgage market in 14 European countries in the period of from 2007 to 2015. Our results indicate that Google query data help to explain the mortgage demand only in the 7 EU countries. The wavelet coherence identifies co-movements at different frequencies therefore we differentiate forecasting potential in short-term and long-run.

Keywords: mortgage demand, Google queries, Morlet wavelet, phase shift

JEL Code: G21, C22

1. Introduction

Economic agents make plenty decisions every day. In case a decision is important, economic agents form an information base and evaluate its details. Due to technological development, the internet is a great source of information for agents when building the information base. Therefore, internet data, so called "big data" are currently popular in social science research because of their ability to precede the decisions of economic agents. This paper studies the ability of internet data to reveal the background of one of the most important decision in human life. To be specific, we examine the ability of Google queries to reflect the mortgage demand when one plan to buy a house. Based on our results, we recommend to policy makers and market regulators to consider the internet data as a valuable source of information about the decisions of economic agents in a timely manner as was not possible in the past. In particular, the majority of data at the

level of the economy is available on a quarterly basis. However, internet big data like Google queries are available without the time lag on a weekly basis and raise the opportunity to better evaluate the current behavior of economic agents. In the context of the paper, central banks can better understand the formation of mortgage credit demand without a time lag.

This paper augments the studies of McLaren & Shanbhogue (2011) from Bank of England and Saxa (2014) from Czech national bank who study the ability of Google to reflect the demand in labor and mortgage market. In particular, this paper examines the Google queries ability to reflect the mortgage demand in 14 European countries. The novelty of this paper is the employment of unique methodology based on wavelet analysis. The added value of wavelet analysis is the deeper understanding of two time series and their behavior in comparison to the simple correlation or ARIMA models which have been applied in the above mentioned studies. The contribution of the paper is the recommendation for market regulators to apply the Google queries as an alternative indicator of society's behavior. The rest of the paper is structured as follows. Next part provides the Literature Overview. The third part describes the Methodology followed by chapter Results. The last part discusses the limits of the paper and concludes.

2. Literature Overview

Employment of big data in scholarly literature is increasing in popularity. Technically, big data are large and complex sets of data which has to be processed computationally (Halevi & Moed, 2012). When properly collected and analyzed, it provides the better insights into the studied topic. In the context of the paper, big data provides the opportunity to track the behavior of a society in a timely manner. Examples of such data are especially the internet data like Twitter tweets, Facebook likes and comments or Google queries (search phrases at Google).

The current research in social sciences employs big data based on the following two approaches. The first one considers the social media as a sentiment indicator of a society. The specific examples are studies Bollen et al. (2011), Mao et al. (2011), Karabulut (2013) or Siganos et al. (2014) focused on the sentiment of a society and market volatility. These studies define the mood of society based on the data from Twitter and Facebook. The second approach works with the economic rationale of information demand. Choi & Varian (2009a, 2009b, 2012) employ the Google queries for nowcasting and forecasting the variables like automobile sales, unemployment claims, consumer confidence or travel destination planning. Another example of such rationale are the studies of Da et al. (2011), Vlastakis & Markellos (2012) and Ding & Hou (2015) who examine the Google queries as a proxy for retail investors attention (a form of information demand). Specifically, the increasing volume of Google queries for specific stock ticker reflects the demand of investors for information about specific stocks. The ability of internet data to precede the later decision of economic subjects can be a valuable source of information for regulators and policy makers as well. In particular, McLaren & Shanbhogue (2011) from Bank of England examines the behavior of labor and housing market in the UK based on Google queries. Similarly, the paper of Saxa (2014) from Czech National Bank studies the Google queries as a proxy for mortgage demand in the Czech Republic. This paper augments two previous national bank studies and provides the extended analysis of 14 European countries and their mortgage market with employment of Google query data. The rationale of this paper is based on the information demand as well. The au-

thors assume that Google queries represent the interest of individuals or households to buy a mortgage. The economic rationale is simple. Housing decision is one of the most important decision of life and economic subject needs to build a proper information base. We assume, economic agents will employ the internet as the main source of data and Google as a most sophisticated web browser is a proper tool to accomplish the market research.

Wavelet analysis is a multiscale analysis developed by Daubechies (1992), Meyer (1986), and Strang (1989). Although the wavelets are often applied in the natural sciences, it is not a unique method in economic time series analyses. There is a wide range of literature employing wavelets to identify business cycles comovements (Fidrmuc et al., 2014; Kapounek and Poměnková, 2013), asymmetric shocks filtering (Maršálek et al., 2014), trade and financial integration (Kučerová and Poměnková, 2015a), monetary and fiscal policy optimization (Crowley and Hudgins, 2017), stock markets (Boubaker and Raza, 2017) and banking (Kučerová and Poměnková, 2015b).

3. Data

The paper studies mortgage market in 14 European countries in the period of 2007 till 2015. The list of countries is mentioned in the next paragraph. The sample has been chosen based on a mortgage data availability. To be specific, only 14 countries have sufficient amount of observations about the mortgage market. This data have been kindly provided by the European Mortgage Federation[1]. Data are available in a quarterly format and represents the gross residential mortgage lending (new mortgages issued every quarter) in millions of €. Data are expressed as a mortgage lending to GDP ratio to incorporate the economic performance of the country in the model.

The paper works with unique data of Google queries. The majority of studies presented above employs only queries in the English language. However, this paper employs search term "mortgage" in the official language of an every studied country. The following search phrases have been applied – Belgium (*hypotheek*), Czech republic (*hypotéka*), Germany (*hypothek*), Denmark (*boliglån*), Spain (*hipoteca*), France (*hypothèque*), Hungary (*jelzáloghitel*), Ireland (*mortgage*), Italy (*mutuo*), Netherlands (*hypotheek*), Portugal (*hipoteca*), Romania (*credit ipotecar*), Sweden (*bolån*) and the United Kingdom (*mortgage*). Data are available at web Google trends[2]. Data are geographically restricted for every mentioned country. The choice of search term has been consulted by native speakers within the given country. In every studied country the word "mortgage" has several synonyms like "mortgage loan" or "residential loan". Therefore, the following "procedure" has been applied to choose the search term which best reflects the behavior of economic agents when they search for information via the Google. In particular, Google enables to compare several time series of given search phrase. We compare the synonyms of word "mortgage" for every country. For example in Belgium, synonyms "*hypotheek*", "*woonkrediet*" and "*woonlening*" have been compared. The synonym with the biggest volume of searches is chosen as the final search phrase. Data of search phrases are available in a weekly format. Data are expressed as the index in the interval (0,100). Zero represents not sufficient volume of searches and 100 represents the maximum reached volume. In particular, Google defines for the specific search phrase in giv-

1 http://www.hypo.org/Content/
2 https://www.google.com/trends/

en period (e.g. 2007–2014) the biggest search volumes as 100 value. The rest of time series is recalculated according to this point. Therefore, we do not have the absolute value of searches for given term but we know the variability of the search term in time in comparison with total searches at Google. Data of Google queries have been transformed to quarterly data as an average to accomplish the same time structure of two studied time series.

4. Methodology

To identify the forecasting potential of the mortgage demand we employ time-frequency analysis and differentiate co-movements between the time series at different frequencies. First, we apply Continuous Wavelet Transformation (CWT) as a band pass filter to time series $(x_n, n = 1, \dots, N)$ with uniform time steps δt, where the time step is defined as the convolution of x_n with the scaled and normalized wavelet. We follow Grinsted et al. (2004) and define the wavelet power as $|W_n^X(s)|^2$ and:

$$W_n^X(x) = \sqrt{\frac{\delta t}{s}} \sum_{n'=1}^{N} x_{n'} \psi_0 \left[(n'-n) \frac{\delta t}{s} \right] . \tag{1}$$

where s represents scale in time. In practice, the complex argument of $W_n^X(s)$ can be interpreted as the local phase. To localize a function in frequency and time we use Morlet wavelet ψ_0 which provides an optimal trade-off between both time and frequency localization (Teolis, 1998):

$$\psi_0(\eta) = \pi^{-1/4} e^{i\omega_0 \eta} e^{-1/2\eta^2} , \tag{2}$$

where $\omega_0 = 6$ is dimensionless frequency and $\eta = s \times t$ dimensionless time by varying its scale s.

Second, we apply Wavelet Coherence (WTC) to identify common time-localized oscillations in nonstationary time series that can be interpreted as co-movement or correlation. Following Torrence and Webster (1999) and Grinsted et al. (2004), we define the wavelet coherence of time series x_n and y_n as:

$$R_n^2(s) = \frac{\left| S\left(s^{-1} W_n^{XY}(s) \right) \right|^2}{S\left(s^{-1} \left| W_n^X(s) \right|^2 \right) \times S\left(s^{-1} \left| W_n^Y(s) \right|^2 \right)}, \tag{3}$$

where smoothing operator S is defined as $S(W) = S_{scale}(S_{time}(W_n(s)))$. S_{scale} represents smoothing operator along the wavelet scale axis and S_{time} smoothing operator in time, suitable or the Morlet wavelet (Torrence and Webster, 1999).

Moreover, it is very important to identify a direction of causality which is given by the relative lag between the two time series. In this sense, we applied a phase shift to identify a time offset between the reflection and the maximum value on the waveform. Thus, we interpret phase shift as a lead or a lag between time series. We follow Grinsted et al. (2004) and estimate the mean and confidence interval of the phase difference. The mean phase calculation is based on the circular mean of a set of angles $(a_i, i = 1, \dots, n)$:

$$X = \sum_{i=1}^{n} \cos(a_i) \qquad Y = \sum_{i=1}^{n} \sin(a_i) \qquad (4)$$

$$a_m = \arg(X,Y) \text{ with } \qquad \text{and} \qquad .$$

For a better understanding this issue, it is comparable to causality in Granger sense. However, to interpret the phase as a lead or a lag have to be done relatively to the anti-phase, because a lead of 90° is also a lag of 270°.

Finally, we focused on the edge effects because wavelets are not completely localized in time in the case of very low frequencies. We follow concept provided by Torrence and Compo (1998) who estimated statistical significance against an autocorrelation model with lag 1 and error term represented as white noise. The same approach was applied to identify significance levels of cross-wavelet power and wavelet coherence.

5. Results

The results of co-movements between the analysed time series are presented as the wavelet coherence (WTC) in Figure 1. Horizontal axis presents the studied period and vertical one the length of the wavelets. Thus, light significant areas in periods 4 and 8 represent co-movements in cycles with length 1 and 2 years. Co-movement cycles with value 4 and below can be interpreted as seasonality which is not particularly important for our results.

Additionally, all results in frequency domain show edge effects that cannot be ignored. This area is represented by the V-shaped curve and lighter shade areas in the pictures. Significant coherence cannot be rejected in these areas but should be interpreted carefully because wavelets are not completely localized in time and frequencies.

According to Figure 1, statistically significant and most extended co-movements are in Germany, Hungary and United Kingdom. The short run co-movement cycles are identified in Germany (from 2 to 6 quarters) and United Kingdom (0 to 5 quarters). Hungary is exposed to long term co-movement cycle with 4 and more quarters. Co-movements are also statistically significant but not as extended in France, Ireland, Netherlands and Romania with short run co-movement cycles from 0 up to 6 quarters. Co-movements in Belgium, Czech Republic, Denmark, Italy, Portugal, Spain and Sweden are either not significant or significance is shown in the area of edge effect which is out of the scope.

Moreover, when co-movements are significant, a phase shift between the analysed time series represented by arrows provides more details. Right arrows indicate that both time series are in-phase, left arrows indicate anti-phase. Thus, we can discuss phase shift between 0° and 90° if arrows turn to the bottom right corner. This effect is significant particularly in the case of Germany, Hungary and Netherlands. With respect to the anti-phase, we can conclude that mortgages (in the percentage of GDP) are leading by google queries. To better understand the results time shift in the frequency domain is "translated" to time domain as follows. In Germany, Hungary (6 to 8 quarters) and Netherlands (8 and more quarters) arrows are turned to the bottom right corner (angle of 45°). Therefore, in Germany and Hungary there is a one quarter time lag and in the case of Netherlands lag of 2 quarters is present.

WTC: Google Queries and Mortgages in Belgium

WTC: Google Queries and Mortgages in the Czech Republic

WTC: Google Queries and Mortgages in Germany

WTC: Google Queries and Mortgages in Denmark

WTC: Google Queries and Mortgages in Spain

WTC: Google Queries and Mortgages in France

WTC: Google Queries and Mortgages in Hungary

WTC: Google Queries and Mortgages in Ireland

WTC: Google Queries and Mortgages in Italy

WTC: Google Queries and Mortgages in Netherlands

Figure 1: Wavelet Coherence

6. Conclusions

This paper presents the preliminary results and following limits of our study need to be taken into account for the further research. Currently, there are 32 observations per country. However, for the proper employment of wavelet coherence technique one should employ longer dataset. Further, all data are expressed in euro currency as it was provided in a standardized format by European Mortgage Federation. However, not all studied countries are part of Eurozone and changes in the exchange rate can bias the final results. Further, from the economic point of view, the paper works with the assumption that information demand on the internet is directly reflected in the volume of mortgages as economic agent search for information when they are interested in buying a house. However, our model does not incorporate the banking sector specifics which can influence the "transmission" mechanism from the demand of economic agent to a final decision that mortgage has been received by the given agent. Therefore, the above results need the further analysis in terms of country and banking system characteristics to provide the detail explanation why is the studied relationship significant only in half of the sample.

Despite the limitations, we recommend the policy makers and market regulators to consider the employment of the internet big data as an alternative tool for decision making. The co-movements are significant in 7 countries. Moreover, the length of co-movement wavelets and phase shift provide the important information about the formation seasonality and time lags of credit demand in given countries.

Acknowledgements

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Consumer's attitudes to Corporate Social Responsibility

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Abstract

Article deals with consumer's attitudes to Corporate Social Responsibility. Main goal of attitude research was to discover what consumer understands under term corporate responsibility in following areas: Economic, Social, and Environmental. Primary data collection was done via quantitative polling. Closed questions – a selection of options, and the Likert scale were used. Results show that majority of consumers understand the term "corporate social responsibility".

As responsible in economic area respondents consider such a firms which are profitable for owners and via taxes bring benefit for all society. In term of social responsibility respondents reputed companies which are not uncaring to social problems and which are active in different social project through philanthropy.

Keywords: Corporate social responsibility, consumer, attitude, buying behavior, social area, economic area, environmental area

JEL Code: M140, M310

1. Introduction

Today's business environment puts companies in front of a lot of challenges. One of them is "corporate social responsibility". This challenge consists in voluntary activities that go beyond the scope of basic economic interests and legislative measures (Carroll and Beiler, 1975). The concept of corporate social responsibility started to develop in the period before World War II (Center for Ethical Business Culture, 2005). Since then, many definitions of corporate social responsibility have been formulated (Dashlrud, 2006). A crucial importance can be attached to publication Social Responsibilities of Businessman by H. Bowen (2013), in which the author, among other things, emphasizes the need to focus on relationships with both close and distant communities in his concept of social audit, which forms an essential part of the work. The 1980s saw the publication of E. Freeman's Strategic Management: Stakeholder Approach (1984), in which the author expands the tradi-

tional understanding of shareholders to comprise also other persons involved, i.e. stakeholders. Stakeholders are then divided into primary and secondary ones depending on how they affect corporate activities or, vice versa, how they are affected by corporate activities. Primary stakeholders are those without which the operation of a company is hardly possible, if not impossible. Primary stakeholders are chiefly employees, consumers, suppliers, investors, shareholders and legislative institutions. Secondary stakeholders are defined as those who can affect or be affected by the company, but are not essential for the functioning and existence if the company. These include media and special interest groups (Clarkson, 1995). Research conducted by author J. Harvey (2010) reveals the importance of good relationships with consumers with regard to their significant bargaining power. Businesses applying CSR should pay attention to their relationships with consumers at least in areas such as general policy, customer communications, product safety, customer complaints, special customer services, and other relevant topics in which consumers are interested in relation with an organization and its activities (Clarkson, 1995). Another thing is the way a business approaches the above-mentioned issues. According to surveys conducted by Chun and Davis (2006), a positive effect on consumers is created by businesses whose behavior towards consumers can be expressed by notions such as cool, trendy, young, adventure, imaginative, up to date, exciting, innovative, boldness, extrovert, and daring.

In addition, consumer buying behavior is influenced by many other factors, including the quality, brand and price (Stávková, Stejskal and Toufarová, 2008). The results of some experimental studies indicate that consumers' attitudes, and subsequently also their buying behavior, are influenced positively when they are aware that the business behaves in a socially responsible manner (Pomering and Dolnicar, 2009). Brown and Dacin (1997) claim that socially responsible behavior has a positive influence on views and attitudes not only towards the company itself but also to its products. Some surveys show that respondents are willing to pay more for products that are manufactured by companies declaring social responsibility (Ferreira et al., 2010). The influence of CSR in the social area was researched in even more specific details by a study that examined the effect of specific activities, such as sponsorship, cause related marketing, and philanthropy, on consumers' opinions. The results show that consumers appreciate philanthropy more than sponsorship and cause related marketing (Lii and Lee, 2012). In contrast, other works show that CSR activities present a rather indifferent element that does not provide consumers with a motive strong enough to switch companies (Rice and Peter, 2015). A virtually negative influence on consumers is exerted by inappropriate social responsibility policy that is not in harmony with the company's objectives (Becker-Olsen et al., 2006).

Another interesting question is how the consumer buying behavior is affected by a responsible approach of companies towards environmental issues. Surveys mapping the behavior and purchases of households have shown that in countries with predominating consumer lifestyle, the lifestyle and the consumer goods purchased contribute up to 40% to environmental damage (Grunert, 1995). The evolution of consumers' thinking shows that there is a potential for a change in their behavior or at least for a shift towards what is known as sustainable development. An extensive survey conducted among U.S. consumers shows that 74% of Americans consider global warming an important issue and more than 50% regard it as an extremely important issue (Grant, 2007). In Europe, the Gallup Organisation conducted a survey among 26,500 consumers across European Union Member States in 2009. The results show that EU citizens regard waste minimization and recycling as having the greatest contribution to the solving of environmental issues. A slight majority of those surveyed, with the exception of respondents in Cyprus, Lithuania, and

Bulgaria, said they were aware of the impact of the products they were buying on the environment and were taking these impacts into account when shopping (Flash Eurobarometer 256 – The Gallup Organisation, 2009). Only a small percentage of consumers think that their individual activities aimed at protecting the environment make sense (Confino and Muminova, 2011), and that a slight change in household behavior can reduce the production of greenhouse gases significantly (Dietz et al., 2009). According to survey results published in the National Action Plan for Social Responsibility issued by the Ministry of Industry and Trade, two thirds of Czech consumers are willing to pay more for eco-friendly products (Ministry of Industry and Trade, 2015).

2. Methodology and Data

The paper has the character of a descriptive quantitative survey. The current state of knowledge of the issue in question has been researched on the basis of a study of mainly foreign as well as Czech reference books. The objective of the survey was to find out which factors in general affect consumers when shopping as well as to examine their awareness and actual knowledge of the notions of social responsibility and green marketing. Another aim was to find out what respondents understand by term "socially responsible organization" in the social, environmental and economic areas. Other questions in the substantive part of the survey focused on consumers' attitudes towards social responsibility. The questionnaire was created using the Lime Survey tool. It contained 18 questions. The questionnaire used close-ended questions such multiple choice, the rating scale and the Likert scale. The questionnaire was completed by basic identification questions. The selection of respondents was based on judgment and availability. The questionnaire was filled in by 359 respondents from all over the Czech Republic.

3. Results

Factors affecting consumer buying behavior were the first to be surveyed. The results (see Table 1) show that respondents placed quality and their previous experience with a product or a producer, followed by the price and country of origin, among the most important factors. Other factors are attached lesser importance. In respect of factors that take into account CSR, it should be noted that respondents attach greater importance to factors related to the environmental pillar rather than to the social one.

Table 1: Factors influencing buying behavior

Factors (1 – unimportant, 5 – important)	Mean scores	Standard deviation
Product quality	4.42	0.76
Previous experience with the product/producer	3.92	0.99
Price	3.87	0.93
Origin (country of origin)	2.92	1.12
Knowing that producer behaves ethically to environment	2.81	1.06
Brand	2.81	0.91
Product packaging	2.80	1.01
Certificate of quality label	2.68	0.98
Environmental label	2.61	1.06
Knowing that the producer behaves ethically to its employees	2.46	1.03
Knowing that the producer contributes actively to solving various social issues	2.25	0.99

In contrast, companies' behavior (see Figure 1) that discourages consumers from purchasing include poor quality/price ratio (85.79%), false advertising (78.55%) and poor customer service (65.46%), followed by animal testing (49.86%), proven violation of laws (43.73%) and harming the environment (40.95%). A corruption scandal (18.94%), bad behavior towards employees (15.88%) and non-transparent business policy (6.96%) have a low influence on consumers.
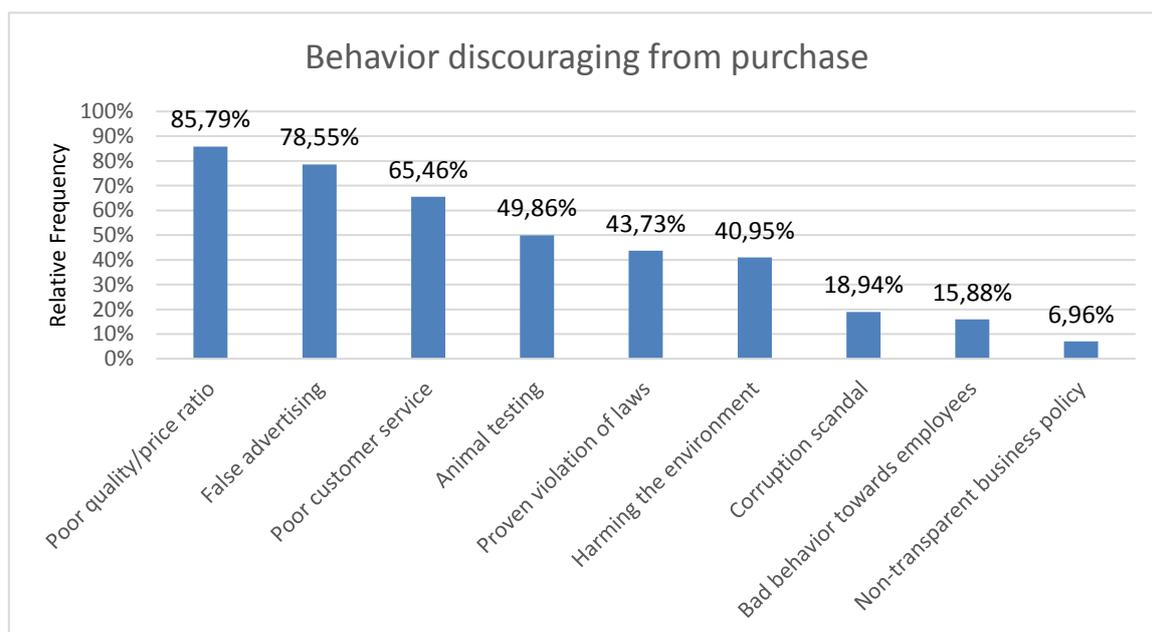
Figure 1: Behavior discouraging from purchase

A total of 69.36% of the respondents are aware of the term CSR, and 68.48% show real knowledge of the term.

The following table (Table 2) shows the consumer perception of a socially responsible company in the social area, where a socially responsible company is viewed to be mainly such company that is dedicated to philanthropy (74.93%) and charity (59.89%), cares about the development of its employees (46.80%) and respects moral principles (45.68%). The lowest values were recorded for a positive attitude of employees towards the consumer (5.01%) and sport sponsorship (2.79%).

Table 2: Socially responsible company in the social area

Possibilities to choose from (n = 359)	Number	Relative number
which, in addition to its economic activities, is involved in various projects in the social area in the form of philanthropy.	269	74.93%
which is not indifferent to social problems in society and tries to provide help in the form of charity.	215	59.89%
which cares about the development of its employees.	168	46.80%
which respects moral principles of society.	164	45.68%
which does more for employees and consumers than what is required by law.	125	34.82%
which enables its employees to carry out voluntary activities in various social or environmental programs.	103	28.69%
whose employees have a very positive attitude towards the consumer.	18	5.01%
which is known for its generous sport sponsorship.	10	2.79%

In the economic area (Table 3), a company is considered responsible if it brings profit to its owners as well as, through taxes, benefit to the entire society (54.32%), provides its customers with products of a high utility value (48.75%), offers products at a fair price (42.62%) and puts the interest of society and environmental protection above its economic benefit (38.44%). The lowest impact on the perception of social responsibility in the economic area was recorded for a well-known brand (3.06%).

Table 3: Socially responsible company in the economic area

Possibilities to choose from (n = 359)	Number	Relative number
which brings profit to its owners as well as, through taxes, benefit to the entire society.	195	54.32%
which provides its customers with products of a high utility value.	175	48.75%
which offers products at a fair price.	153	42.62%
which puts the interest of society and environmental protection above its economic benefit.	138	38.44%
whose products and services fully satisfy customer needs.	121	33.70%
which is active mainly on the local market.	100	27.86%
which strictly complies with the law.	60	16.71%
which has highly effective sales.	59	16.43%
which has the reputation of a thriving business on the market.	52	14.48%
which has a well-known brand.	11	3.06%

In the environmental area (Table 4), a company is considered to be responsible if it invests in technologies (65.74%) which generate less or no waste during production (46.24%), uses renewable energy sources (42.62%), uses energy-efficient technologies and sorts waste consistently (37.60%). The lowest importance is attached by consumers to products that cost more but last longer (6.96%), and to the use of recycled parts and components in production (3.06%).

Table 4: Socially responsible company in the environmental area

Possibilities to choose from (n = 359)	Number	Relative number
which invests in technologies that generate less or no waste during production.	236	65.74%
which uses renewable energy sources.	166	46.24%
which uses energy-efficient technologies.	153	42.62%
which sorts waste consistently.	135	37.60%
which invests in modern waste water treatment and gas emission reduction technologies.	124	34.54%
which seeks to avoid the use of harmful materials in production.	107	29.81%
which tries to minimize its carbon footprint.	64	17.83%
which produces its products so as to minimize costs linked with the production and use of the products.	45	12.53%
which produces products that cost more but last longer.	25	6.96%
which uses recycled parts and components in production.	11	3.06%

Figure 2 shows attitudes towards corporate social responsibility issues with the use of the agreement scale. Responses on the agreement side concern the important role of producers and the industry in addressing environmental issues (93.31%) and the fact that some businesses make claims regarding their impact on the environment that may be considered false, unsubstantiated or unethical when promoting their products and services (61.56%) . Responses on the disagreement side concern the opinions that the main environment polluters have no moral right to be engaged in environmental protection programs (55.71%) and that environmental protection is more important than solving the social issues of our society (45.96%).
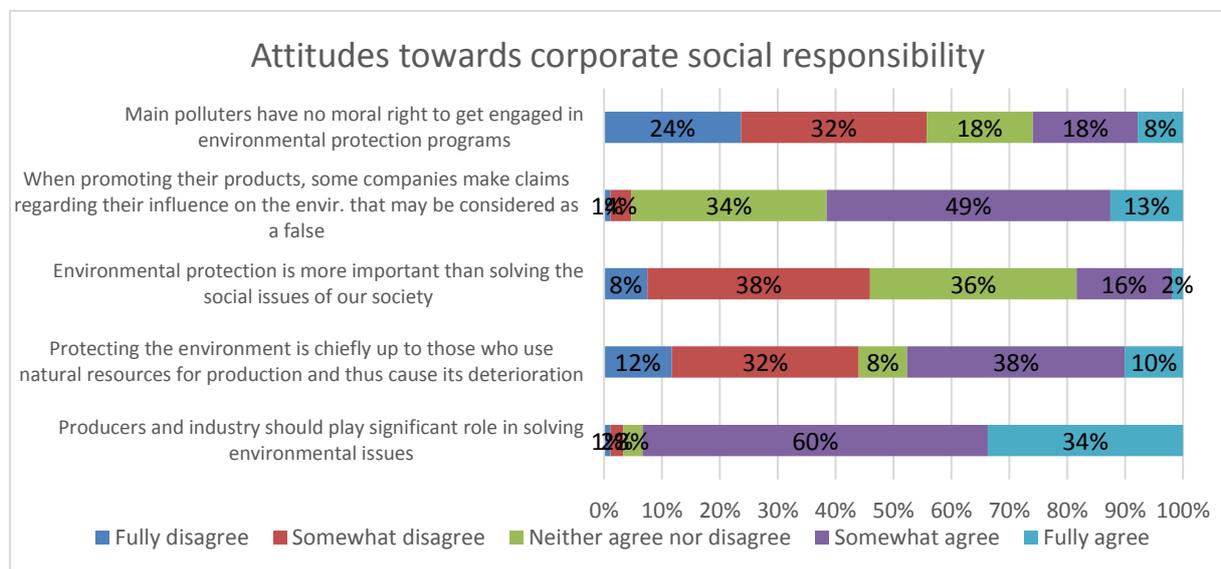
Figure 2: Attitudes towards corporate social responsibility

4. Discussion and Conclusions

We can conclude from the results that a majority of consumers know the meaning of the term "social responsibility". The Ministry of Industry and Trade (2015) states in the Na-

tional Action Plan for Social Responsibility in the Czech Republic that almost three quarters of the public consider CSR important when shopping. In contrast, our results show that knowing that a company behaves in a socially responsible manner presents a less important factor influencing the buying behavior. CSR activities are considered to be an indifferent factor also by Rice and Peter (2015). The factors that are considered important for consumers are product quality, previous experience with the product and the price. This corresponds with the findings of Stávková et al. (2008), among others, who name the quality, brand and price as important factors influencing the buying behavior. From among factors that discourage consumers from purchase, poor price/quality ratio has turned out to be the most significant, as it discourages more than 85% of respondents. Half of the respondents are discouraged from purchase by animal testing, while bad behavior towards employees discourages mere 16% of respondents.

Another part focused on exploring what characteristics consumers attach to socially responsible companies in three basic pillars. In the social area, it is mainly engagement in various projects in the form of philanthropy. Sport sponsorship, on the other hand, is evaluated as insignificant. Similar results have been achieved by Lii and Lee (2012). A company considered responsible in the environmental area is a company investing in technologies that generate less or no waste. Companies considered responsible in the economic area are such companies that are profitable and at the same time beneficial for the entire society through the taxes they pay.

Acknowledgements

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The Transposition of the Mortgage Credit Directive and the Czech Perception of its Impacts

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Abstract

The Directive 2014/17/EU on credit agreements for consumers relating to residential immovable property of 4th February 2014 ("MCD") was recently transposed in the national Czech legal system by Act No. 257/2016 Coll., on consumer credit ("CCA") and immediately generated much criticism due to the perception of its impact, i.e. an alleged favoring of consumers taking mortgage credits. A critical Meta-Analysis of a primary data yield by questionnaires, as well as an investigative and comparative search and presentation of secondary data from a multitude of sources, along with the Socratic questioning method, led to a rather surprising conclusion. The hypothesis of the awareness, knowledge and willingness to use the new rules by consumers wanting to and/or taking consumer mortgage credits are confirmed, as well as the hypothesis that these new rules will lead to an increase of complications and administrative burdens, and costs. A cursory comparison shows that the Czech critical perception of the MCD, CCA and their impacts has parallels in EU member states. Indeed, the EU drive to create and support the effective and competitive Single European Mortgage Market in the name of the (alleged) consumer protection has several highly controversial features.

Keywords: consumer protection, mortgage, residential real estate.

JEL Code: K20, K22, K25.

1. Introduction

The Directive 2008/48/EC on credit consumer agreements ("CCD") set the national transposition deadline for 12th May, 2010. Just shortly before the expiration of this deadline, on 21st April 2010, Czech Act No. 145/2010 Coll., on consumer credit, was enacted. Following this was enacted Directive 2011/90/EU amending the CCD with respect to the calculation of annual percent rate of expenses and the Directive 2014/17/EU on credit

agreements for consumers relating to residential immovable property and amending CCD ("MCD"). Art. 2 of MCD states the level of harmonization as not precluding EU member states from maintaining or introducing more stringent provisions in order to protect consumers, provided that such provisions are in compliance with the EU law. Art. 42 of MCD sets the main transposition deadline as 21st March, 2016. Hence, the Czech Act No. 145/2010 Coll., on consumer credit, updated by the Czech Act. 43/2013 Coll., was replaced on 14th July, 2016 (4 months after the MCD deadline!) by another Czech Act transposing the updated and modified EU rules on consumer credit, Act No. 257/2016 Coll., on consumer credit ("CCA"). The ultimate goal of the CCA is to create a unified framework for consumers and consumer credit providers as designed by EU Directives. The CCA induced an immediate interest by the academic, professional and laic public and the prevailing tenor seems to be highly critical. Allegedly, the true purpose of the CCA is to shift the balance towards consumers by granting them significant rights and claims, i.e. to reinforce the position of consumers and to reduce the number of individuals and households which would become bankrupt and unable to repay their loans. In any event, the CCA took effect on 1st December 2016, the measures accepted in the reaction by consumer credit providers were published and the public has reacted to it, often in a manner not expected by the MCD.

The leitmotif of this paper is the analysis of the key features and several special provisions of the CCA in the light of the EU Directives, especially the MCD, and the reactions to them, as expressed by the ultimate stakeholders as well as academia. The milestones of this leitmotif are hypotheses and their confirmation or rejection along with comparative glosses and remarks. Many questions are answered and even more are emerging, and the attached comparison with respect to the MCD transposition in other EU member states makes the picture even more puzzling. The Meta-Analysis of this conglomerate of data with a Socratic touch leads to conclusions touching the MCD and CCA fundaments and suggestions for further research.

2. Sources, Methodology, Goal and Hypotheses

Research for this paper entails primary as well as secondary sources and the collected, assessed and processed data has a varied nature and comes from various fields and regions, in order to have a spectrum pool of information allowing for a qualitative as well as quantitative analysis, or preferably Meta-Analysis. The open minded and Socratic questioning and critical comparative glossing is instrumental for the dual goal of this article to which goes the leitmotif linking all stated and tested hypothesis. All of this constitutes a platform to present well argued conclusions and recommendations for further research. The source of primary data will be questionnaires specifically created and correctly structured (Harris & Brown, 2010) by the authors of this paper and presented by them to respondents and the secondary data will be legislative acts and related official reports, academic articles and even, as appropriate, financial news and published articles not reaching academic status but indicating the perception and impact trends by the large public. Since this paper entails legal and economic aspects, it includes deductive and inductive aspects of legal thinking (Matějka, 2013) as legal theoretic orientation reflects legal science which is argumentative not axiomatic (Knapp, 1995).The methods used will be comparison, Meta-Analysis (Silverman, 2013), Socratic questioning (Areeda, 1996), and the qualitative assessing as well as quantitative statistic processing and eval-

uation. The leading instrument vis-à-vis questionnaires will be the Pearson´s chi-squared test of goodness of fit (Plackett, 1983).

This paper has a mutually supporting dual goal. Indeed, the goal of this paper is (i) to provide an analytically critical description of selected features of the new legal regime set by the CCA and (ii) to assess their perception and impacts by the public, especially based on a questionnaire search and categorical data analysis. Naturally, this should be linked to the discussion, confirmation or rejection of the stated hypothesis, which predominantly targets the burning questions about the perception and impacts of the new legal regime set by the CCA. For this purpose, two groups of respondents were addressed. The first group consisted of consumers interested in getting a consumer credit to finance the purchase of real estate in the Czech Republic, i.e. probably people wanting to resolve their habitation situation. This group was split in two sub-groups based on an age criterion, i.e. respondents in the age bracket of 30–45 years and respondents in the bracket of 46–70 years, i.e. people with a resolved habitation situation and looking for investment. The second group consisted of financial advisors who exclusively work for the biggest Czech financial institution providing mortgages, i.e. intermediate its mortgages to ultimate consumers. The second group was as well split in two sub-groups according to age, i.e. financial advisors up to 45 years and 46 years and above. In total, 200 respondents from the 1st group (consumers) and 200 respondents from the 2nd group (financial advisors) were contacted and each group was tested vis-à-vis four hypotheses set by the authors of this article, see Table 1 regarding the hypotheses for the 1st group (consumers) and Table 2 regarding the 2nd group (financial advisors). Some hypotheses are intentionally cross-examining.

Table 1: Hypotheses for the 1st group of 200 respondents

1st group – 200 respondents interested in a consumer credit to finance real estate
H1 – Consumers are aware about the new Act, i.e. CCA
H2 – Consumers are aware about their new rights provided by the CCA
H3 – Consumers perceive positively their new rights provided by the CCA
H4 – Consumers are interested in using some of their new rights provided by the CCA

Table 2: Hypotheses for the 2nd group of 200 respondents

2nd group – 200 respondents providing financial advising
H1 – The CCA brings new complications and administrative burdens
H2 – Consumers are aware about the new rights provided by the CCA
H3 – Consumers are not aware about their new rights provided by the CCA and should be informed
H4 – Consumers are interested in using some of their new rights provided by the CCA

The hypotheses were set based on questionnaires and the data yield was assessed by the categorical data analysis by the Software program Statistika, while using the method of dependency of quantitative features and outcomes of Pearson´s chi-squared test.

3. The legal framework for consumer credits by the CCA

The CAA sets a very large definition of consumer credit. It defines it as any manner of providing finance to consumers, including payment delay. Three types of consumer credits are recognized based on the financed asset – (i) credits to finance a purchase of a specific product, (ii) credits to finance a purchase of residential real estate and (iii) other credits. Until the CCA, consumer credits were provided by banks as well as other providers, which needed to have a trade license for that and were under the supervision of the Czech Trade Inspection. The CCA sets the same conditions for all consumer credit providers, regardless of whether they are banks or not. The non banking providers must obtain permission from the Czech Central Bank and be under its supervision; otherwise they are not allowed to provide consumer credit. The permission of the Czech Central Bank is granted only if strict qualification requirements are met and only for 5 years. This should lead to a reduction and professionalization of non banking credit providers and elimination of unfair, if not illegal, predatory practices. An additional aspect of the CCA is the effort to reduce the number of credit providers which are not banks and an effort to avoid the massive number of bankruptcies and incapacities of consumers to repay their credits. This aspect is perceived very positively by society at large which perceives it to be the right step considering the current economic situation, and not only in the Czech Republic. According to the CCA, any provider of consumer credits has the duty to make sure that the content of communications regarding the granting of consumer credits was provided in a clear, concise and obvious manner. Such a provider is not allowed to use formulations able to create misleading expectations concerning conditions, accessibility of consumer credits or related costs. The CCA explicitly states the duty of consumer credit providers is to provide consumers with the pre-contract information and the breach of this duty can be sanctioned by the consumer´s withdrawal from the entered into consumer credit contract. Further, pursuant to the CCA, the consumer credit contract must be in a written form and the security cannot be inadequate to the secured receivable. When evaluating the asset for securing in the case of consumer credit for residential real estate, the Czech Act. No. 151/1997 Coll., on evaluating properties must be followed, i.e. the evaluation must be done by an unbiased appraiser and be recorded in a permanent manner, either in hardcopy or electronically. The CCA protects even defaulting consumers and puts a cap on the contractual penalty at 0.1% per day from the due amount and states that the total contractual penalty can never, regardless of the default amount, exceed CZK 200,000. The defaulting mortgage consumer has the favor of an additional period of 6 months to pay the due amount, before the real estate is foreclosed. Disputes over consumer credits will newly be decided only in adjudication and this can lead to a cluttering up of judicial proceedings.

In general, the most discussed and heavily criticized feature of the CCA is its dramatic shift of the previous balance. Namely, a majority of the public perceives the CCA as a statute which gives way too many rights, susceptible to be abused, to consumers. Indeed, already the novelization of the Czech Act No. 634/1992 Coll., on consumer protection grants more and more rights, without certain limitations, to consumers. Identically, the Czech Act No. 89/2012 Coll., Civil Code, regulates e.g. in its Art. 1812 and Art. 1813 the protection of consumers when entering into contracts while stating that, if in doubt, these contracts are to be interpreted in the favor of consumers. Thus, it is legitimate to ask if all these rights set in favor of consumers are not sufficient, i.e. to ask if it is truly necessary to extend even more consumers rights. In this respect, perhaps the biggest and most questionable impact has the CCA provision allowing the earlier full or partial

repayment of consumer credits without sanctions to consumers. In the case of an earlier repayment, the consumer has the right to reduction of the entire consumer credit costs by the amount of interest and other costs which the consumer would pay, if the earlier repayment would not occur. After banks learned about this proposal, they attempted to grant fast consumer credits and fix them for at least ten years. The Ministry for regional development announced in August 2016 that Czech banks granted during the first 6 months of 2016 over 54 thousand mortgages for an entire amount of CZK 102 billions, i.e. CZK 14 billions more than in the previous year.

4. Perception and impacts of the CCA – Questionnaire investigation vs. secondary data

In order to confirm or reject the preset battery of hypotheses, the questionnaire investigation along with a secondary data search was performed. The 200 respondents from the 1st group were consumers interested in getting a consumer credit to purchase residential real estate. This group was further split in two sub-groups – (i) respondents up to 45 years of age primarily desiring to resolve their residential need and (ii) respondents over the age of 46 years rather going for residential investments. All respondents were identified and their age was verified. The 200 respondents from the 2nd group were financial advisors working exclusively for the biggest Czech financial institution providing mortgages and this group was further split in two sub-groups – (i) financial advisors up to 45 years and (ii) financial advisors over 46 years. The questionnaires consisted of eight closed questions and five semi-closed questions. The return rate of questionnaires from the 1st group reached 95% and from the 2nd group reached 89%. Specifically, from the 1st group 190 questionnaires were returned, 98 by the "younger" sub-group and 92 by the "older" sub-group, and from the 2nd group 178 questionnaires were returned, 93 from the "younger" sub-group and 85 from the "older" subgroup. The yield data was processed by categorical data analysis while using the software program Statistika. The level of importance was set as $\alpha = 0.05$. To assess the data, the statistical method of dependence of quantitative features of Person´s chi-square was used. Requirements to use a chi-squared test were met (n>40).

For the 1st group, the H1 was that consumers are aware about the CCA, H2 was that consumes are aware about their rights newly provided by the CCA, H3 that they perceive them positively and H4 that they are interested in using their rights newly provided by the CCA. To each of them H0 was the negation.

Table 3: 1st Group H1 contingency table – H1 is confirmed, consumers are aware about the CCA

	Yes	No	Total
Consumers up to 45 years	69	29	98
Consumers 46 years and over	42	50	92
Total	111	79	190

The value of Pearson´s chi-square test is $X^2 = 11.97$. The level of importance is $\alpha=0.05$, i.e. $X^2_{0.05\,(1)} = 3.841$. Based on the value $X^2 > X^2_{0.05\,(1)}$, H_0 is rejected. Between indicated features exist the dependency, and the consumers are aware about CCA.

Table 4: 1st Group H2 contingency table – H2 is confirmed, consumers are aware about their new rights

	Yes	No	Total
Consumers up to 45 years	45	53	98
Consumers 46 years and over	28	64	92
Total	73	117	190

The value of Pearson´s chi-square test is X^2 = 4.808. The level of importance is α=0.05, i.e. $X^2_{0.05 (1)}$ = 3.841. Based on the value $X^2 > X^2_{0.05 (1)}$, H_0 is rejected. Between indicated features exists the dependency, and the consumers are aware about their rights newly provided by the CCA.

Table 5: 1st Group H3 contingency table – H3 is confirmed, consumers perceive these rights positively

	Yes	No	Total
Consumers up to 45 years	58	40	98
Consumers 46 years and over	40	52	92
Total	98	92	190

The value of Pearson´s chi-square test is X^2 = 4.686. The level of importance is α=0.05, i.e. $X^2_{0.05 (1)}$ = 3.841. Based on the value $X^2 > X^2_{0.05 (1)}$, H_0 is rejected. Between indicated features exists the dependency, and the consumers perceive positively their rights newly provided by the CCA.

Table 6: 1st Group H4 contingency table – H4 is confirmed, consumers perceive these rights positively

	Yes	No	Total
Consumers up to 45 years	39	59	98
Consumers 46 years and over	20	72	92
Total	59	131	190

The value of Pearson´s chi-square test is X^2 = 7.226. The level of importance is α=0.05, i.e. $X^2_{0.05 (1)}$ = 3.841. Based on the value $X^2 > X^2_{0.05 (1)}$, H_0 is rejected. Between indicated features exists the dependency, and the consumers are interested in using some of their rights newly provided by the CCA.

For the 2nd group, the H1 was that the CCA brings new complications and administrative burdens, H2 that consumers are aware about their rights newly provided by the CCA, H3 that consumers are not aware about their rights newly provided by the CCA and should be informed, and H4 that consumers are interested in using some of their rights newly provided by the CCA.

Table 7: 2nd Group H1 contingency table – H1 is confirmed, the CCA brings new complications and burdens

	Yes	No	Total
Financial advisors up to 45 years	75	18	93
Financial advisors 46 years and over	81	4	85
Total	156	22	178

The value of Pearson´s chi-square test is X^2 = 8.798. The level of importance is α=0.05, i.e. $X^2_{0.05 (1)}$ = 3.841. Based on the value $X^2 > X^2_{0.05 (1)}$, H_0 is rejected. Between indicated features exists the dependency, and the CCA brings new complications and administrative burdens in the operation of financial advisors.

Table 8: 2nd Group H2 contingency table – H2 is confirmed, consumers are aware about their new rights

	Yes	No	Total
Financial advisors up to 45 years	58	35	93
Financial advisors 46 years and over	34	51	85
Total	92	86	178

The value of Pearson´s chi-square test is X^2 = 8.896. The level of importance is α=0.05, i.e. $X^2_{0.05\,(1)}$ = 3.841. Based on the value $X^2 > X^2_{0.05\,(1)}$, H_0 is rejected. Between indicated features exists the dependency, consumers are aware about their rights newly provided by the CCA.

Table 9: 2nd Group H3 contingency table – H3 is confirmed, consumers are not aware + should be informed

	Yes	No	Total
Financial advisors up to 45 years	32	61	93
Financial advisors 46 years and over	49	36	85
Total	81	97	178

The value of Pearson´s chi-square test is X^2 = 9.671. The level of importance is α=0.05, i.e. $X^2_{0.05\,(1)}$ = 3.841. Based on the value $X^2 > X^2_{0.05\,(1)}$, H_0 is rejected. Between indicated features exists the dependency, consumers are not aware about all their rights newly provided by the CCA, i.e. they are aware only about some of them, and should be informed.

Table 10: 2nd Group H4 contingency table – H4 is confirmed, consumers are interested in using their rights

	Yes	No	Total
Financial advisors up to 45 years	58	35	93
Financial advisors 46 years and over	36	49	85
Total	94	84	178

The value of Pearson´s chi-square test is X^2 = 7.137. The level of importance is α=0.05, i.e. $X^2_{0.05\,(1)}$ = 3.841. Based on the value $X^2 > X^2_{0.05\,(1)}$, H_0 is rejected. Between indicated features exists the dependency, consumers are interested in using some of their rights newly provided by the CCA.

Pursuant to the field search in this respect. Czech financial institutions, especially banks extending huge mortgage credits, were at first very silent regarding the proposal of the CCA. However, once it became clear that the enactment would occur, they made strong statements that everything can be handled and no dramatic delays and expenses would occur. However, many of them made their own assessment with a clear result – to increase the paperwork and the mortgage rate. Indeed, after months of a continuous decline in mortgage interest, the trend changed in November 2016, i.e. just a few days before the CCA took effect, when Komerční banka, followed by other leaders in providing mortgages, increased the mortgage interest rate (Bílá, 2016). Indeed, pursuant to the Czech Hypoindex.cz, the average mortgage rate in October was 1.8% p.a. and certain banks offered even 1.19% per annum, which is allegedly the absolute possible bottom, and the entry into force of the CCA became the reason or the pretext to go above (Jol, 2016). The leading argument of banks/mortgage providers is that the exceptional earlier payment (under consumer's favourable conditions) will lead to the *lucrum cessans*, i.e. the expected interest will not be paid. Considering the amount of mortgages and the

cash flow capacities of consumers, the early payment of 25% or even of the entire mortgage is rather unlikely. Only the near future, i.e. the real behaviour of consumers and their use of the early repayment option in 2017 and perhaps in 2018 will answer if the leading argument of banks/mortgage providers is or is not justified. In other words, whether the direct impact of the CCA is to truly help consumers taking mortgage credits or the indirect impact of the CCA is to hurt consumers and to help banks/mortgage providers to increase their profits. As mentioned, the reaction by consumers is unknown, but the strategy of leading banks became clear already in December 2016. Komerční banka increased the mortgage interest rate by 0.4%–0.6%, according to the length of the fixation, while Hypotéční banka and ČSOB increased the mortgage interest rate by 0.3% and Raiffeisenbank by 0.1%–0.3% (Jol, 2016). The remaining large banks and mortgage providers, including UniCredit Bank and the "investigated" Česká spořitelna, seem about to take similar steps in the very near future. However, "smaller" banks and mortgage providers, such as Airbank, Fio, Equa, Sberbank, and Expobank do not plan to increase mortgage interest rates, while stating that they have already, even before the CCA, allowed for the earlier repayment without any extra costs to consumers. Even more interesting is the decision of Wüstenrot and mBank to decrease the existing mortgage interest rate! In SWOT terminology, is the CCA a Threat for big financial institutions and an Opportunity for small financial institutions? Is the direct impact of the CCA to change the mortgage interest rates and the indirect impact of the CCA to change the mortgage providers market in the Czech Republic? Is the perception and impact of the MCD less controversial in other EU member states?

5. The impact of the transposition of the MCD in selected EU member states

Interestingly, a general trend in EU member states and their national laws has been towards more, rather than less, regulation of mortgage lending (Whitehead et al., 2014). The 2008 crises brought concerns about the lack of expansion in housing output, dramatic consequences for consumers unable to pay their mortgage loans and ultimately market instability (Cvik & MacGregor, 2016). The EU and almost all its member states, except the Czech Republic, decided to take a pro-active and pro-regulatory approach several years ago and this led to various legislative, regulatory and other solutions and instruments. Thereafter came the strongly harmonizing MCD with its concept of responsible lending and an openness regarding the bottom-up approach. National legislations often incorporate prior informal rules established by private entities and even the MCD reflects the Consumer Credit Directive and partially adopts (!) the European Voluntary Code of Conduct on Pre-Contractual Information for Home Loans (Mak, 2015). EU member states are aware about, and agree to, the EU´s demand to protect consumers, especially consumers taking mortgage credits, against predatory, irresponsible creditors, as well as against their own naivety and irresponsibility. At the same time, they recognize that funding needs to be available for housing investment (Whitehead et al., 2014) and that social or other protection engineering can be contra-productive and at the very end hurt consumers and the entire market. Hence, the majority of the EU member states takes a cautiously pro-regulative approach, since there is little certainty about the most appropriate approach leading to stability in the mortgage and housing market (Whitehead et al., 2014).

Despite all these particularities and challenges and the imperative, but not full harmonization nature, the MCD needs to be transposed and the European Commission ("Commission") seems to be serious about it. The deadline for the MCD transposition expired on 21st March, 2016 and the subjects under its reach can benefit via a grandfather clause expiring on 21st March, 2017. Hence, exactly in the middle of this transition period, six months after the expiration of the deadline for the legislative transposition and six months before the elimination of any grandfather exception, the Commission underwent a check up of the transposition with a dismaying result. Indeed, in November 2016 the Commission urgently requested 9 EU member states (Croatia, Cyprus, Finland, Greece, Luxembourg, Portugal, Slovenia, Spain, and Sweden) to fully transpose the MCD. By then the CCA did not take its effect, but still the Commission did not include in its criticism the Czech Republic, i.e. the requested 9 EU member states were not even in the state of national enacting. Sadly, the biggest EUROcrisis trespassers, PIGS, are among the top trespassers in this matter also. The Commission is getting nervous and stated that this is not a national problem, but an issue directly challenging the creation and operation of the Single European Mortgage Market and warned that the next step will be an action filed with the CJ EU (EC, 2016). Of even more concern is the perception and transposition of the MCD in the "good" EU member states. The UK states that (i) the MCD does not offer many benefits to UK consumers beyond those already provided by the high level of protection offered by the existing UK law, i.e. FCA regime, for mortgages and that (ii) it adds a number of costs to the UK industry. Thus the UK´s approach to the implementation of the MCD had been to minimise the impact on the UK market as far as possible (HM Treasure, 2015). In the Netherlands and France, the MCD is perceived as adding to the undesirable red tape (Mignot, 2016).

6. Conclusions

The sustainable growth in the EU and other priorities of Europe 2020, especially the creation and operation of various aspects of the Single Internal Market, are possible only with the active participation of responsible and well informed Europeans sharing a compatible perception of fairness and sustainability The MCD is to harmonize and to reinforce the recognition of the concept of responsible lending and its national transpositions should reflect as appropriate national particularities, and possibly potentials for abuses. Developers should be able to complete sustainable residential projects, credit providers should be able to grant reasonable price credits which will be repaid in a timely and duly fashion and consumers be able to get credits and real estate truly matching their status. (Cvik & MacGregor, 2016). The MCD attempts to bring a one-size-fits-all solution by shifting the established balance, to allegedly increase the efficiency and effectiveness and do the best for the market as well as consumers, i.e. to create a competitive internal market for mortgage credit with a high level of consumer protection. Well, such an approach is inherently highly questionable, if not directly megalomaniacal. The MCD and its transposition are facing dramatically different settings, since the majority of the EU member states went already several years (and even decades) ahead with their "own" regulation of mortgages and related consumer protection and are not impressed by the balance shift of the MCD and increased red tape, see e.g. the UK, France or the Netherlands. Other EU member states plainly ignore the MCD and test the enforcement drive of the Commission, such as the PIGS countries.

The Czech Republic is one of the countries with a history of mortgage granting issues and an underdeveloped legislation as well as internal regulation in this respect. Thus, it was a *prima facia* target of the MCD and a model outcome. The transposing CCA ambitiously goes up to and even above the MCD. All hypotheses were confirmed, and both financial institutions as well as consumers are sufficiently aware about it, including about the increase of information duty and various individual rights in favor of and in alleged protection of consumers. This knowledge and at the same time uncertainty about its use and abuse leads to preventive, perhaps even speculative, measures by large financial institutions. The well-meant protection by the MCD and perhaps even more pushed by the CCA possibly went too far and the illusory rights, such as on the earlier repayment, became the (alleged) reason for the increase of the mortgage interest rate to be paid by all consumers. A sarcastic question could be 'why should we have the MCD after all and why to, via integration engineering, change the well established balance in many EU member states?'. An even more sarcastic question can ask who are the true beneficiaries and trespassers, or at least who deserves the criticism? Perhaps, the Czech Republic will end up by benefiting from the MCD and CCA (but this is highly speculative), but even if this happens, will it not be just a small exception?

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Impact of risk factors on market value of companies from Polish renewable energy sector in changing regulatory environment

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Abstract

The paper aims to assess the impact of change of law regulations concerning renewable energy market on equity value and risk of renewable energy producers listed on Warsaw Stock Exchange. We analyze several risk factors in the period of 2012-2016 in comparison with previous findings from 2012. Among others we analyze company size, shareholders structure, liquidity and systematic risk. Using standard market risk measures we observe that the sector continuously may be described as defensive. Small sample of companies operating in this sector makes the statistical hypothesis testing difficult.
Recently on Polish market new auction system was introduced replacing green certificate support mechanism. In our study we want to verify whether it increases the exposure to firm's specific risks. Results show that risk of well-diversified, large investors faces minor changes that are statistically insignificant. While for small, undiversified investors beta is decreasing.

Keywords: renewable energy sources, regulatory risk, market risk, auction system

JEL Code: G11, G31, G38

1. Introduction

Renewable energy could be analyzed from many perspectives. Undoubtedly climate change awareness and supranational regulations are putting pressure on using renewable sources of energy. Renewable energy projects have been continuously introduced to

Polish investors, both on public as well as on private market. Our research aims at evaluating financial standing of Polish publicly traded companies from renewable energy sector (RES) from the perspective of risk and liquidity. In particular, we aim at verifying whether and how situation of those companies has changed under the condition of introduction of new mechanism of regulating trade of green energy, that came into force on 1st of July 2016. In order to achieve that goal, we analyze beta coefficients prior and after the introduction of new regulations.

Many studies (Criscuolo and Menon 2015, Kayser 2016) show that renewable energy investments are mostly challenged by and highly sensitive to the risk of changing regulations. Our sample is divided into two groups where one consists of well diversified, big companies from energy sector with long history and often having state as a major shareholder, being traded at the main floor of Warsaw Stock Exchange, second group consist of relatively smaller entities, with shorter history, with major field of business being renewable sources and technologies, traded at the alternative market of Warsaw Stock Exchange called New Connect.

2. Legal background

The basic legal act specifying the situation of the renewable energy sector in Poland, and all European Union member states, is the Directive 2009/28/EC of 23 April 2009 on the promotion of the use of energy from renewable sources, which defines the obligatory goals with respect to the minimum volume of energy generated from renewable sources. Pursuant to its provisions, Poland is obliged to achieve a 15% share of energy production from renewable sources in 2020.

The current market conditions prevent the full competitiveness of alternative fuels and require dedicated support for the producers of energy from renewable sources. By 1 July 2016, the incentive scheme addressed to the RES installations was primarily regulated in the Act of 10 April 1997 – the Energy Law and the transitional provisions of the Act of 20 February 2015 on renewable energy sources. It was based on tradable green certificate system since 2005. In green certificate system producers of energy from renewable sources were entitled to issue tradable green certificates (TGC), which constituted proprietary rights as the object of trade. Electricity producers must attain a minimum level of share of renewable energy from RES (15% and 14,35% for the second half of 2016 – pursuant to the amendment act of 22 July 2016.

The green certificate system had worked well for some time. Due to the development of co-firing (co-combustion of coal and biomass in large coal-fired plants) it created an enormous oversupply of green certificates in the last several years. It caused a significant drop of the market value of green certificates from around 280 PLN/MWh to even 30 PLN/MWh in 2016. The outcome was a reduction of profitability of co-firing plants. The RES Act also cut green certificates for co-firing by a half. These two factors made co-firing unprofitable. Unfortunately, the oversupply also caused RES projects of different technologies unprofitable, among them wind on-shore – the second mature and developed renewable energy technology in Poland.

Since the adoption of the 2009/28/EC Directive, several RES bills have appeared, but the legal risk – which in the case of the RES investment projects in Poland is the key risk source of each investment project – remained high. The act that was finally passed on the 20th of February 2015 introduced an auctioning system for the large providers (more than 40 kW). The laws from chapter 4 of the RES Act, pertaining to the mecha-

nisms and instruments of support for renewable energy sources, were to enter into force on the 1st of January 2016, but Ministry of Energy passed two amendments: in December 2015 – postponing the entrance of chapter 4 of the RES Act by 6 months and in June 2016, introducing changes in the auction system in the direction of greater support for the production of energy from biomass and co-firing (as stable energy sources) over wind and photovoltaic panels which generate power intermittently. Finally, the auctioning system started functioning on the 1th of July 2016. The first auctions were organized simultaneously on the 30th of December 2016.

Auctions are divided into groups characterised by the reference to efficiency of an installation (instead of the type of technology). The Amending Act of 22 July 2016 introduces individual groups of RES installations for which the auctions will be held separately. Moreover, for each of the groups there will be separate auctions for installations with capacities below and above 1MW.

The Act on Windfarms of 20 May 2016 (called also an anti-windfarm act) sets of new demands for wind power specifically aimed at restricting its development (also significantly impedes or phases out existing wind farms) which significantly increases operating costs and along with the drop in green certificate price makes existing farms unprofitable, so massive bankruptcies are expected.

It clearly outstands that law promotes agricultural biogas sector. The act of 22 June 2016 on the amendments to the 2015 RES Law establishes separate certificates of origin (called blue certificates) awarded to agricultural biogas power plants with separate quotas for such certificates. The Amending Act of 22 June 2016 defines large installations as installations with a capacity equal to or exceeding 500 kW. According to the Amending Act, a mandatory energy purchase by an entity called an obliged seller is no longer applicable for such installations (except of all biogas plants). In the absence of an obligation to purchase energy from RES, many large installations may suffer from a reduction in their revenues and overall profitability.

Some of the aspects of the new RES regime are still to be determined by way of secondary legislation (including reference prices which should be published before 31 August each year). However, it appears that the Polish government intends to reduce support for the RES industry and will most likely treat biomass, including co-firing and agricultural biogas installations preferentially as opposed to PVs and windfarms.

3. Literature review

In the light of aforementioned study of changing regulatory environment in Poland it is important to analyse how these factors are perceived by investors and what is the impact of such changes on market risk of companies from renewable energy sector traded at the market in a country that new regulations are being introduced. One can expect that any changes that are introduced too often, do not impact positively business operations and market risk. Unstable conditions create uncertainty and increase risk. This could be confirmed by several studies, among which Kayser (2016) indicated, on the basis of interviews with market participants in China, that severe cash flow uncertainty and weak regulatory environment are most prominent risk factors for RES companies. Crisculo and Menon (2015) research results confirm that long term stability, sustainability and credibility are important policy features to ensure investments in innovative and risky entities in green sector. Kitzing (2014) shows that feed-in tariffs systematically require lower direct support levels than feed-in premiums while providing the same

attractiveness for investment, because they expose investors to less market risk. We also take into account arguments about significant positive relationship of size and diversification of the company and its risk and expected rate of return studied among others by Cressy (1995), Conine 1983 and Thomadakis (1976).

Study conducted by Słoński et al. (2014) on the same sample of companies with some minor changes caused by few companies entering Warsaw Stock Exchange and some withdrawing their interest or being liquidated showed that investing in stocks of these companies is connected with lower risk due to results of beta coefficient below 1. It could indicate that these companies were defensive in analyzed period (500 trading sessions prior September 2012) and could be part of less aggressive portfolios.

On the basis of those literature findings and regulative environment study we hypothesize that small, non-diversified companies from renewable energy sector traded at alternative market of Warsaw Stock Exchange are susceptible to changes in law regulations which is reflected in significant increase of systematic risk. Second hypothesis is that big companies traded at main market of Warsaw Stock Exchange are less susceptible to changes in law regulations and their systematic risk is decreasing.

4. Methodology and Data

Analysis of market risk of the investment in public companies from renewable Energy sector was conducted according to the procedures of assessment of publicly traded companies from the perspective of well diversified capital market investor (Jajuga 2011). Additionally, liquidity risk measures were introduced. We assumed, after Amihud and Mendelson (1986) that illiquidity of trading is understood as the cost of immediate realization of placed offer. Additionally, we assume that rate of return should be growing function of illiquidity of trade, while the level of liquidity of the whole market is related to the amount of capital used for arbitrage along with Amihud and Mendelson (1991). In order to analyze exposition to the level of market risk we used the suggestions of Cochrane (2005) related to the venture capital investments.

In distinction from Amihud et al. (2005) Vayanos and Wang (2009) draw attention to important element, such as a possibility of having significantly bigger impact by some investors. In this paper that type of impact is represented by the level of free float and shareholders' concentration. Vayanos and Wang (2009) in their study extend the research on relation between expected returns and illiquidity. They found out that not under every market imperfection conditions there is positive relation. The effect is reversed under non-competitive behavior and might be reversed under search.

Our sample consists of 25 companies operating in renewable energy industry, 13 from main floor of Warsaw Stock Exchange (WSE) and 12 from alternative market New Connect (NC). Our sample depletes the overall group of publicly traded companies from this industry, constituting of 3% of total number of traded companies (487 at WSE and 406 at NC). Data has been collected from EMIS database and web site with raw quoting data (www.stooq.pl). Our analysis covers three different periods. Initially we analyzed data since June 2012 (final date of our previous report and study published in the paper of Słoński et al. (2014)) until the date when the new act on renewable energy introducing auction mechanism was outvoted by the parliament, i.e. 10th of June 2016. We decided to take the date of outvoting and not of coming of the act into force due to the fact that the former had more significant signaling power for investors than the later. Next step was to analyze period after the event until the end of 2016. Bearing in mind that

results could be biased by unequal length of the compared periods, we decided to obtain results for number of trading sessions prior the event equal to number of trading sessions afterwards. In order to capture short term effects and short term volatility of analyzed stocks we decided to base our analysis on daily logarithmic rates of returns. To obtain comparability with our previous study we use 60-days rolling beta coefficients. This is our proxy for systematic risk. Our analysis of liquidity is based on free float, number of sessions without transactions in reference to the total number of sessions, number of shareholders with more than 5% of shares.

5. Results

Analysis of publicly companies from renewable energy sector traded at Warsaw Stock Exchange shows several findings and big differences between studied subsamples.

First of all, analysis of capitalization shows significantly different size of the scale of operations. Table 1 presents average and median results for main stock market and for alternative market.

Table 1: Capitalization as of 29.12.2016

Capitalization	Main floor	New Connect	Total RES
Average	10,950,370,928	14,495,745	5,701,150,840
Median	3,990,507,730	6,275,064	65,400,000

Big entities' capitalization outweighs several times (755 times) capitalization of companies traded at alternative market (New Connect). BGE SA from New Connect has the smallest market value of equity equals to 1,343 mln PLN and the biggest – CEZ AS traded at main market equals to 37,659 bln PLN. Size of a company is one of important determinants of cost of capital with inversely proportional impact, therefore we can expect big differences in cost of capital between small and big RES companies.

Energy sector is perceived as strategic from country's perspective that is why state is major shareholder in most energy companies traded at main floor of WSE. Out of companies presented in table 2, eight are co-owned by the state, including the foreign one where Czech state is the major shareholder (CEZ AS). In the same time in none of relatively smaller companies traded at alternative market (NC) state shareholder is present. These companies have less significant or minor share in total market of energy production as well as short history of operations.

Table 2: Characteristics of companies traded at the main market of WSE as of 29.12.2016

	Free Float	Number of shares	Trading sessions without transactions[c]	Shareholders with min. 5% of shares	Share of the largest shareholder
CEZ AS	30%	537,989,759	2	1[a]	70%
Będzin SA	18%	3,149,200	466	6[a]	26%
Enea SA	43%	441,442,578	0	2[a]	52%
Kogeneracja SA	24%	14,900,000	19	4[b]	50%
Polenergia SA	14%	45,443,547	6	5[b]	50%
PGE SA	43%	1,869,760,829	0	1[a]	57%
Tauron SA	53%	1,752,549,394	0	3[a]	30%

	Free Float	Number of shares	Trading sessions without transactions[c]	Shareholders with min. 5% of shares	Share of the largest shareholder
InterRaoLietuva AB	20%	20,000,000	169	2[b]	51%
Energa SA	48%	414,067,114	376	1[a]	52%
PAK SA	24%	50,823,547	100	5[b]	52%
Starhedge SA	57%	7,011,403	36	4[b]	13%
PKN Orlen SA	57%	427,709,061	0	3[a]	28%
PGNiG SA	30%	5,900,000,000	0	1[a]	70%
Average	**36%**	**883,449,725**	**90.31**	**2.92**	**46%**
Median	**30%**	**414,067,114**	**6.00**	**3.00**	**51%**

[a] State is one of the shareholders
[b] State is not the shareholders
[c] calculated in the period of 11.06.2012-29.12.2016

It is also important to notice that the average number of significant shareholders, holding above 5% of stake is slightly smaller for companies from main market (2,92) than for companies from alternative market (3,67) while median is exactly the same and equals to 3, results are shown in table 2 and 3 respectively. But on average share of the major shareholder is bigger among first group of companies (46%) in comparison with 42% for small companies. One can observe that high share of major shareholder determines the level of shares available for small shareholders and the bigger it is the smaller free float can be. Which in consequence can impact the liquidity of stocks. Average free float of all companies from RES is 33% while for all companies from all sectors traded at WSE it is 47,5%.

Table 3: Characteristics of companies traded at the alternative market of WSE as of 29.12.2016

	Free Float	Number of shares	Trading sessions without transactions	Shareholders with min. 5% of shares	Share of the largest shareholder
Photon Energy N.V.	8%	60,000,000	398	3	64%
BGE S.A.	28%	12,211,707	119	7	17%
G-Energy S.A.	48%	46,995,632	305	2	31%
Ekokogeneracja S.A.	36%	13,600,000	690	6	29%
Aqua S.A.	18%	857,550	229	3	67%
Biofactory SA	9%	1,902,000	569	6	23%
MVA Green Energy SA	25%	33,340,000	933	3	57%
Elkop SA	27%	12,000,000	103	1	73%
Fluid SA	56%	31,996,040	10	4	18%
Genesis Energy SA	30%	195,141,363	625	4	25%
Bras SA	52%	50,851,200	76	2	48%
Sunex SA	27%	4,058,307	333	3	57%
Average	**30%**	**38579483**	**365.33**	**3.67**	**42%**
Median	**28%**	**22798020**	**319.00**	**3.00**	**40%**

Liquidity of stocks from the perspective of potential shareholder is understood as the possibility of fast exchange of any given number of shares for cash or other marketable securities. We analyzed it by studying the level of disperse ownership, i.e. the percentage of shares held by small investors with stake below 5% of total shares as well as free float. Risk of liquidity is important element of risk analysis of an asset due to the fact that low liquidity can stand for higher transaction costs that can lead market participants to resigning from purchasing particular stocks. Risk of liquidity can be measured by volume of transactions per day or number of trading sessions without transactions of particular stock. While high illiquidity will be represented by low volume of daily transactions and/or high number of trading sessions without transactions.

Results of the measure showing relation of trading sessions without transactions to all trading sessions in the period of 11.06.2012 and 29.12.2016 are shown in table 4. Stocks traded at NC are much more illiquid on average while at the main floor majority of stocks are traded on every session with some exceptions that overestimate the average so the median is more credible. These findings are consistent with our previous findings presented in the paper of Słoński et al. (2012).

Table 4: Relation of trading sessions without transactions to all trading sessions in the period of 11th of June 2012 – 29th of December 2016

	Main floor	New Connect	Total RES
Average	7.95%	32.20%	19.59%
Median	0.53%	28.08%	9.07%

Next we use beta coefficient to measure systematic i.e. undiversifiable risk. We estimated results in equal time spans (equal number of trading days with transactions) prior and after the date that the new auction mechanism was outvoted (10.06.2016). Beta is estimated on the basis of daily logarithmic rates of return. In order to reduce, to some extent, the bias of reported daily betas lower than they really should be for illiquid firms, and for liquid firms reporting higher betas than justified as Damodaran (1999) argues, we decided to use 60-day rolling betas.

Majority of big companies have results below 1 what indicates defensiveness of stocks of these companies and leads to the conclusion that they can be included in the portfolios of assets managed under non-aggressive investment strategy. Additionally, assets characterized by this type of risk profile could be attractive investment alternative in market downturns periods. This observation stays in line with results of a study conducted on the same sample in years 2009–2012 by Słoński et al. (2014).

In order to verify our hypothesis, we compare beta results before introduction of new auction mechanism and afterwards. Results for companies traded at the main market of WSE are presented in table 5. Aggregated average result for $\overline{X^*}$ (0.698) is higher than for $\overline{X^{***}}$ (0.672) which potentially could signify lower systematic risk for big energy companies after introducing new regulations. It also holds when we compare results for equal time spans before and after law changes. It is interesting to analyze changes individually for each company and particular conclusions could be drawn on the basis of that.

Table 5: 60-day rolling beta coefficients for companies traded at main floor of WSE

	$\overline{X}^*$	$\overline{X}^{**}$	$\overline{X}^{***}$	Median*	Median**	Median***
CEZ AS	0.464	0.514	0.351	0.499	0.523	0.353
Będzin SA	0.404	0.706	−0.053	0.487	0.770	−0.066
Enea SA	0.893	1.250	1.268	0.903	1.287	1.322
Kogeneracja SA	0.372	0.107	0.307	0.340	0.156	0.338
Polenergia SA	0.262	0.406	0.865	0.278	0.486	0.798
PGE SA	1.080	1.407	0.914	1.074	1.397	0.931
Tauron SA	0.996	1.09	1.073	0.999	1.151	1.111
Inter Rao Lietuva AB	0.082	−0.032	0.166	0.024	−0.07	0.215
Energa SA	0.786	0.954	1.357	0.812	0.887	1.435
PAK SA	0.663	0.605	0.658	0.682	0.501	0.46
Starhedge SA	0.648	0.51	−0.153	0.523	0.429	−0.144
PKN Orlen SA	1.294	0.948	1.016	1.334	0.821	0.947
PGNiG SA	1.134	1.269	0.972	1.135	1.277	0.951
Average	**0.698**	**0.749**	**0.672**	**0.699**	**0.74**	**0.666**

* result for the period between 11.06.2012 and 10.06.2016
** equal number of sessions with trading days before 10.06.2016 as after that date until 29.12.2016
*** equal number of sessions with trading days after 10.06.2016 until 29.12.2016 as before 10.06.2016

Even though results are visibly different after running test t for corresponding samples and test t with two samples assuming equal variances we obtained unsatisfactory results for statistical significance. That leads us to rejection of the hypothesis about big, well diversified companies benefiting from changing regulatory environment by reducing systematic risk. Additionally, a conclusion could be drawn that our sample in not homogeneous enough to face similar reaction of investors. Even though we classified those companies to renewable energy industry each of them specializes in different energy sector (i.e. fossil fuels production and distribution, power plants and energy distribution, heating production and distribution among others). What is more in the given period of analysis there might be many more significant factors determining the size and changes of risk parameters that are not captured in our research.

Analogical results are presented in table 6 for companies traded at New Connect.

Table 6: 60-day rolling beta coefficients for companies traded at New Connect – alternative market of WSE

	$\overline{X}^*$	$\overline{X}^{**}$	$\overline{X}^{***}$	Median*	Median**	Median***
Photon Energy N.V.	0.102	0.23	0.216	0.443	0.222	0.141
BGE S.A.	0.126	0.756	−0.858	0.162	0.792	−0.741
G-Energy S.A.	0.63	−0.905	1.216	0.241	−0.972	1.28
Ekokogeneracja S.A.	−0.32	0.269	1.121	−0.552	0.334	0.748
Aqua S.A.	0.205	−0.747	0.446	0.225	−0.821	0.324
Biofactory SA	0.042	0.598	0.185	0.011	0.599	0.23
MVA Green Energy SA	−1.453	0.095	−1.289	−1.1	−0.237	−1.211
Elkop SA	0.241	−0.036	0.416	0.266	−0.209	0.536
Fluid SA	0.571	0.727	−0.121	0.659	0.861	−0.094
Genesis Energy SA	0.552	4.66	2.93	0.302	5.077	3.447
Bras SA	0.212	−0.314	−0.26	0.189	−0.439	−0.096
Sunex SA	0.356	−0.313	−0.135	0.435	−0.06	0.022
Average	**0.105**	**0.418**	**0.322**	**0.107**	**0.429**	**0.382**

* result for the period between 11.06.2012 and 10.06.2016
** equal number of sessions with trading days before 10.06.2016 as after that date until 29.12.2016
*** equal number of sessions with trading days after 10.06.2016 until 29.12.2016 as before 10.06.2016

Individual results for those companies are much more volatile than for companies from the main market, there are also some outstanding observation that might bias aggregated averages. For example, riskiness of Genesis Energy increased immensely in 2016 (beta equal to 4.66 before and 2.93 after new regulation) in correspondence with moderate result in the period of 2012–2016 (0.552). Depending on the period of analysis, comparison of results shows, that on average, beta is either increasing or decreasing. Taking into consideration shorter period of time with matching number of sessions with trading days (results of $\overline{X^{**}}$ compared with $\overline{X^{***}}$) we could conclude that also for smaller companies systematic risk is decreasing which makes them more immune to changes in regulatory environment. Median results also potentially confirm that. Unfortunately, after conducting tests for statistical significance we obtained none. Excluding outstanding observations didn't improve the results.

Therefore, we also reject the hypothesis about companies traded at NC and their growing systematic risk due to changes in law regulations. Reasons for such inconclusive results could be connected with lack of homogeneity of the sample similarly to results for the big companies. They could also result from the methodological limitations of the study, such as too short period of analysis, daily intervals instead of monthly intervals, too small sample, lack of identification of other important factors that influence results to greater extent than those of regulatory nature.

6. Discussion and Conclusions

The analysis of the RES Act reveals that biomass installations, including co-firing, will be most competitive in auctions, due to the advantage provided by the new RES support system preferring stable sources and admitting those installations to auctions that are specified in the RES Act as "dedicated" for co-firing and generally "retrofits". This might lead to further concentration of the declining RES technologies on the market and the overuse of the renewable yet limited power source, biomass (this might cause excessively high Action Plan implementation costs and pose a threat to environmental sustainability).

New Act seems not to support renewable energy sources sector and may not lead to the development of green production capacities (maybe except agricultural biogas). In particular, it ignores the key message of sustainable development: the development of the renewable energy sector should be based primarily on local renewable sources and distributed generation. In result creating unstable and uncertain conditions for operations in renewable energy sector.

Our research results show that new regulation impacts changes in systematic risk in individual cases, to bigger extend in small undiversified companies traded at New Connect. Unfortunately, our findings are inconclusive at that stage of analysis. The differences in systematic risk were statistically insignificant in both subsamples. Therefore, we had to initially reject our hypotheses. One has to keep in mind that the study was conducted shortly after introduction of new regulations on small number of observations which could be the major reason for lack of consensus. Our findings show bigger volatility of results and less homogeneity in risk profiles of companies in the sample than in the research conducted on the same sample of companies from Polish renewable

energy sector prior 2012 (Słoński et al. 2014). Further studies should be conducted in order to extend the period of the analysis, take into account different time intervals as well as analyse different factors that might impact systematic risk of companies from renewable energy sector. Further study using multivariate approach might be more successful in solving that puzzle.

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Concept Proposal for Integration of Virtual Team Collaboration in a University Study Subject

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Abstract

Emergence of digital technology, especially the information and communication technology (ICT), created new ways of processing that augmented the physical reality by creating one common virtual space for collaboration across time and distance. The penetrance of virtual teaming into all facets of business operations and processing changed the business environment irreversibly. Although, remote collaboration exists already some years, the management and leadership of virtual teams are still not fully mastered in todays´ corporations as many virtual teams are operating inefficiently or even decay due to various reasons and insufficient experience. Therefore, this paper aims to highlight the necessity of the integration of virtual teaming already in the academic studies and provides a concept implementable in study subjects with corresponding high level analysis. Collecting experiences with virtual teaming already during educational process may enrich and significantly impact soft skills and technical proficiency that may play an important role in virtual teaming and remote collaboration. Students and primarily students of managerial studies may benefit significantly of such experiences as they will most probably lead and manage international multicultural virtual teams during their professional career. The aim of this paper is to propose a concept of a possible implementation of virtual teaming and collaboration of students in a university study object that may foster collaboration among academic institutions too. This paper provides a discussion of the advantages and disadvantages of proposed concept as well as risks of its possible integration and realization.

Keywords: information and communication technology, virtual team, virtual collaboration, education

JEL Code: M150, M190, O310

1. Introduction

The development of information and communication technology (ICT) enabled fast communication across large distances (Dávideková & Hvorecký, 2017), raised the amount of storable knowledge into very large data volumes, notably cut down the task execution times, extended the space for collaboration and excessively increased the rate of informational exchange around the globe. ICT impacts our lives in a far more immense global extend than any previous technology (Al-Rodhan, 2011) by penetrating almost every facet of it: the way people work, communicate, learn, spend time, and interact (Jorgenson & Wu, 2016).

ICT supports business processes by providing the base for computer applications (Broadbent & Weil, 1997) for fast processing of large data volumes by versatile software tools. Companies are using IT solutions integrated in ICT to support their business operations through automated processing of data faster and in new innovative ways not possible before through Application Programming Interfaces (APIs) that provide IT capabilities and allow composing flexibly business specific applications (Molnár, Kryvinská & Greguš, 2014).

ICT is not a mere enabler for a business activity anymore (Cherbakov, Galambos, Harishanka, Kalyana & Rackham, 2005). It drives business strategy, enables new possibilities and creates new previously non-existent opportunities. ICT has increased global productivity more efficiently than any other technology before (Hidalgo-Peréz, O´Kean Alonso & Rodríguez Lopéz, 2015). It promotes further technological innovation, standardization and globalization (Mandorf & Greguš, 2014). This dominant technology driver of output per worker contributes with a relatively high power to long-run economic growth (Kumar, Stauvermann & Samitas, 2015) by facilitating intra- and inter-enterprise mutual collaboration.

Nowadays workers carry out work through interacting with ICT and processing input data into desired outputs in virtual environment. Digital processing became a substantial part of everyday business operations allowing quick dissemination of information (Ogbomo & Ogbomo, 2008) to a broad group of concurrent receivers without repeated resending and enabling real time collaboration of individuals across any distance. The ability to respond fast to occurrences in business environment represents the essential deciding factor for surviving and succeeding in current competitive business environment shaped by dramatic turbulent changes and by the pressure on reduction of induced costs. Through the omnipresence, affordability, accessibility and ubiquitous connectivity ICT allows involving individuals from locations with lower cost of work force as well as connecting experts from various geographical locations in virtual space. Virtual teams are an emerging phenomenon with significant implications to the way of working known so far (Jackson, 1999) based on the fact that people can find and cultivate relationships by means of ICTs through the network (Moody, 2001).

ICT enables virtual collaboration through computer mediated communication (Stowell & Cooray, 2016) across geographical boundaries and triggers cultural shocks through interaction of people from diverse nations, cultures and speaking various languages (Bodziany, 2008). It is no longer unusual to cooperate with foreign colleagues in impersonal virtual environment. This global cultural exchange is dynamically reshaping the contemporary society (Papastergiadis, 2013).

On one hand, the diversity of cultures denotes a significant factor that influences mutual collaboration within virtual teams. It often leads to destructive conflicts and clashes of mentalities and denotes important factor impacting team´s coherency causing

inefficient functioning of more than 25% of existing virtual teams (Derosa & Lepsinger, 2010). On the other hand, it creates synergic effects leading to the emergence of new innovative solutions (Nurmi & Hinds, 2016). For a successful virtual collaboration, soft skills and technical proficiency denote essential premises. Their availability has become the key in achieving innovation (Volná, Kohnová, Bohdalová & Holienka, 2015) and sustainable successful existence of business entities.

Research findings confirm that there is already a higher stress on the development of ICT applications targeted to make students more confident in their digital competences (Wastiau, Blamire, Kearney, Quittre, Van de Gaer & Monseur, 2013) in academic institutions around the world. However, at the same time research findings show that expecting students to work in virtual teams is less frequent despite the fact that involving students in virtual teaming enriches them with experience of intercultural communication, overcoming time zones, develops time management and virtual collaboration (Long, Carlo, Fraser, Gosavi & Grasman, 2010) presuming that virtual teams are cautiously designed and the team members are appropriately instructed (Hvorecký, 2006). Such experiences may provide an invaluable experience that can be later efficiently exploited by the students' future employers.

This paper intends to propose a concept model for an academic study subject facilitating the collecting of experiences in virtual collaboration by building virtual teams. It is based on the conviction, that the widespread ICTs will improve the quality of experience as well as active participation (Veselý, Karovič & Karovič ml., 2016). It aims to enhance the academic education with inventive activities that are possible with current available and affordable technology for particular studied academic institution. The implementation of proposed concept may provide a higher added value for students as well as more complex preparation for their future professional path.

Last, but not least, this proposal has the ambition to encourage the involvement of students in international multicultural environment in time of their studies and to provide them with priceless experiences of cultural clashes and the impersonality of virtual environment in order to support the increase of tolerance in relation to other cultures and nations as well as to widen their horizons in the area of biases and prejudices they have and are not even aware of.

This paper is organized as follows: Next section proposes the conceptual model with individual subsections. Those denote integral parts devoted to various aspects of described concept and provide discussion of given model on that way. Conclusion summarizes the contribution of this paper.

2. Concept Proposal

This section describes a concept model that shall provide students with the experience of virtual teaming and its possible integration into a university study subject. The delineation is divided into individual integral subchapters devoted to separate topics for the convenience of the reader.

2.1.   Concept Description

Analyzed academic institution denotes a faculty focusing on business administration and management at a university. The study of managerial and business sciences includes several study subjects that allow initiation of teams and solving of assignments in team

work. Such practice provides students with experiences of issues occurring in teams that provide room for training and development of soft skills necessary for team leading and team management in later employment.

Teams built out of study fellows from the same group of students attending the same particular subject are likely to be built and to achieve team coherency fast since students know each other through regular meeting in classes. However, the collaboration of mutually unknown persons in a virtual team provides a completely different experience offering an invaluable practice that may contribute to the development of their soft skills to a far larger extent as the collaboration in a local team. At the same time, it represents a unique opportunity to foster international collaboration across cultural differences and provides the opportunity to enrich users with international and cultural differences as people with foreign experiences are far more tolerant to other nations and able to cooperate in a multicultural and multinational environment we experience today. Concurrently, the proposed concept enables the possibility to gain international multicultural experience of a far greater group of people than a student exchange program as those are accessible to only a limited number of people. Therefore, this concept allows to increase the pool of possibilities to obtain international multicultural experience in current global intertwined environment.

Figure 1: Collaboration of academic institutions across the world

As depicted in fig. 1, the concept aims to enable international collaboration among students of various universities by ICT means. The concept assumes that a group of universities who provide similar or combinable study programs offer at least one subject with no less than at least a partially resembling, comparable or combinatory part. Another premise denotes the use of the same virtual collaboration platform allowing the collaboration of students across boundaries of institutional affiliation.

The proposed concept denotes a possible integration of providing virtual teaming experience to students already during the time of their academic studies. It compromises the alignment of at least a part of a study subject among participating academic institutions and joint assignments for their students.

The architecture consists of following parts:
- Shared or compatible collaboration platform(s)
- Combinable study subjects providing assignment to be elaborated in virtual teams
- Collaboration among participating institutions in terms of subject leading, organization and assessment of assignments.

Authors recommend to build teams across the specialization of participating academic institutions for creation of synergic effects and supporting the development of soft skills of all participants. By combining students of economy, technique, humanities and arts focuses, great projects can be created where each team member can contribute to the final outcome with his/her knowledge and no one can conduct tasks of remaining team members.

A typical use case is described in next subsection.

2.2. Use Case Scenario

This subchapter exemplifies the use of proposed concept model to identify its strengths, weaknesses, opportunities and threats. It is described in form of a use case scenario for better demonstrational purposes and for the convenience of the reader.

A group of academic institutions agree on using shared common collaboration platform and on alignment of study subjects that students of all institutions can attend. The leading lecturers agree on joint assignment(s) for teams consisting of students of those and combining them across institutional affiliation. At the beginning of the term, students are provided with assignment(s) to be elaborated in collaboration with students of partner institution as well as with the access to the joint collaborative platform.

Students meet in the virtual environment and build teams on voluntary base, are automatically or manually divided into teams by the system as depicted in fig. 2. The division into teams assumes that each team consists from only one student of one academic institution targeting the experience of a pure virtual teaming. However, this can be combined with targeting the experience of the differences between local and virtual teaming if teams consists of at least two students of each academic institution. The authors focus on first of given examples in this paper.

Teams consisting of students attending various academic institutions work in virtual environment on their assignments experiencing obstacles and impediments of virtual teaming, gaining experience in virtual collaboration, learning to know new persons from different locations and training their skills in technical proficiency in working with given platform, ICT tools as well as developing their soft skills in terms of virtual teaming.

In case the participating academic institutions are universities from different countries, distinguish cultures and various languages, such collaboration may provide international multicultural experience including following aspects, but not limited to:
- Foster collaboration among nations and academic institutions.
- Contribute to intercultural tolerance through connecting with another culture and people with miscellaneous habits and customs.
- Develop soft skills of leading and/or participating in a virtual team.
- Enhance communication skills in foreign language.
- Train technical proficiency with collaborative systems.
- Provide the experience in collaboration with another academic institution and study program that may offer a possible student/lecturer hosting or exchange in the future.
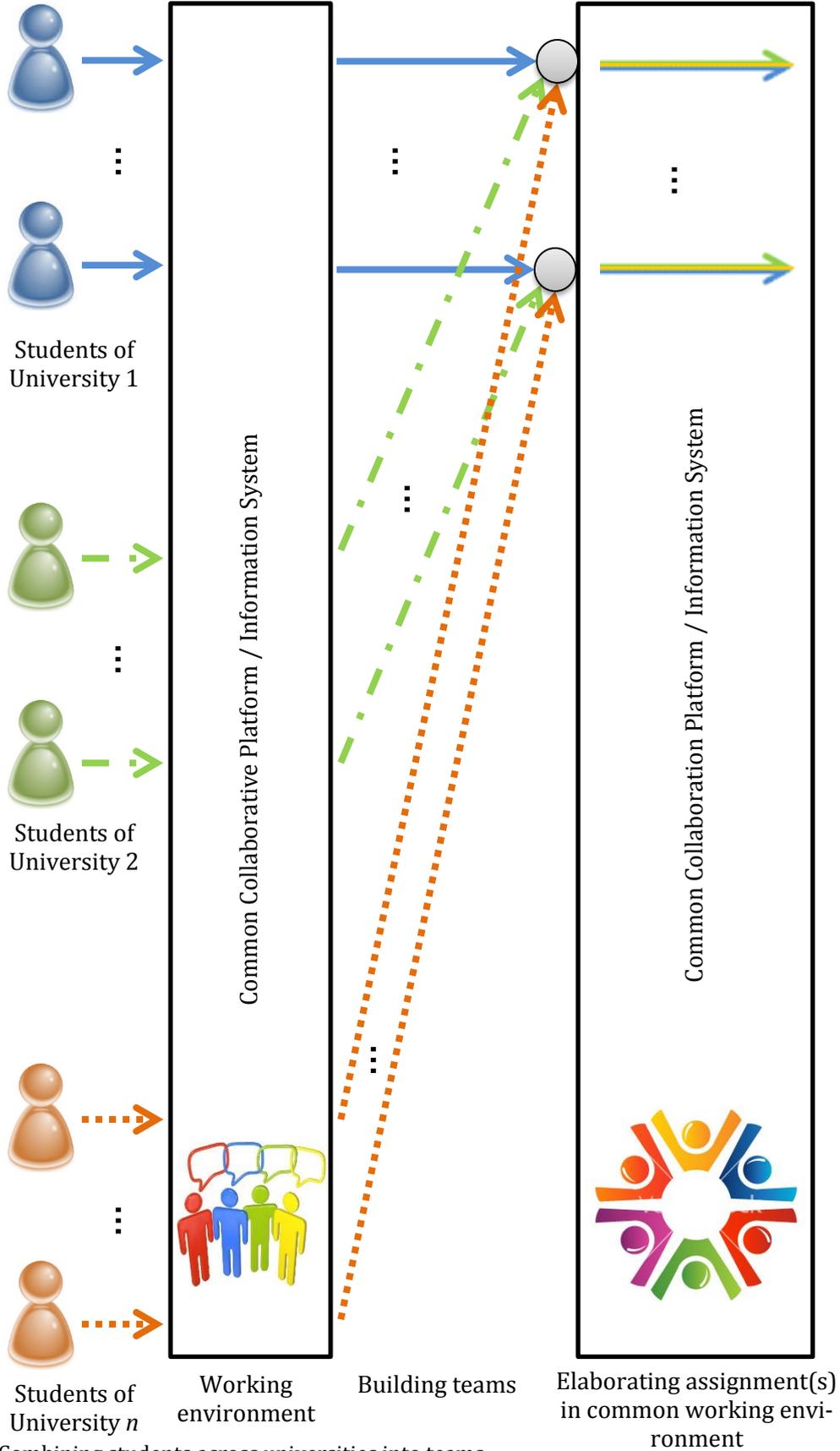
Figure 2: Combining students across universities into teams

The list of opportunities and strengths provided above is incomplete and can be extended by further gains of such a synergic collaboration.

Proposed concept is accompanied with various threats that may hinder such collaboration. Those can be represented by following impediments:

- Incompatible collaborating platforms
- Not combinable study subjects
- Unadjustable organization of terms
- Language barriers
- Cultural barriers
- Time shift
- Divergent understanding and assessment of assignments
- Insufficient support of team work engagement
- Too many teams

The provided list enumerates only a limited number of obstacles and impediments that may come along with a possible implementation of proposed concept, however, the list is not considered to represent a complete list of all possible issues to be solved. This paper is a concise description of such a concept that could represent a further field of research in the future.

2.3. Possible Software Solutions, Environments and Tools

A concrete implementation of proposed concept is dependent on purpose and objective of planned assignments. There are several solutions for software development and programming projects. Yet, the non-programming focused ones are less known. However, the geographical distribution of team members is becoming common also in other fields of business operations. For all types of virtual teams, the inner communication trough virtual environment is essential for team's existence and coherency.

Further, the learning objectives of academic institutions mainly focus on acquaintance with different activities and not on deeper development of skills or on practicing software programming. Therefore, a particular implementation should be tailored to the needs of participating institutions by providing the elaboration of several proposals on what to use as a collaboration tool and how to use it. However, the actual Implementation depends both on the willingness, proficiency and skills of teachers, students, and their willingness to cooperate and, of course, the difficulty and type of specific course and learning objectives of that study subject.

The software development industry points out suitable complex and sophisticated collaboration solutions, environments and software tools. These existing tools are built on processes closely tied to selected project management technique that defines the structure of contained modules and processing. Nowadays, several collaboration platforms are built in compliance with agile approach like Scrum or Kanban that continuously gains on popularity. An example denotes the Team Foundation Server (TFS) or Jira that provides native integration in Microsoft Visual Studio for software development. However, it is possible to use TFS also for agile projects with focus on non-programming development. It represents a framework that supports step by step development of parts of a complex solution. Such collaboration platforms offer integration with Microsoft Project software tool to align agile templates based on Scrum or Kanban methodologies.

Virtual collaboration can be enhanced on various ways also by diverse freeware tools focused on various functions that are not as complex as aforementioned TFS or

Jira. Their description follows in subsequent chapters. It is important to mention that many academic institutions provide free/discounted access to Microsoft tools to students and therefore, Microsoft solutions are mentioned. It shall not represent any type of recommendation, neither any favoring of those.

2.3.1. Tools for team communication

There are several options from emails, message boards, forums and chatrooms to instant messaging and video conferencing. Tools facilitating instant response support team coherency. Further, tools with voice and/or visualization have higher affinity with face-to-face meetings that are otherwise missing in virtual teaming.

Instant messaging clients are wide spread and commonly used for instant communication. Most popular are Microsoft Communicator/Lync/Skype for Business, ICQ, Slack, Flowdock, HipChat, Viber, etc. offering searches, file transfers, etc. Many of them offer the possibility to integrate management tools like Trello.

Video conferencing clients are e.g. WebEx, GoToMeeting, Viber, Skype for Business, etc.

2.3.2. Tools for project management

Managing project life cycle and task coordination is critical for any kind of project. An effective coordination presumes monitoring of task progress and keeping track of objectives. Agile tools e.g. TFS prefer dashboards and classical tools e.g. Microsoft Project provide Gant chart. Task tracking is also implemented in Microsoft Outlook, further project management tools are Trello (preferred), Asana, Dapulse, Redbooth, Wimi, etc.

Properly guided "To Do List" is essential for any project control. E.g. Trello offers creating a team account and adding it to individual "boards" with defined access restrictions. Each board is divided into columns and/or swimlines denoting current status and attribute of included tasks. Various states can be defined e.g. "To do", "Discuss it", "In progress", "Done". Such a dashboard provides instant overview of states of all tasks. Tasks are tied up to a particular member who is informed by any new comment to given task.

2.3.3. Workspaces

Workspaces are complex environments for collaboration integrating file sharing, editing, reviewing, document repositories, applications and other previously mentioned tools. Popular examples are Microsoft Office 365, Google Docs – apps, open source Quip or for simple design/implementation and task share Coding Team, Git , Igloo, etc.

3. Conclusions

The development of information and communication technology (ICT) provides innovative ways for academic institutions to design their study programs. This paper proposed a concept of a possible integration of virtual team experience into a study subject. The proposed concept targets the enhancement of academic studies with international multicultural experience accessible to a broad group of individuals supporting the development of tolerance among cultures and nations in current global environment. It provided a high level overview of an eventual architecture of proposed concept. The provided use case scenario outlined a discussion about possible advantages and disadvantages of

such a concept that may represent the area of further research providing a more detailed design with solutions to possible impediments. This paper also briefly outlined possible collaboration solutions, platforms and tools that can be used for implementation of proposed concept that has to be tailored to actual needs of participants. All spread tools are tied up with use of particular project management technique and therefore it is impossible to name an ultimate collaboration platform to be used. However, technical proficiency in software utilization is highly important and should be developed already by contemporary students to support their competitiveness on labor market.

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A Piece to the Puzzle of Lorenz Curve and Gini Coefficient – Instruments for Evaluation of Fairness

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Abstract

The Lorenz curve is a widely used tool measuring the impacts of taxation on the redistribution of income and wealth. The graphical representation of distribution of income or of wealth was supplemented with a numeric indicator named after its author as the Gini coefficient. However, the Lorenz curve, and especially the Gini coefficient in particular, do not always provide precise information about the distribution of income or of wealth in the society. The values of the Gini coefficient may be negatively affected by the choice of input data. Therefore we decided to define the deviation from the correct value of the Gini coefficient.

Keywords: Gini coefficient, Lorenz curve, deviation

JEL Code: H23, I31, E64

1. Introduction

The impacts of tax policy may be examined on the level of incidence of direct and indirect taxes or on the general level of wealth, see e.g. Sen (1976). The Lorenz curve and the Gini coefficient are two of the indicators for measuring tax progressivity of direct taxes. However, the incidence of indirect taxes is no less important. The research of Besley and Rosen (1999), David (2009, 2012), or Böhringer (2010) attests to the significance of such measurement. According to Kinkor (1994), the progressive income tax rate reflects the different tax burdens, which differ according to the amount of income of the various types of taxpayers.

One of the factors affecting conclusions on tax progressivity is the selected period. When measuring tax progressivity, the taxes may be assessed in the framework of a current year or of a life cycle. Although theoretical studies point out substantial differences between the annual and lifetime approach, the annual data are usually utilized in the measurements, which is also the case of the Lorenz curve and Gini coefficient. The importance of the lifetime approach is stressed e.g. by Poterba (1989) or Fullerton and

Rogers (1995). A summarizing work dealing with the lifetime approach was written by Metcalf and Fullerton (2002). Empirical research in this area was conducted e.g. by Caspersen and Metcalf (1993), Metcalf (1994), or Slintáková et al. (2007).

Tax theory distinguishes between two indicators of tax progressivity: local progressivity and global progressivity. The use of local progressivity indicators is appropriate for examining progressive tax impacts on various income brackets (Kubátová, 2015). The local tax progressivity indicators are not suitable for the comparison of progressivity in different countries or within the entire income bracket, one of the reasons being different income levels in the countries concerned (Vančurová, 2013). The Lorenz curve and the Gini coefficient belong to the group of global progressivity indicators.

The Lorenz curve is a widely used tool measuring the impacts of taxation on the redistribution of income and wealth. The curve was developed by Max Otto Lorenz in 1905 and expresses the cumulative income of households in the context of the cumulative number of households in the economy concerned (Lorenz, 1905).

Široký (2008) points out that the Lorenz curve measures the impact of tax rate changes on the redistribution of real disposable income of households in the economy as a whole. The extent to which the Lorenz curve departs from a straight line of equality indicates the degree of inequality of income distribution. When one Lorenz curve lies below another, the first distribution is more unequal than the second (Fellman, 1976). The curve is often used for the comparison of income distribution before and after tax. Where the curve approximates the line of equality, the progressive tax system is in place.

The graphical representation of distribution of income or of wealth was supplemented with a numeric indicator designed by Corrado Gini in 1912, which was named after its author as the Gini coefficient (Gini, 1912). The standard values of the coefficient range from 0 to 1, where 0 expresses the absolute equality of distribution and 1 represents the absolute inequality of distribution of income or of wealth.

According to Kubátová (2015) it has been proved that the Gini coefficient has the necessary properties of a suitable indicator of equality of income distribution. This is demonstrated by the fact that if the total income is fixed, the transfer of an income unit from a rich taxpayer to a poor taxpayer leads to the decrease of the Gini coefficient and vice versa. If all the incomes are subject to the same change, the Gini coefficient shall remain unchanged. The coefficient may also be used for the comparison of income redistribution within the framework of one country, as well as in the international scope. The lower the Gini coefficient, the more equal is the income distribution amongst various groups of taxpayers. The Gini coefficient can be used to monitor the tax progressivity only through the comparison of its values calculated from the distribution of income before and after tax.

Besides the Lorenz curve and the Gini coefficient, the global tax progressivity is also measured by the Musgrave and Thin method (Musgrave and Thin, 1948), Kakwani method (Kakwani, 1977), Suits method (Suits, 1977), Reynolds-Smolensky index (Reynolds and Smolensky, 1977), Robin Hood index (Hoover, 1936), entropy methods (Zandvakili, 1994), the Atkinson index (Atkinson, 1970) or the index of tax progressivity (Kakinaka and Pereira, 2006).

Many, and probably most of other mentioned indicators for the assessment of tax progressivity or equality of income distribution are based on the Lorenz curve and the Gini coefficient to a significant extent. Therefore their form must be defined as precisely as possible so that the result reflects the real state of affairs and not just the ideal situation or the ideal form of the input data.

What was said above testifies to the importance of the Lorenz curve and the Gini coefficient not only due to wide and frequent application of these indicators. However, the Lorenz curve, and especially the Gini coefficient in particular, do not always provide precise information about the distribution of income or of wealth in the society. The Gini coefficient is unable to take into account the specifics of a particular form of income distribution. This imperfection can be compensated through the Lorenz curve, which shows the exact shape of the distribution of income or of wealth in the society. Moreover, the values of the Gini coefficient may be negatively affected by the choice of input data in the form of the number of households. This is a limitation of its information value that even the Lorenz curve cannot compensate.

The parameters of influencing the results of the Gini coefficient by input data consisting in the number of households shall be the subject of the contemplated research. The goal of the study shall be to define the deviation from the expected value of the Gini coefficient, caused among others by the real form of the input data.

2. Methodology

The text presents original logical and systematic procedures. These procedures helped us to introduce the initial state of the issues connected with the measurement of income distribution in the society. New facts and contexts were described, explained and analyzed in order to achieve the preset goals. The text contains simple models which enable the comprehensive study of the measurement of income distribution in the society without the necessity to collect concrete data that prevent drawing general conclusions.

The application of the models presumes the use of data concerning household incomes. There has been some criticism of the use of households and not individuals (Fullerton and Rogers, 1991); nevertheless potential application of data concerning incomes of individuals is not relevant to the results of this research.

The empirical experiment has been replaced with the thought experiment here. Unfortunately, the outcome of the thought experiment cannot be considered the criterion of correctness. However, this imperfection has been eliminated through the use of modeling.

Standard mathematical methods have been used for the definition and solution of model situations. Model situations have been expressed by equations, which have been modified and solved according to needs. The definitions of functional relationships and limits of sequences of values have been considered as well.

The research does not contain practical applications and does not use and therefore does not need empirical data. The reason is that this work has been created for the purpose of defining the calculation formula of the Gini coefficient deviation depending on the range of the examined sample and equality of distribution of incomes in the society.

3. Results

The Lorenz curve is usually depicted in a uniform manner. However, in the graphic representation of income distribution, there is no way to eliminate the distortion caused by the limited number of households included and unequal distribution of incomes amongst the households. This imperfection surely should not result in refraining from the application of the Lorenz curve. As Dixon (1987) points out, certain shortcomings of

indicators should not lead to their automatic rejection. Thus, it should be sufficient to bear this in mind when constructing the Lorenz curve. Moreover, the Lorenz curve provides additional information about the distribution of income and wealth amongst households that is not apparent from any other indicator that uses a certain value testifying to the income distribution in the society.

The Gini coefficient has several alternatives of quantification. Lerman and Yitzhaki (1989) define it as a covariance of the income function. The calculations may also be based on the median difference of income values. We may also cite the Brown formula (Brown, 1994). There are other mutations of the Gini index, which have been described in the above text stressing the significance of the Gini coefficient. In this research, we shall stick to the basic form of the Gini coefficient quantification:

$$G = 1 + \frac{1}{n} - \frac{2}{n^2 \cdot \bar{I}} \cdot (I_1 + 2I_2 + \cdots + nI_n) \qquad (1)$$

For the sake of simplicity, we shall use the standard form of the Lorenz curve. Axis x depicting the cumulative proportion of households as well as axis y depicting the cumulative income in the ascending order reach the maximum value of 1, or 100%. Then it applies that the average income $\bar{I}$ equals the proportion of the number of households n.

$$\bar{I} = \frac{1}{n} \qquad (2)$$

For the examination of the Gini coefficient values, we shall use a simple model with two households. One household receives all the incomes of the society comprising of two households. The other household has no income. This is an absolutely unequal distribution of incomes in the society and the value of the Gini coefficient should be 1. In this model it applies that the sum of household incomes is identical to the total income of 1.

$$I_1 + 2I_2 + \cdots + nI_n = 1 \qquad (3)$$

After the modification of the basic formula, we can get the Gini coefficient in the below form.

$$G = 1 - \frac{1}{n} \qquad (4)$$

The resulting value of the Gini coefficient after substituting the number of households with 2 is surprisingly 0.5, and not the expected 1. Let us add other households to the model and leave the situation on the most unequal level. We shall have a model with three households where one of them receives all the incomes of the society and the remaining two get no income at all. The result of the Gini coefficient is then 0.66. If we add another household with zero income, the coefficient shall increase to 0.75.

If, with the growing number of households, the value of the Gini coefficient approximates 1, we can express this relationship with the help of a limit and subsequently modify.

$$\lim_{n \to \infty} G(x) = \lim_{n \to \infty} \left(1 - \frac{1}{n}\right) = 1 - \lim_{n \to \infty} \frac{1}{n} = 1 \qquad (5)$$

If the number of households approaches infinity, the index value shall equal the expected value of 1. The deviation from the Gini coefficient value can be quantified for this model with absolute inequality of distribution of incomes in the society. If equation (4) applies, the deviation from the Gini coefficient of 1 is as expressed below.

$$D_G = 1 - G = \frac{1}{n} \tag{6}$$

Although the identified deviation applies, this is a textbook situation which is far from reality due to two aspects. The first one is the small number of households and the other is the absolute inequality of income distribution. The deviation from the expected value decreases with the growing number of households, and if there is a sufficient number of households, it may be referred to as negligible. Unfortunately, in practice we must use available data, which often classify households by percentiles, and most often by deciles. Thereby the originally broad sample becomes very narrow, with the number of 10. In practice, the deviation of the Gini coefficient may be 0.1 using the sample of 10, which is a serious fact. However, is this deviation dependent on the equality / inequality of income distribution in the society? We have described the utterly unequal situation. The utterly equal situation for two households and any other number of households requires the coefficient result of 0. If the basic formula (1) is applied, we find out that the result always equals 0. It holds true that if the household incomes are absolutely equally distributed, the deviation from the expected value shall be 0 regardless of the number of households.

It may be assumed from the above that the deviation from the expected Gini coefficient value shall increase with the increasing inequality of income distribution within the society. Let us introduce the model with two households with unequally, albeit not absolutely unequally, distributed income. We shall modify formula (1) for the purposes of this model:

$$G = 1 + \frac{1}{2} - (I_1 + 2I_2) \tag{7}$$

This equation may be further modified, if condition that the sum of incomes of two households in the model equals 1 applies.

$$G = 1 + \frac{1}{2} - (1 + I_2) \Rightarrow G = \frac{1}{2} - I_2 \tag{8}$$

Let us focus on the identification of the deviation from the Gini coefficient value. Unfortunately, we are not able to define the expected Gini coefficient value in the model with somewhat unequal distribution of incomes. Consequently, we are unable to precisely quantify the deviation from such value. What we know is that the deviation value shall be between 0 and 0.5. The maximum value of the deviation $maxD_G$ is 0.5. We also know that it shall increase with the increasing inequality of income distribution. The value of the deviation in this situation may be quantified in several manners. We shall choose a simple method consisting in the quantification of deviations from the income average, which is 0.5.

$$D_G = maxD_G * (|I_1 - 0.5| + |I_2 - 0{,}5|) \tag{9}$$

After substituting the income distribution of 1/0, the deviation shall be at its maximum of 0.5. In case the income distribution is for instance 0.7/0.3, the deviation shall be 0.2. If the equality of income distribution between two households is further increased to 0.6/0.4, the deviation shall be 0.1. With equal distribution of 0.5/0.5, the deviation shall be 0.

Finally, the model must be generalized to include any number of households and unequally distributed income. The average value is given by the ratio of 1 and the num-

ber of households *n*. The deviation from the Gini coefficient is given by the average deviation from the average value of the households' income.

$$D_G = \frac{\left|l_1 - \frac{1}{n}\right| + \left|l_2 - \frac{1}{n}\right| + \cdots + \left|l_n - \frac{1}{n}\right|}{n} \tag{10}$$

Formula (10) is the resulting form of the deviation from the Gini coefficient allowing for imperfections and inconsistencies of data entering into the examination of income and wealth distribution in the society and distribution impacts of taxes.

4. Conclusion

The most important, most widely used and serving as the bases for many other indicators of income and wealth distribution in the society and distribution impacts of taxes are the Lorenz curve and the Gini coefficient. Also these instruments suffer from certain imperfections, which result from the incompleteness of input data. This includes the factor of a limited number of households entering the research and inequality of distribution of incomes in the society. These imperfections may be resolved in the case of the Gini coefficient. The Lorenz curve must be interpreted taking into account a certain distortion.

We have ascertained that the degree of the Gini coefficient distortion grows with the decreasing number of households and increasing inequality of income distribution in the society. The maximum level of the Gini coefficient distortion, amounting to 0.5, was identified in the extreme model case involving two households with the absolutely unequal distribution of incomes between them. On the contrary, the model with the infinite number of households and also the model with absolutely equal distribution of income amongst any number of households showed no distortion; its value was 0.

Finally we found resulting form of the deviation from the Gini coefficient allowing for imperfections and inconsistencies of data entering into the examination of income and wealth distribution in the society and distribution impacts of taxes. Calculation process of the deviation from the Gini coefficient is defined in formula (10).

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How to measure risk in asset pricing models: entropy or beta?

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Abstract

Financial theory borrows scientific methods from natural sciences. In this paper, we consider one of such methods called entropy, which in financial terms can be considered as a measure of risk in asset pricing models. We propose three different non-parametric estimation techniques to estimate financial entropy, the results of which we compare to the CAPM beta based on their explanatory power to describe the diversity in expected risk premiums. Kernel density estimated Shannon entropy provides the most efficient results not dependent on the choice of the market benchmark and without imposing any prior model restrictions. Kernel density estimated Rényi entropy and maximum likelihood estimated Shannon entropy also perform better in-sample than the CAPM beta.

Keywords: entropy, risk measure, beta, asset pricing

JEL Code: G12

1. Introduction

In the recent review of emerging trends in asset pricing, Campbell (2015) considers entropy as a measure of uncertainty in the probability theory to be an alternative to variance in risk measuring. Even though the idea of using entropy in economic theory is at least 70 years old, it was famously ridiculed by Paul Samuelson and, given his authority, was popularized in econophysics just recently. Entropy was initially implemented in thermodynamics by Clausius (1870). Later Shannon (1948) showed that entropy concept can be applied in areas of science where probabilities can be determined. Since than entropy became the major cornerstone of information theory (see Paninski 2006 for extensive overview), from which econophysics and modern financial economics borrow heavily.

In finance, entropy is viewed as "a measure of dispersion, a generalization of variance" (Backus et al. 2014). Maasoumi and Racine (2002) identify statistical properties of the entropy measure which are useful in regard to asset returns. Financial applications of entropy might be found in portfolio optimization (for example, Xu et al.

2011) or option pricing (Zhou et al. 2006). According to Backus et al. (2014) entropy being a logarithmic measure can be easily computed for most of the popular asset pricing models usually defined as log-linear functions.

According to Ormos and Zibriczky (2014), implementing entropy in the asset pricing models allows dismissing the restriction on returns' normality distribution. This limitation was inflicted on asset returns by the use of standard deviation as a measure of uncertainty in the classic capital asset pricing models. Thus, restrictive assumptions of the CAPM are not applicable for returns in the model based on entropy risk measure. Moreover, calculation of entropy does not require defining any market portfolio.

In our study, we consider two risk measures which can be applied in asset pricing: the entropy – econophysics measure of risk, and the beta coefficient – covariance-variance ratio between the market portfolio and individual stock return. Beta coefficient has been the classic measure of risk in equilibrium based asset pricing models and had no powerful alternative to compete with. In accordance with results of previous research in this field we consider that entropy could be such an alternative. Unlike the variance that measures concentration only around the mean, the entropy measures diffuseness of the density irrespective of the location of such concentration. We are aimed to compare the explanatory power of standard CAPM beta and non-parametric ways of entropy calculations as risk measures arising from exposures to general market movements. Our study is closely related to Ormos and Zibriczky (2014), but distinct in two main considerations/contributions. First, instead of histogram-based density function estimation, we use kernel based and maximum likelihood estimations of entropy. Second, the explanatory power of risk measures is tested on extended sample of European stocks. European stock market is an interesting case for the testing of asset pricing models, since contrary to finance theory the basic risk-return trade-off is generally negative for European stocks (Aslanidis et al. 2016).

2. Methodology

Since the concept of entropy is implemented in many scientific areas, there are several measures of the entropy which are used depending on the characteristics of data. In compliance with efficient market hypothesis, the stock market is an equilibrium system, which is a requirement for the implementation of Shannon and Rényi entropies. Even though the efficient market hypothesis is largely criticized, we leave the testing of entropy in terms of adoptive market hypothesis for further research.

Following Ormos and Zibriczky (2014) we consider a discrete random variable X, which has possible outcomes denoted by $o_1, o_2, \ldots, o_n$ and corresponding probabilities $p_i = \Pr(X = o_i)$, $p_i \geq 0$ and $\sum_{i=1}^{n} p_i = 1$. The generalized entropy function for the variable X is defined as:

$$H_\alpha(X) = \frac{1}{1-\alpha} \log\left(\sum_{i=1}^{n} p_i^\alpha\right) \tag{1}$$

where α is the order of entropy, $\alpha \geq 0$ and $\alpha \neq 1$, which expresses the weight put on each outcome. In case of $\alpha = 1$, the generalized entropy $H_\alpha(X)$ converges into Shannon (1948) entropy:

$$H_1(X) = -\sum_{i=1}^{n} p_i \log p_i \tag{2}$$

In case of $\alpha = 2$, the generalized entropy $H_\alpha(X)$ converges into Rényi (1961) entropy:

$$H_2(X) = -\log\left(\sum_{i=1}^{n} p_i^2\right) \tag{3}$$

If the considered random variable X is continuous with a probability density function $f(x)$, the generalized continuous entropy (also known as differential) is defined as:

$$H_\alpha(X) = \frac{1}{1-\alpha}\int f(x)^\alpha \, dx \tag{4}$$

The Shannon and Rényi entropies in the continuous case are defined as follows:

$$H_1(X) = -\int f(x)\ln f(x) \, dx \tag{5}$$

$$H_2(X) = -\ln\int f(x)^2 \, dx \tag{6}$$

In practice the underlying probability function is unknown. The density function is estimated non-parametrically without assuming any particular theoretical probability distribution. The kernel-based density is estimated by the following formula:

$$\hat{f}(x) = \frac{1}{nh}\sum_{i=1}^{n} K\left(\frac{x_o - x_i}{h}\right) \tag{7}$$

where $\hat{f}(x)$ is the density estimation of the random variable X, n is the number of observations, h is the smoothing parameter (bandwidth) and $K(\cdot)$ is the kernel function integrated to unity ($\int K(u)du = 1$). The most common Gaussian form of the kernel function is used:

$$2\pi^{-1/2}\exp(-u^2) \tag{8}$$

The quality of the kernel function is largely based on the value of bandwidth. When a Gaussian kernel is used as a reference function, the optimal choice of bandwidth h or Silverman's rule of thumb is:

$$h = \left(\frac{4\hat{\sigma}^5}{3n}\right)^{1/5} \approx 1.06\hat{\sigma}n^{-1/5} \tag{9}$$

where $\hat{\sigma}$ is the standard deviation of the sample.

As an alternative to kernel density estimation we also propose to use the maximum-likelihood estimator of Shannon entropy given by:

$$\hat{H}^{ML} = -\sum_{i=1}^{n} \hat{\theta}_i^{ML} \log\left(\hat{\theta}_i^{ML}\right) \tag{10}$$

The multinomial distribution is than used to connect the observed outcomes o_i with corresponding frequencies θ_i:

$$Prob(o_1, o_2, \dots, o_n) = \frac{n!}{\prod_{i=1}^{n} o_n!}\prod_{i=1}^{n} \theta_i^{o_i} \tag{11}$$

The maximum likelihood estimator of θ_i maximizes the function (11) for fixed number of outcomes o_n leading to the observed frequencies $\hat{\theta}_i^{ML} = \frac{y_n}{n}$ with variances $Var(\hat{\theta}_i^{ML}) = \frac{1}{n}\theta_i(1-\theta_i)$ and zero bias $\hat{\theta}_i^{ML} = 0$ as $E(\hat{\theta}_i^{ML}) = \theta_i$. Even though $\hat{\theta}_i^{ML}$ is unbiased, the plug in entropy estimator $\hat{H}^{ML}$ is not. According to Miller (1955), first-order bias correction leads to so called Miller-Madow estimator:

$$\hat{H}^{MM} = \hat{H}^{ML} + \frac{m > 0 - 1}{2n} \tag{12}$$

where m is the number of cells with $o_i > 0$.

The entropy-based risk measure is defined as follows:

$$\rho_i = \log H_\alpha\big(R_i - R_f\big) \tag{13}$$

where R_i is a stock return and R_f is a risk-free return. Given R_m as a market return, the CAPM beta risk measure is defined as follows:

$$\rho_i = \beta_i = \frac{cov(R_i - R_f, R_m - R_f)}{\sigma^2\big(R_m - R_f\big)} \tag{14}$$

As a simple way to compare the explanatory power of risk measures, we consider the linear relationship between the expected risk premium $E(R_i - R_f)$ and risk measure ρ_i:

$$E\big(R_i - R_f\big) = a + b\rho_i + \varepsilon \tag{15}$$

Given the ordinary least square estimation of (15), the in-sample explanatory power of risk measure is denoted by the goodness-of-fit:

$$R^2\big(E\big(R_i - R_f\big), \rho_i\big) = \frac{\sum_{i=1}^n \Big(E\big(R_i - R_f\big)_i - \big(\hat{a} - \hat{b}\rho_i\big)\Big)^2}{\sum_{i=1}^n \Big(E\big(R_i - R_f\big)_i - \overline{E\big(R_i - R_f\big)}\Big)^2} \tag{16}$$

3. Data

The empirical analysis is based on European stock markets, for which STOXX® Europe 600 index is taken as a market benchmark. The index represents large, mid and small capitalization companies across 17 countries: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom. The consistent prolonged data exists for 390 European stocks included in the index. The risk-free rate is the 10-year Germany government bond yield, reflected by Bloomberg in the automatic calculation of beta on the Bloomberg Terminal.

The daily data are obtained from Bloomberg for the period from the beginning of January 2003 to the end of June 2016. Each time series contains 3509 price observations.

Table 1: Results of normality tests

Test	Market returns		Risk-free returns	
	statistic	p-value	statistic	p-value
Shapiro-Wilk	0.9276	$2.2 \cdot 10^{-16}$	0.59845	$2.2 \cdot 10^{-16}$
Anderson-Darling	51.62	$2.2 \cdot 10^{-16}$	364.44	$2.2 \cdot 10^{-16}$
Pearson χ^2	519.37	$2.2 \cdot 10^{-16}$	4040.6	$2.2 \cdot 10^{-16}$

Table 1 reports the results of chosen normality tests (namely Shapiro–Wilk test, Anderson–Darling test and Pearson's chi-squared test). The results of normality tests for both market returns and risk-free returns indicate that examined time series do not follow normal distribution, thus, violating the assumption behind capital asset pricing model and beta risk measure and justifying the use of non-parametric techniques.

4. Results

In order to analyse how the expected risk premium might be efficiently explained by risk measures, we estimate the risk for each security using the CAPM beta and three non-parametric entropy measures: kernel density estimated Shannon entropy, kernel density estimated Rényi entropy and maximum likelihood Miller-Madow estimated Shannon entropy. Figure 1 shows the efficiency of explaining the average long-run risk premium by the considered risk measures. There is certainly no strong linear relationship between risk premium and risk measure, even though the clustering of the results is apparent. The observations for the trade-off between expected risk premium and risk measure are less dispersed for kernel density estimated entropies.
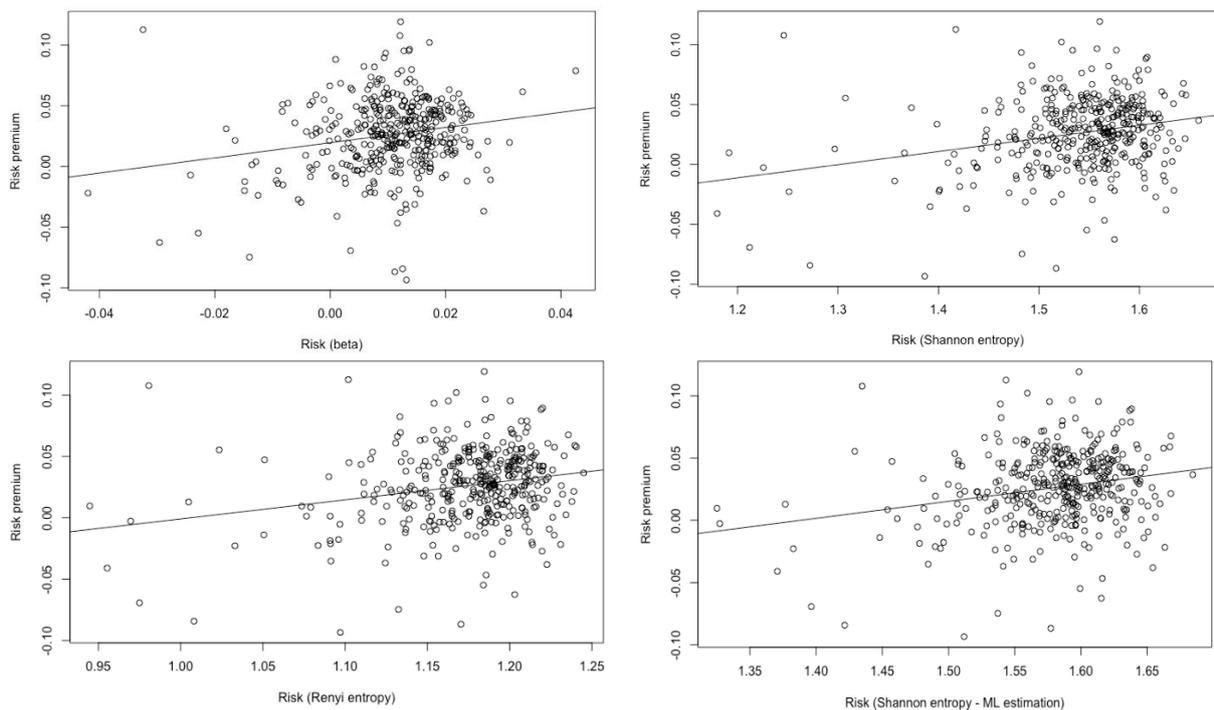
Figure 1: Explanatory Power of Risk Measures

Table 2: In-sample explanatory power of tested risk measures

	Estimate	Std. error	t-statistic	p-value	R-squared
(Intercept)	0.166870	0.002251	74.118	$2.2 \cdot 10^{-16}$	0.03812
Beta	0.625979	0.159627	3.922	0.000104	
(Intercept)	−0.14287	0.09087	−2.271	$1.95 \cdot 10^{-5}$	0.0633
Shannon entropy	0.10970	0.06538	4.180	$4.80 \cdot 10^{-7}$	
(Intercept)	−0.15650	0.1498	−1.868	0.000103	0.05132
Rényi entropy	0.15558	0.1348	3.025	$6.24 \cdot 10^{-6}$	
(Intercept)	−0.18966	0.11749	−1.963	$6.06 \cdot 10^{-5}$	0.05206
ML entropy	0.13660	0.07718	3.439	$5.32 \cdot 10^{-6}$	

Table 2 summarizes the results of linear regressions of risk premium on risk measure. The explanatory power of kernel density estimated Shannon entropy of 6.3% is the highest. Two other entropy measures perform similarly (goodness-of-fit of 5.1% and about 5.2%) worse than Shannon entropy, but better than the CAPM beta with 3.8% efficiency. The unexplained risk premium (also known as Jensen's alpha) given by the

intercept in the regression is measured differently in sign by beta and entropies. Entropy-based alpha indicate no excessive returns given the amount of risk.

The risk measures are certainly sensitive to the choice of analyzed intervals and observations frequency, therefore, the stability of the results should be tested as the next step of the research.

5. Discussion and Conclusions

Entropy is gaining prominence in asset pricing and financial modelling, but there are still uncertainties about the usage of the specific calculation techniques. Since there are several measures of entropy, the question arises: which one should be used in asset pricing models. As a continuing discussion to previous studies, we considered three non-parametric possibilities. Our analysis based on European data demonstrates that the kernel density based entropy is a worthy option for the risk measure performing better than the CAPM beta. Even though we cannot directly compare our results to those of Ormos and Zibriczky (2014) set to different approaches in entropy calculations, our outcome supports the previous findings. The support comes in the form of the better explanatory power of Shannon entropy, which is the most widely used technique in information theory, as well as Rényi entropy. Moreover, the entropy provides a risk measure not dependent on the choice of the market benchmark and without imposing any prior model restrictions.

The predictive power of entropy measure of risk should also be considered in further studies alongside with different concepts of entropy, such as Tsallis entropy, Kullback cross-entropy and fuzzy entropy, which might be used for the formulation of entropy-based risk measure in terms of adaptive market hypothesis.

Acknowledgements

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A Note on Effects of Corporate Governance and Social Responsibility in Insurance

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Abstract

The paper examines the effects corporate governance and social responsibility on financial performance of European insurance companies. The empirical evidence provides support for unbiased and objective boards, indicating that investors trust independent directors as protectors of shareholder value, and increased number of board members. As for social responsibility, three main factors turn out to be relatively more important than others, in particular, employee turnover, community spending and UN Global Compact signatory.

Keywords: insurance, corporate governance, corporate social responsibility

JEL Code: G22, M14, G34

1. Introduction

Excessive risk-taking by financial institutions could be controlled via corporate governance mechanisms, as they are meant to deal with principal-agent issues, such as misbehavior of management that threatens welfare of shareholders and other stakeholders (Gup, 2007). Apart from the fact that good corporate governance is believed to be helpful in strengthening firms' ability to resist unfavorable externalities (Greuning and Brajovic-Bratanovic, 2009), in literature it is also associated with better financial performance (e.g. Peni and Vähämaa, 2012; Caprio et al., 2007; Cornett et al., 2009). However, empirical evidence is not entirely straightforward with respect to every aspect of corporate governance practices.

Corporate governance is closely related to the concept of corporate social responsibility (Louche & Van den Berghe, 2005). Despite longevity of discussion in management literature regarding corporate social responsibility (CSR) and related concepts, such as corporate social performance (CSP), corporate social responsiveness or corporate citizenship, the domain remains "controversial, fluid, ambiguous and difficult to research" (Wood, 2010, p. 50). In the light of recent financial crisis, engagement in socially responsible behavior can be viewed as compensation from financial institutions for receiving

public resources instead of raising capital from shareholders (Shen, Wu, Chen, & Fang, 2016).

Similarly to corporate governance studies, scholars have been interested in investigating association between corporate social performance and various aspects of performance (e.g. Soana, 2011; Jo, Kim and Park, 2015; Simpson and Kohers, 2002). Although, due to diverse underlying motives of engagement in CSR, usage of different methods, measures, model specifications, industries or time periods, evidence regarding the question under consideration has been mixed and contradictory.

The aim of this paper is to investigate the impact of corporate governance and social responsibility on financial performance of listed European insurance companies. For this purpose, we conduct econometric analysis of panel data based on a sample of 40 biggest insurance companies across Europe. In quantifying financial performance, we follow existing literature and employ Tobin's Q and Market Capitalization to Book Value as proxies of market performance, while Return on Common Equity (ROE) and Return on Assets (ROA) are used to measure companies' accounting-based profitability.

Our study extends earlier research on the relationship between corporate governance and corporate social performance and financial performance in the insurance sector to recent time period using Environmental, Social, and Governance (ESG) factors available to investors on Bloomberg, and, unlike previous investigations, we study CSR and corporate governance indicators simultaneously. Bloomberg ESG factors provide a common framework for the analysis of corporate governance and social responsibility, thus, unifying their measurement.

2. Related Literature

As formulated by Venuti and Alfiero (2016), there are several industry specific traits that influence application of corporate governance mechanisms in insurance companies:
- strict regulation of the sector regarding solvency as well as pricing, provided by different regulators leading to relative heterogeneity in legislation;
- inversion of production cycle as long as raising revenue in the form of premiums precedes the time when corresponding costs are incurred;
- another peculiarity regarding revenues/costs generation is related to certainty of the former in terms of amount and time and uncertainty of the latter until policy expires;
- high level of "social relevance" and importance for the community, policyholders and financial markets due to their role as institutional investors.

All the mentioned characteristics underscore the importance of risk management in insurance companies and therefore need to apply correct corporate governance practices in order to address existent and potential risks. Furthermore, purposes of good corporate governance practices are not limited to protection against different types of risks and include supporting company success by making it more attractive to investors and highly qualified professionals (Njegomir and Tepavac, 2014).

Compared to extensive empirical evidence for banks, the investigation of corporate governance and CSR is relatively scarce for insurers. Most of the studies concentrate on risk-taking behavior in insurance industry, rather than profitability or market performance. Another peculiarity of studies in this regard is variation in organizational structures of insurance companies, which allows scholars to explore its implications. Below we discuss each of these works separately.

Based on research of life insurers in the UK, Hardwick et al. (2011) suggests that corporate governance is a complex system and possible interactions among different aspects should be taken into account while forming opinion about their effectiveness. One of the underlying results leading to such conclusion is that CEO duality per se does not show any significant influence on profit efficiency, however, in case of separation of the CEO and board chairman positions and absence of audit committee, impact of board independence measured by representation of non-executive directors on the board becomes positive.

Two other studies that examine factors other than risk-taking are He and Sommer (2011) and He et al. (2011). Both researches are based on the same sample, namely 423 mutual and 1516 stock insurance companies in the property–liability insurance industry within the period of 1996–2004. While the former investigates how organizational structure affects CEO turnover, the latter concentrates on post turnover developments, in particular, the issue under consideration is whether companies' financial performance improves. The results suggest that likelihood of CEO turnover based on poor performance is significantly higher in stock firms than in mutual firms while CEO turnover for its part, positively affects insurers' post-turnover performance as measured by cost efficiency and revenue efficiency scores.

Contrary to previous findings, Venuti and Alfiero (2016) show that in European insurance industry the publicly-held insurance companies are associated with lower risk in comparison with privately held ones. In addition, they report that larger board size as well as higher ownership concentration is significantly correlated with lower risk, since the higher the number of directors on the board the harder for them to unanimously agree on engaging in risky projects.

Scholtens (2009, 2011) provide a cross-sectional analysis framework in order to study 32 banks and 153 insurance companies across Europe, North America and Asia Pacific regions with respect to CSR. European and Japanese insurance companies in these studies outperform North American counterparts in most of the CSR aspects researched. However, different CSR policies are not implemented into business activities at a same degree, namely, when it comes to donations/sponsoring or voluntary work, insurers perform significantly better than in environmental aspects (Scholtens, 2011). Engagement in CSR activities is positively correlated with size of insurance companies, which might be explained by increased attention from stakeholders related to company growth (Waddock and Graves, 1997). Otherwise, on an industry basis banks show notably superior performance in every single CSR aspect observed both in Europe and North America.

Clearly, there is a considerable room for further research with respect to corporate social responsibility. Diversity of the empirical studies presented above demonstrates complexity of the concept and motivates further research in this regard in order to supplement gaps in existing literature by identifying and measuring impact of various features of corporate governance and social responsibility on financial performance in European insurance companies simultaneously.

3. Data and Methodology

The importance of corporate governance and social responsibility in insurance companies is examined by its influence on different measures of financial performance, such as Tobin's Q, Return on Common Equity, Return on Assets and Market to Book ratio. We

focus on European publicly traded insurance companies within the period of 2000–2015. The data are collected from Bloomberg. Due to poor extent of firms' Environmental, Social and Governance disclosure, our primary sample has been reduced to 40 insurance companies. As mentioned earlier, only biggest companies tend to disclose such information. Since there is little theoretical guidance about precise measurement of corporate governance and social responsibility, as well as about exact design of specifications, we select groups of variables based on the emphases placed in literature and also taking into account the accessibility of corresponding data in Bloomberg. All the variables are retrieved from Bloomberg and further explanations are based on the data and definitions provided in the mentioned system.

We start with ESG disclosure score, which reflects overall extent of ESG disclosure. It is based on large pool of data points and is not directly associated with the weighted sum of variables presented here. Next, we try to cover corporate governance aspects by including six frequently used proxies, particularly: board size, percentage of women on the board of directors, percentage of independent directors and presence of CEO duality all measure general structure and board composition. In addition, they serve as a proxy for relative independence, objectivity and monitoring power of the boards; number of board meetings for the year quantifies communication between board members and finally, dummy variable for unitary and two-tier board systems depicts two major structures of governance.

What concerns the measurement of CSR, literature in this regard is even more ambiguous, while data disclosed by the companies is even scarcer. Due to these constraints, we consider seven possible proxies that are meant to assess different aspects of socially responsible behavior. We use energy intensity per employee, which measures consumed energy standardized by number of employees in order to evaluate firms' environmental responsibility. The rest of the variables within the group mostly concentrate on social aspect. In particular, percentage of employee turnover attempts to quantify company's attractiveness as an employer. High employee turnover may indicate unsatisfying working conditions, including compensation, health and safety provisions. Community spending and personnel expenses per employee measure employee-related costs such as wages, benefits, trainings, team-building and other activities. Dummy variables show if companies take care of their employees' CSR education by providing relevant trainings and if they have implemented any initiatives in order to ensure protection of human rights. Finally, we include UN Global Compact Signatory to judge companies' social responsibility by their adherence to the world's largest voluntary corporate sustainability initiative. The UN's corporate citizenship initiative was launched in June 2000 with the aim to support creation of sustainable and inclusive global economy (Kell, 2003).

Financial performance can be observed by applying large set of ratios developed to measure particular aspect of interest. However, we follow existing empirical researches and use four most prominent indicators. To evaluate market performance of insurance companies, we apply primarily Tobin's Q. The ratio compares market value of the firm to the replacement cost of the firm's assets and is based on the hypothesis that in the long run these two amounts should be roughly equal. As a robustness check of the results obtained on Tobin's Q, we use Market Capitalization to Book Value ratio employing same set of explanatory variables, controls and methods. Furthermore, we use two measures of profitability based on accounting data. Return on Common Equity (ROE) reveals how much profit a company generates utilizing the money that shareholders have invested, whereas the Return on Assets (ROA) shows company's relative profitability to its total

assets and illustrates management's efficiency in generating earnings by using company's assets.

Following Adams and Mehran (2008) we employ several control variables: natural logarithm of the book value of firm's total assets as a measure of the company's size; financial leverage, determined as the ratio of average assets to average equity to proxy bank's capital structure; volatility of security prices as a measure of risk and uncertainty and finally, lagged value of ROA in the specifications, involving Tobin's Q or Market to Book ratio as dependent variable to check robustness of the specifications. We also include dummy variable distinguishing results among the following types of insurance: life insurance, property and casualty insurance and reinsurance.

We estimate models based on Fixed Effects (FE) estimation procedure, apart from the cases, when relevant test statistics indicate that either Pooled OLS or Random Effects (RE) specifications are superior. Overall, we start estimation with panel data by testing existence of common intercepts. If the intercepts are equal, then data are pooled, otherwise we need to evaluate two individual effects models, FE and RE. Unbiasedness of Random Effects estimator is tested by applying Hausman test. If the implied null hypothesis is not rejected and both FE and RE give roughly same results, then RE should be preferred since it is the most efficient estimator. However, rejection of the null suggests superiority of FE estimator.

We adopt general-to-specific modelling approach, according to which estimation starts with general unrestricted model and is gradually reduced by testing different imposable restrictions. The underlying logic implies that as long as parsimonious models convey all of the information about reality described by general complex models, but in a simpler manner, they should be favored (Verbeek, 2008).

In this context, the general unrestricted model can be formulated as follows:

$$FP_{it} = \beta_0 + \beta_1 \cdot D_{it} + \sum_{j=1}^{6} \beta_j \cdot CG_{jit} + \sum_{k=1}^{7} \beta_k \cdot CSR_{kit} + \sum_{l=1}^{4} \beta_l \cdot C_{lit} + \varepsilon_{it} \qquad (1)$$

where FP_{it}, D_{it}, CG_{it}, CSR_{it} and C_{it} stand for categories of variables namely Financial Performance, Disclosure, Corporate Governance, Corporate Social Responsibility and Controls respectively.

4. Results

Throughout analysis we employ three methods of estimation, Pooled OLS, FE and RE. P-values providing support for choice of the models are presented in the last raw of the results table. Whenever we are forced to use only Pooled OLS due to small number of observations in comparison with number of variables included, p-values are not applicable (N/A). In case of using FE or Pooled OLS, P-values are presented according to robust test for differing group intercepts with null hypothesis that the groups have a common intercept, thus low value counts against adequacy of OLS and provides evidence in favor of FE, while high values indicate that data are poolable. As for RE, we conduct comparison between FE and RE estimators using Hausman test, with null hypothesis that GLS estimates are consistent. Therefore, low p-values in this case count against the usage of RE and provide evidence in favor of FE, whereas high p-values prove RE to be better choice.

First, we start by investigating impacts of corporate governance and social responsibility on market-based measures of financial performance, particularly Tobin's Q and ratio of Market Capitalization to Book Value. Table 1 discloses results of the preliminary specifications for each dependent variable. Columns I in each section use Pooled OLS as an estimation method due to impossibility to utilize either FE or RE. Columns II and III employ FE and Pooled OLS respectively in accordance with the indications of p-values presented in the last raw. Women representation on the boards significantly positively affects both measures of market performance, although only when studied in context of corporate governance. Percentage of independent directors and board size show negative impact only when all the rest of the variables are included in specifications. UN Global Compact signatory in most of the specifications improves market performance. As for type of insurance, results are extremely confusing and contradictory, since whenever equation employs all the available variables, reinsurers seem to perform significantly better than life or P&C insurance companies; however, when it comes to assessing impact of CSR attributes, relation changes into completely opposite direction and life insurers outperform the rest.

Table 1: Regressions Results of Tobin's Q and Market Capitalization to Book Value on Corporate Governance and CSR Indicators

	Dependent variable: Tobin's Q			Dependent variable: M/B		
	I	II	III	I	II	III
	Pooled OLS	Within	Pooled OLS	Pooled OLS	Within	Pooled OLS
Constant	1.094*** [0.0085]	0.7007* [0.0764]	1.290*** [<0.0001]	11.02 [0.1358]	−2.133 [0.6871]	9.241*** [<0.0001]
ESG Disclosure Score	0.000477 [0.3369]	0.001558 [0.1572]	−0.0001609 [0.6557]	−0.07955*** [0.0032]	−0.0001582 [0.9795]	0.008335 [0.342]
% Women on Board	−0.0002669 [0.6526]	0.001455*** [0.0099]		−0.008457 [0.4235]	0.009877*** [0.0028]	
% Independent Directors	−0.0005825* [0.0676]	0.0009773 [0.3341]		−0.02752*** [0.0086]	0.004823 [0.1407]	
Unitary or Two Tier Board System	0.01273 [0.3019]			−0.7578* [0.0589]		
Number of Board Meetings for the Year	0.0003518 [0.7491]	−0.0001998 [0.8519]		0.01993 [0.3609]	−0.01691 [0.161]	
Size of the Board	−0.003541** [0.0238]	0.002678 [0.5081]		−0.07008 [0.1009]	0.0309 [0.3867]	
CEO Duality	0.009427 [0.6484]	0.04790*** [<0.0001]		−0.7445 [0.2377]		
Energy Intensity per Employee	0.00009228 [0.9722]		−0.0005987 [0.5973]	0.01628 [0.765]		−0.03211 [0.3898]
Employee Turnover %	0.0008697 [0.2072]		−0.0002988 [0.4551]	0.01756 [0.2351]		−0.01539 [0.2657]
Community Spending	−0.0002444 [0.5819]		0.001168*** [0.0034]	−0.02146* [0.093]		0.01637 [0.2532]
Employee CSR Training	−0.0135 [0.4022]		−0.008102 [0.1932]	−1.013** [0.0283]		−0.4394** [0.0396]
UN Global Compact Signatory	0.01189 [0.1047]		0.01890*** [<0.0001]	1.183*** [0.001]		0.7869*** [0.0002]
Volatility	−0.001082 [0.1521]	−0.0002335 [0.187]	−0.0002003 [0.144]	−0.004994 [0.6704]	−0.01171*** [0.0012]	−0.003463 [0.4165]
Type of Insurance	−0.02075*** [0.0087]		0.01173** [0.021]	−0.3274* [0.0761]		0.4650*** [0.0037]
Ln (Total Assets)	−0.0007654 [0.968]	0.01156 [0.693]	−0.02197*** [0.0007]	−0.2161 [0.636]	0.2492 [0.5607]	−0.6618*** [0.0001]
Human Rights Policy			−0.01437*** [0.0026]			−0.4058*** [0.0058]

	Dependent variable: Tobin's Q			Dependent variable: M/B		
	I	II	III	I	II	III
	Pooled OLS	Within	Pooled OLS	Pooled OLS	Within	Pooled OLS
n	20	142	41	20	126	41
Adj. R2	0.5585	0.2454	0.3637	0.7566	0.3115	0.3335
P-value	N/A	4.132 56E–14	0.355 552	N/A	1.480 45E–07	0.087 9968

Notes: P-values in parentheses. *, **, *** indicate significance at the 10, 5, 1 percent level respectively. P-values in the last raw are related to robust test for differing group intercepts. Low values count against the null hypothesis that the groups have a common intercept, in favor of the fixed effects alternative; N/A whenever it's impossible to estimate either FE or RE. Model I in each section includes all the variables defined in dataset. Models II and III use only Corporate Governance and Social Responsibility factors together with control variables.

Next, we investigate relations between accounting-based indicators, such as ROE and ROA and corporate governance and social responsibility and follow the same sequence of research. Table 2 compares estimations for each dependent variable. Based on the tests, when every defined variable is included or we are interested just in CSR aspects, the most suitable method to use is OLS, since the data are poolable. However, when it comes to addressing only corporate governance indicators, in case of ROE as a dependent variable, F-test showed that groups have different intercepts, making FE the most appropriate method to apply; while in case of ROA, Hausman test indicates that RE model is more efficient. Regarding the estimates of the independent variables, remarkably, none of them except controls shows consistently significant impact on both measures of financial performance, naturally forcing us to evaluate relations separately from each other. Furthermore, when employing ROA as dependent variable, conclusive results are absent even between the models.

Table 2: Regressions Results of ROE and ROA on Corporate Governance and CSR Indicators

	Dependent variable: ROE			Dependent variable: ROA		
	I	II	III	I	II	III
	Pooled OLS	Within	Pooled OLS	Pooled OLS	GLS	Pooled OLS
Constant	−81.01 [0.4679]	122.5** [0.0199]	45.16** [0.0186]	−4.225** [0.0114]	8.608** [<0.0001]	0.9359 [0.4029]
ESG Disclosure Score	−0.8855* [0.082]	−0.3140*** [0.004]	−0.03916 [0.5908]	−0.01802** [0.0221]	−0.007124 [0.5484]	−0.01544** [0.0164]
% Women on Board	−0.03563 [0.779]	0.09854 [0.1733]		−0.002092 [0.5924]	0.02297** [0.0258]	
% Independent Directors	−0.2689* [0.0639]	0.002159 [0.9778]		0.002264 [0.3076]	−0.01764** [0.042]	
Unitary or Two Tier Board System	−1.914 [0.6702]			−0.06464 [0.2992]	−0.5539 [0.1971]	
No of Board Meetings per Year	0.371 [0.2717]	0.8365*** [0.0028]		−0.005706 [0.4711]	0.03031 [0.3498]	
Size of the Board	0.09203 [0.9331]	−0.1166 [0.786]		0.008139 [0.7224]	−0.1115** [0.0141]	
CEO Duality	−18.87 [0.1726]	0.8941 [0.719]		−0.2631 [0.3656]	1.084** [0.0152]	
Energy Intensity per Employee	0.4069 [0.6589]		−0.7218** [0.0382]	0.01499 [0.4222]		−0.004145 [0.8313]
Employee Turnover %	−0.3066 [0.3447]		−0.1209 [0.2859]	−0.006442 [0.4386]		0.001744 [0.7333]
Community Spending	−0.1628 [0.4517]		−0.2727*** [0.0006]	0.008327 [0.117]		0.003094 [0.5301]
Employee CSR Train-	−10.85		−4.412*	0.2086		−0.1167

	Dependent variable: ROE			Dependent variable: ROA		
	I	II	III	I	II	III
	Pooled OLS	Within	Pooled OLS	Pooled OLS	GLS	Pooled OLS
ing	[0.1275]		[0.061]	[0.1772]		[0.6134]
UN Global Compact Signatory	−0.1137		3.128**	−0.006704		−0.1963**
	[0.9684]		[0.0309]	[0.8778]		[0.0229]
Volatility	0.2559	−0.1492***	−0.2208***	0.007334	−0.01915**	−0.006743**
	[0.1864]	[<0.0001]	[<0.0001]	[0.2678]	[0.0002]	[0.0156]
Type of Insurance	−9.470*		−0.407	−0.5232***	−0.8271**	−0.4663**
	[0.0855]		[0.8142]	[0.0036]	[0.0035]	[<0.0001]
Ln (Total Assets)	12.38	−9.033**	−0.9985	0.4359***	−0.3501**	0.08541
	[0.1717]	[0.0398]	[0.5444]	[0.0033]	[0.0429]	[0.4439]
Human Rights Policy			−6.510***			−0.08475
			[0.0024]			[0.1387]
n	20	211	41	20	142	41
Adj. R2	−0.171	0.2039	0.4274	0.884		0.6287
P-value	N/A	0.000109265	0.244226	N/A	0.266122	0.43261

Notes: P-values in parentheses. *, **, *** indicate significance at the 10, 5, 1 percent level respectively. P-values in the last raw are related to either 1) robust test for differing group intercepts (in case of OLS or FE/Within), where low values count against the null hypothesis that the groups have a common intercept, in favor of the fixed effects alternative; or 2) Hausman test (in case of GLS/RE), where low p-value counts against the null hypothesis that the random effects model is consistent, in favor of the fixed effects alternative. N/A whenever it's impossible to estimate either FE or RE. Model I in each section includes all the variables defined in dataset. Models II and III use only Corporate Governance and Social Responsibility factors together with control variables.

Frequent board meetings improve companies' financial performance, thus having positive influence on ROE that becomes significant when studied in context of corporate governance. While community spending decreases effectiveness of equity, UN Global Compact Signatory drives the ratio to the opposite direction, although both of them just as in case of number of board meetings show significance only when studied in relevant context, namely CSR. And finally, according to results, accounting profitability proxied by ROE is the highest in case of reinsurance companies and lowest in life insurers.

Importance of other explanatory variables is not crucial if we judge based on their estimates' statistical significance. However, presence of independent directors on the boards shows almost always positive influence on ROE, while employee turnover, on the opposite, decreases profitability in every specification since high turnover might indicate companies' failure to retain qualified staff and constant need to spend time and funds on recruitment. As for control variables, interestingly, firm size and complexity is negatively associated not only with market performance of European insurance companies, but with accounting profitability as well.

5. Discussion and Conclusions

The main result of this analysis is that corporate governance and social responsibility factors significantly influence financial performance in the European insurance sector. Generally, we find that market-based performance ratios are more vulnerable in comparison with their accounting-based counterparts, if judged according to the number of affecting corporate governance or CSR dimensions. Particularly, board independence proxied by the percentage of independent directors is a strong determinant of improved market performance. We also provide support for unbiased and objective boards, indicating that investors trust independent directors as protectors of shareholder value. As

for board size, the increased number of board members on average is associated with improved market performance. Frequency of board meetings shows consistently significant positive impact on profitability. The result underscores the vital importance of boards' active involvement in business process, proper execution of advisory and monitoring power and benefits of increased communication between members. Board size and women representation are two other dimensions of corporate governance, significantly affecting return on assets. Larger board size significantly reduces financial performance, while women representation is associated with value creation.

Three main factors turn out to be relatively more important in CSR than others: employee turnover, community spending and UN Global Compact signatory. Employee turnover shows significantly negative impact on market performance, whereas community spending enhances companies' financial performance. Community spending, even though positively influencing market performance, expectedly reduces accounting-based profitability due to additional expenses incurred. Based on our results, UN Global Compact signatory has the best explanatory power on movements in financial and accounting indicators. The result might be driven by the fact that adherence to internationally accepted principles is a relatively simple indicator for investors to judge companies' attitudes towards social responsibility.

Corporate governance mechanisms together with socially responsible behavior can be treated as factors influencing financial performance of European insurance companies. Clearly, significant room exists for future research. Major limitations of panel-data studies on the effects of corporate governance and CSR include: absence of a comprehensive conceptual framework, ideal empirical measurement techniques and expected theoretically sound causations (Simpson and Kohers, 2002). However, results of our study contribute to existing debate about the relationship between different mechanisms of corporate governance and social responsibility and financial performance by providing additional empirical evidence that insurance firms can be socially responsible and financially successful at the same time.

Acknowledgements

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China after 15 Years in the WTO: What Role Does the Chinese State Play?

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Abstract

Last year, it was 15 years since China became the Member State of the World Trade Organization (WTO). This probably contributed to the fact that China is currently the second largest economy and the leading exporter of goods and services in the world. It also sparks an increasing interest in this country. The object of the paper is to contribute to the discussion about the Chinese economy and to find out how China fulfilled its WTO trade commitments in the area of state regulation in the period 2001–2015, i.e. after 15 years since its entrance into the WTO. The intention of this paper is to point out the fact that although China made trade commitments in the WTO and gradually liberalised its trade regime, some sensitive areas of the Chinese economy remained under the influence of the state and local organs. However, the research carried out in the area of state trading, price controls and state enterprises in China showed that the realisation of these forms of state influence is in principle in compliance with China's commitments in the WTO, with the exception of the government support of state-owned enterprises. A qualitative research was carried out through the logical methods using official documents and data published by the WTO and the Chinese authorities.

Keywords: General Agreement on Tariffs and Trade, monopoly, most-favoured nation, price control, state-owned enterprises, state trading enterprises, trade commitments, World Trade Organization.

JEL Code: F13, K33, P21

1. Introduction

After the approval of China's accession to the WTO by the WTO Ministerial Conference on 10 November 2001, a new era of China's trade relations with more than 140 countries around the world based on the multilateral principles started. The accession process took 15 years, during which many trade negotiations were held firstly through the GATT Working Party and later through the WTO Working Party. The results of the trade negotiations brought China a lot of trade commitments that were connected with the

liberalisation of its trade regime. The fulfilment of these commitments involved adopting a number of different domestic reforms on the one hand, but on the other hand, it now enables China to get access to the markets of the other 163 WTO Member States via the most favoured nation (MFN) treatment and to participate in the process of the world trade liberalisation. However, China has remained a communist state, in which state influence over the economy in different forms has already existed. Discussion held by economists, politicians and the civil society on different forums is very often led by the idea if China has really liberalised its market for suppliers from foreign countries. Thus, the object of the paper is to contribute to this discussion and to find out how China fulfilled its WTO trade commitments in the area of state regulation in the period 2001–2015, i.e. after 15 years since its entrance into the WTO. The exploration of China's trade commitments and the institutional area of trade policy in China requires a qualitative research based on the exploration of the official documents published by the WTO or the Chinese government.

The structure of the paper is as follows: Firstly, a short introduction of the topic and then the main moments of China's accession to the WTO will be depicted. In the next part of the paper, methodology and data will be introduced. The following parts of the paper will be focused on mapping the current institutional framework of China's trade regime and the realisation of some of China's trade commitments in the WTO with focus on state regulation. In conclusion, the results of the analysis will be discussed.

2. China's Accession to the WTO

According to Article XII of the Marrakesh Agreement establishing the World Trade Organization (WTO), any state or customs territory having full autonomy in carrying out its trade policy may accede to the WTO on terms to be agreed between it and the WTO (WTO, 1994). This is done through the Working Party of the WTO Members and a process that includes bilateral, plurilateral and multilateral negotiations. Although the accession process is based on united rules for all countries, each accession to the WTO is a unique event.

China was one of the 23 original contracting parties in the General Agreement on Tariffs and Trade (GATT) in 1948, but in connection with China's revolution in 1949 the Chinese government has not participated in the creation of a multilateral trade system governed by the GATT for almost 40 years. In 1986 the Chinese government notified the GATT of its interest in resuming its status as a GATT contracting party and a Working Party to examine China's status was established in March 1987 (GATT, 1987). Because the GATT Working Party on China's status did not bring a conclusion, negotiations continued simultaneously on the bilateral and multilateral level after 1995 in the frame of the WTO Working Party. Bilateral and multilateral negotiations about China's accession to the WTO were successfully concluded in September 2001. China's Protocol of Accession was approved at the Fourth Ministerial Conference held in Doha, Qatar, on 10 November 2001. One day later, China signed the agreement and deposited its instrument of ratification with the Director-General of the WTO. Thus China became the 143rd member of the WTO on 11 December 2001 in compliance with the Final Provisions of the Chinese Accession Protocol to the WTO, i.e. 30 days after the WTO Director-General received notification of the ratification of the agreement by the Chinese Parliament.

3. Methodology and Data

In order to achieve the considered object of the paper, a qualitative research based on analysing different types of laws and documents published by the WTO or the Chinese state in compliance with its entrance commitments in the WTO will be used. China's trade commitments in the WTO are included in the Working Party Report and the Protocol of Accession of the People's Republic of China, including Goods and Services Schedules. The Protocol of China's Accession to the WTO contains three parts: (1) General Provisions, (2) Schedules and (3) Final Provisions. With respect to the object of the paper, Part I – General Provision, concerning state trading, state-owned enterprises and price controls, will mainly be analysed.

The determination of the influence of the state and regional institutions in China on its trade regime after 15 years since its entrance into the WTO will carried out using logical methods, such as abstraction, analysis and deduction. Firstly, by using abstraction, a model situation will be created, i.e. China and its accession to the WTO. The specification of China's trade policy framework and its commitments in the WTO will serve to analyse the role of the state and the regional institutions in the trade area. The results of the analysis will be used for the deduction of the main conclusions. The analysis will cover the period 2001–2015. Data about China´s trade regime will be drawn especially from the World Trade Organization and the Chinese authorities.

4. Institutional Framework of China´s Trade Regime

China is a communist state, in which state power is distributed into a legislative, executive and judicial branch. The holder of legislative power is the unicameral National People's Congress (NPC) and its Standing Committee. The President of China promulgates the legislation adopted by the NPC and appoints the Prime Minister and other members of the central government. The State Council, i.e. the central government of China has executive power. China's judicial system consists of the Supreme People's Court, the local people's courts at different levels and special courts. There are also three intellectual property courts in China. The area of China is divided into several administrative levels. It includes 23 provinces, 5 autonomous regions and four municipalities. The provinces and autonomous regions are divided into autonomous prefectures, counties, autonomous counties and cites. These administrative bodies are further divided into lower levels. Except for the central government, there are four types of local governments, two types of provincial governments, several governments in municipalities and cities and rural area governments. For example, special economic zones or development zones, etc. also have local governments (The State Council, 2017).

This complicated structure of China's state administration sparked the concerns of some WTO Members during the accession process about the presence of multiple trade instruments used by the different levels of government within China and whether the central government could effectively ensure that trade-related measures introduced at the sub-national level would conform to China's commitments in the WTO Agreement. However, a Chinese representative confirmed that sub-national governments had no autonomous authority over issues of trade policy and promised that the government rules and other local measures that were inconsistent with China's obligations in the WTO would be eliminated (WTO, 2001b). The Secretariat of the WTO found out that local rules and regulations may vary across regions, but there is a Legal Affairs Office of

the State Council that reviews local rules and regulations to ensure policy coherence (WTO, 2016). In addition, the Legislative Law of 2000 determines the order of laws and regulations according to their importance, i.e. constitution, laws, administrative regulations and local regulations.

The central government includes some of the most important institutions governing the trade policy area in China. The Ministry of Commerce (MOFCOM) is mainly responsible for the coordination and implementation of trade-related, investment and economic policies. It also publishes China's trade-related laws, regulations and rules in the China Foreign Trade and Cooperation Economic Gazette. The General Administration of the Customs Administration of the People´s Republic of China (GACC) is the national authority in the area of customs affairs and procedures. It issues especially administrative customs ordinances and announcement changes in customs procedures. There is also the National Development and Reform Commission (NDRC), which is in charge of designing China´s overall national economic and social development policy, and in this way it also plays an important role in the formulation of the trade policy and its objectives. The economic, trade and investment development of China is mainly outlined in the Central Government Five-Year Plans, sectoral and provincial Five-Years Plans. The current 13th Five-Year Plan, which will guide China's economic and social development from 2016 to 2020, was announced at the Fifth Plenum of the 18th Communist Party of the Chinese Central Committee in October 2016 (EURObiz., 2015). The 13th Five-Year Plan includes an ambitious programme of market-oriented reforms.

5. Legal Interpretation of China's Trade Commitments with Focus on State Regulation

The membership in the WTO means for China that it had to agree and to take concrete steps to remove trade barriers and to open its markets to foreign companies and their exports in every product sector and for a wide range of services. However, some forms of state regulation, which can disturb the market environment in China, occur all the time.

5.1. State Trading

In Section 5.1 of the Protocol of Accession it is stated that "China shall progressively liberalise the availability and scope of the right to trade, so that, within three years after accession, all enterprises in China will have the right to trade in all goods throughout the customs territory of China, except for those goods listed in Annex 2A of the Protocol of Accession which continue to be subject to state trading". Goods subject to state trading can be imported and exported only by the authorised enterprises, though specific quantities of some goods that are subject to state trading may be imported and exported by non-state trading enterprises that have obtained trading rights through registration. These trading enterprises may import a limited volume of goods in the frame of tariff rate quotas (TRQ). On a yearly basis the NDRC and the MOFCOM issue the volumes of goods, i.e. TRQ that they can import.

On the import side, there are eight products, such as grain, vegetable oil, sugar, tobacco, crude oil, processed oil, chemical fertilizer and cotton that are the subject of China's *state trading enterprises* (STEs) in compliance with the Protocol of Accession. The list of

products subject to state trading includes a different number of commodity lines, i.e. lines of the Harmonised system (HS) as well as a different number of STEs. For example, the import of grain, which includes 18 HS commodity lines, can be carried out by only one STE, namely the China National Cereals, Oil & Foodstuff Import and Export Co. On the other hand, cotton is included in only two HS commodity lines, which can be imported by four STEs. Chemical fertilizer is the area of trade in which the Chinese state kept its monopoly in import from the point of view of the number of HS commodity lines the most. The highest "competition" among STEs exists in trade in vegetable oil, which can be imported by six STEs. From the point of view of the percentage of TRQ allocated to state-trading enterprises, the STEs share is 100% for chemical fertilizers and tobacco (WTO, 2006) and a further 90% for wheat, 70% for sugar, 50% for rice, etc. (WTO, 2016). The list of "protected" products remained the same until 2015.

On the export side, there are 21 products that are subject to state trading. The Chinese government has to provide full information on the pricing mechanism of its trading enterprises for exported goods according to the provision of Section 6 of the Protocol of Accession. STEs export e.g. tea, rice, corn, soy bean, coal, crude oil, processed oil, silk, unbleached silk, cotton, antimony ores, etc. These products again include a different number of HS lines and STEs that have a monopoly position in the export of these products. The most protected products are cotton yarn from the aspect of the number of HS lines as well as STEs. In 2015, STEs exported rice, maize, cotton, coal, crude oil, processed oil, tungsten ore and products, antimony ore and products, silver, tobacco, tea and silk (WTO, 2016). It was found out that STEs exported tobacco in 2015, although it did not correspond with the list of products included in Annex 2A2 of the Protocol of Accession. On the other hand, STEs did not export other products from the approved list, such as unbleached silk, cotton yarn, woven fabrics of cotton, antimony oxide and antimony products. Trade with another 245 products that were introduced in Annex 2B of the Protocol of Accession, such as natural rubber, timber, plywood, wool, acrylic and steel, was liberalised within 3 years after China's accession to the WTO according to the results of the WTO negotiations.

5.2. Price Controls

Price controls represent another type of state regulation in China. China agreed in the WTO that the prices for traded goods and services in every sector would be determined by the market forces and the dual pricing for such goods and services would be eliminated, but some goods and services may be subject to price control all the time. Price regulation is carried out on different levels of state administrative, i.e. via the NDRC at the central level, and the provincial level DRCs and the Bureau of Commodity Pricing in each province. The Chinese authorities publish in an official journal a list of goods and services subject to state pricing and changes thereto, together with price-setting mechanisms and policies. However, a Central Government Pricing Catalogue or Local Government Pricing Catalogues are published only in Chinese.

Annex 4 of the Protocol of Accession includes a list of products and services, in which tobacco, edible salt, natural gas and pharmaceuticals are the products subject to *government pricing.* Public utilities (such as the supply of gas, electricity, heating power, water) and some service sectors, such as postal and telecommunication services charges, entrance fees for tour sites and educational services charges are also subject to government pricing (WTO, 2001a). Another list of products, such as grain, vegetable oil, processed oil, fertilizer, silkworm cocoons or cotton are subject to *government-guided*

pricing. Some services sectors (transport services, professional services charges, health related services, etc.) are also subject to government guidance pricing. A difference between both types of state prices is that the government prices (or government-determined prices) are fixed prices set by the authorities, while the government-guided prices are prices set within a range.

In order to implement the WTO commitments, China enacted the Price Law. Article 18 of the Price Law of 2014 states in which products and services the government may enforce state influence through the price mechanism. Guided prices or government-set prices can be imposed according to the Price Law on products that are important for the development of the national economy and people's life, which are rare or are a natural monopoly, or are considered key public utilities or public services (The State Council, 2014). In 2015, on the central level, *government set prices* were applied to common salt**,** water supply by conservancy projects, commercial bank services, charges for authenticating academic degree certificates and citizens' identity, important postal business charges, special medicines and blood. *Government-guided prices* were applied to refined oil products, natural gas, railway transportation prices, monopolistic port service fees and passenger fee rates of civil air. The prices of military goods and the price of tobacco leaves were liberalised, although these products are state monopoly all the time. Important central reserve materials, i.e. grain, cotton, sugar, filature silk, crude and processed oil, and chemicals were removed from the 2016 Catalogue (WTO, 2016)**.**

5.3. State-owned Enterprises

A huge discussion is led about *state-owned enterprises (SOEs).* Although SOEs are not mentioned in the Protocol of Accession, in the Report of the Working Party the Chinese representatives stated that the state-owned enterprises basically operated in accordance with the rules of the market economy (Section 5.43 of the Report of the Working Party) and the Chinese government would not influence, directly or indirectly, commercial decisions on the part of SOEs (Section 5.46 of the Report of the Working Party).

There are currently three types of SOEs in China, such as: (1) state-owned enterprises (pure SOEs) with 100% state ownership, (2) state-controlled enterprises with state controlled ownership and (3) state-invested enterprises, in which the state owns some of the shares of the company. The definition of SOEs and their organisation structure is introduced in Section 4 of China's Company Law, revised in 2013, Article 64–70 (FDI, 2013). This division of SOEs is often the cause of different data about their number published by Chinese or other bureaus. For example, the OECD (2015) recorded that at the end of 2011, there were 144,700 state-owned and state-holding enterprises in China, excluding financial enterprises with the total assets of RMB 85.4 trillion, an equity value of RMB 29.2 trillion, and profits of RMB 2.6 trillion. According to the WTO, state-owned holding enterprises listed on the Shangai and Shenzen Stock Exchanges were 1,012 in May 2015. This accounted for more than 68% of the total equity of all the companies listed in these two stock exchanges (WTO 2016). The central government controls them through the State-Owned Assets Supervision and Administration Commission of the ruling State Council (SASAC). SOEs currently dominate in sectors of strategic importance, i.e. energy, utilities, transport, financial, telecom, education, and health care services. For example, the share of SOEs in strategic subsectors such as communication and aviation services is estimated at 80%–90%. The largest SOEs also occur on the Fortune Global 500 list. In 2016, a total of 110 Chinese companies were on this list, rising from 106 in

the previous year. Some basic indicators about China's three largest SOEs that were among the top 4 on the 2016 Fortune Global 500 list are introduced in Table 1.

Table 1: Selected indicators of China's Largest SOEs in 2016

	Revenues (mill. USD)	Profits (mill. USD)	Employees
State Grid	329,601	10,201	927,839
China National Petroleum	299,271	7,091	1,589,508
Sinopec Group	294,344	3,595	810,538

Source: Fortune, 2016

Except for strategic sectors, the share of the output produced by China's SOEs in the industrial sector gradually declined from 26.6% in 1998 to 22.3% in 2014. So did the number of state-holding industrial enterprises in China decline from 53,489 in 2000 to 19,273 in 2015, although their assets and profits increased 4.7 times according to data published by the Chinese authorities (see Table 2). However, some authors state that the profitability of state companies has fallen, even as private firms have grown in strength. SOEs returns are now about half those of their non-state peers (The Economist, 2014). The profit of SOEs is influenced more by their monopolistic market position accompanied by state support, easier access to loans and more favourable policies than their efficiency. For this reason, they are also called the "zombie corporations".

Table 2: Indicators of State-holding Industrial Enterprises in 2000–2015

	2000	2005	2010	2015
Number of SOEs (in units)	53,489	27,477	20,253	19,273
Total assets (in 100 mill. RMB)	84,014.94	117,629.61	247,759.86	397,403.65
Total profits (in 100 mill. RMB)	2,408.33	6,519.75	14,737.65	11,416.72

Source: National Bureau of Statistics of China, 2016

SOEs have anti-competitive effects and thus also impede other WTO Members. Because the activities of China's SOEs are usually connected with unfair trade practices, such as subsidies or dumping, they are often the source of trade disputes in the WTO. Although China is committed to eliminate all subsidies that are defined in Article 3 of the Agreement on Subsidies and Countervailing Measures (see Section 10.3 of the Protocol of Accession), subsidising the loss-making SOEs is documented by statistics. In 2014, 2,473 companies listed in the Shanghai and the Shenzhen Stock Exchanges received government support amounting to RMB 89.421 billion. Of these companies, 154 received more than RMB 100 million in 2014; 105 of which were SOEs (WTO, 2016). However, the Chinese government is aware of the inefficiency of SOEs and therefore in November 2013 (over the 13th FYP) announced the SOEs Reform Plan aimed at higher ownership diversification of SOEs. The plan content defines the role of the state and market. The private sector should be a vehicle for achieving policy objectives, while SOEs should become more profit-oriented and shift to mixed ownership. In 2014, China's State Council listed 80 projects in state-dominated sectors to private investors by 2020, including transportation infrastructure, clean energy and energy projects. At the provincial level, by September 2014, over 20 provinces, had announced concrete implementation pro-

grams involving the potential listing or selling off assets in up to 70% of the provincial SOEs by 2017 (Dusek, Huang, Zhu, 2015).

6. Discussion and Conclusions

In this paper, only three ways were explored how the Chinese central government and local governments disrupt the market environment, although many other state interventions occur in the area of tariff as well as non-tariff measures. They also occur in commercial services, including the financial system (Fojtíková, Kovářová, 2014). Because China has been the WTO Member since 2001, there is a question whether the role of the Chinese state in its mix economy (explored through state trading, price controls and state-owned enterprises) is in compliance with the WTO commitments.

The analyses that were carried out in the mentioned areas confirmed that the behaviour of the Chinese authorities after 15 years since its entrance into the WTO is in principle in compliance with the official documents, such as the Protocol of Accession and the Working Party, although some small discrepancies from the trade commitments were discovered. The exceptions from the multilateral trading rules concerning STEs and price controls, introduced in the Annexes of the Protocol of Accession, were accepted for China by all WTO Members. On the other hand, China committed to non-discrimination treatment, including national treatment (Section 3 of the Protocol of Accession). From this point of view, the activities of STEs and SOEs should have the same impact on the private domestic as well as foreign enterprises. In principle, a negative impact of the different forms of state monopoly on private entities is evident; it limits them in the export or import of products that are protected by the Chinese state. The important fact is that SOEs also occur in other WTO states, including the most advanced ones, not only in China. However, Büge et al. (2013) analysed the share of SOEs in sales, assets and market value in selected countries and found out that the share of SOEs among the countries' top ten firms reached, for example, 11% in Germany, 48% in Norway, 59% in India, 81% in Russia, but the largest share was in China, i.e. 96%. As Lardy (2014) states, state firms do not dominate China's economy, but they are still a substantial drag on its growth. Although the Chinese government started to reform its SOEs, the main motivation for it is to improve the efficiency of SOEs rather than to open China to the world competition. The reform of SOEs, which was released by the Communist Party of China Central Committee and the State Council that prefer mixed-ownership of SOEs in China, confirms it. In addition, opening some sensitive sectors of economy to foreign investors can be forbidden or followed by other non-tariff obstacles, such as a licence system. The important point is the fact that SOEs adopt the government financial supports, although the Chinese authorities promised that all SOEs and state-invested enterprises would make purchases and sales based solely on commercial consideration and that the government would not influence, directly or indirectly, commercial decisions (Section 5.46 of the Report of Working Party). It is also the reason why China is a frequent participant of trade disputes in the WTO.

The transparency of price controls is also debatable. Although information about state pricing is regularly published in the Pricing Catalogues by the Chinese authorities in compliance with China's commitments, the text is available only in Chinese. It can be a problem for many traders from other WTO countries, who have to hire translators and to pay additional costs in order to get topical information about the Chinese state pricing. From this point of view, the transparency of the Chinese economy is lower. Howev-

er, the contractual conditions in the WTO were not determined in a way in which China shall have to provide state pricing in one of the official languages of the WTO, i.e. English, French or Spanish. From this aspect, the transformation to a mix economy is more determined by the Chinese state than its trade commitments in the WTO.

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Perception of Corporate Social Responsibility of South Moravian Region by Enterprises

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Abstract

The paper deals with corporate social responsibility (CSR) in public administration – South Moravia Region, Czech Republic. This office deals with CSR and reports its activities. Nevertheless, many citizens and enterprises aren´t aware of this effort. This article pays attention to enterprises and their knowledge about CSR activities of South Moravia Region. The conclusions are based on primary research implemented in the form of a questionnaire. 384 respondents – enterprises from South Moravian Region – participated in this research. The main conclusion states poor awareness of South Moravian region CSR activities among general public and their insufficient communication by the office.

Keywords: corporate social responsibility, public administration, South Moravian Region

JEL Code: M14, M31, M38

1. Introduction

The notion of responsibility is as old as the mankind. It is a broad term including both legal and moral or ethic aspects. Man needs to realize that nobody is born responsible and all people must be brought up to responsibility. That is the whole society and all its educational levels should act on the individual when he/she enters various communities in the individual stages of his/her life, whether it is the family, the school, the place of residence, the urban area he/she lives in, sport, business or employment in private or public sphere, for him/her to become responsible. At present this issue has been intensely studied for example by Formánková & Kučerová (2016).

Since the end of the past millennium emphasis has been laid on development of social responsibility. The concept of social responsibility thus represents, according to certain theories, an important feature of the new economy. These theories bring forward the opinion according to which not only governments but also businesses should bear

their portion of responsibility for environment protection, rational use of non-renewable resources, social wellbeing and sustainable progress (Kunz, Kašparová, 2013). Clearly social responsibility is mostly still perceived as a concept to be applied above all in the commercial area. Practical efforts, however, point to the conclusion that not only the commercial sphere but also NGOs and state administrative and self-governing unit authorities should take interest in social responsibility and become involved for they too are responsible for impact of their activities on the society.

This also follows from the definition and characteristics of public administration as such. Definition and characteristics of Czech public administration has been dealt with for example by Brůna (2006) and development of Czech public administration has been analyzed for example by Pomahač & Vidláková (2002). The first regional council and public administrative body obtaining a CSR management certificate after a successful CSR audit was the Regional Council of South Moravia Region in 2013. This award followed after long-term efforts of the Regional Council to behave responsibly towards its surroundings and documents compliance with the requirements of the National Program for Correct Setting and Application of Principles of Corporate Social Responsibility in Everyday Practice of Regional Council and became a commitment for continuous improvement in this area.

2. Methodology and Data

The purpose of this article is to find out about awareness of current CSR activities of Court Moravia Region in the business sector. To achieve the specified objective it is necessary to define social responsibility. Corporate social responsibility (hereinafter just "CSR") currently involves a mutually interconnected set of activities and processes that are an integral part of corporate governance in the area of social, environmental and economic activity and are performed by the organization voluntarily in excess of its regulatory obligations with the motivation to contribute to improvement of social l conditions (National Action Plan 2014). According to Kunz CSR is a concept of contemporary business enterprising, understanding it in a wider context and based on three pillars (the triple-bottom-line, Kunz, 2012). The pillars are:

- Economic (Profit),
- Social (People),
- Environmental (Planet).

For the purpose of quantitative research and analysis of awareness of current activities of South Moravia Region in the area of CSR among organisations an empirical study was used based on questionnaire technique. Organisations seated in South Moravia Region were addressed. They were selected from Amadeus database according to their registered seat. The research study period was between November 2015 and March 2016. The questionnaire included 28 questions.

2.1. Characteristics of Respondent Sample

The research involved 384 respondents representing companies seated in South Moravia Region. The respondents were classified on the basis of the following criteria: number of employees, field of company activity and size of municipality where the company registered seat was situated.

    Classification based on staff numbers was performed with the help of an auxiliary material used for specification of business size for the purpose of applications for subsidised from the European Structural and Investment Funds. According to that material the businesses are divided on the basis of their numbers of employees to:

- 1–10 (micro enterprise),
- 11–50 (small enterprise),
- 51–250 (medium-sized enterprise),
- 251 and more (large enterprise).

    The results show that the research involved representatives of enterprises of all sizes distributed equally across the enterprise size scale. The lowest number of respondents came from large enterprises. This result can be explained by the small number of large enterprises in the economy.

    Classification by field of business activity was based on the classification by the Czech Statistical Office. Municipality size classification was based on five categories, with the population category "300,001 and more" only represented by a single municipality, the city of Brno. The city of Brno, the second largest city of the country and the centre of the region, provided the highest number of respondents. This result is also expectable for Brno is the seat of many local as well as foreign companies. For the purpose of the subsequent statistical analysis the population categories "20,001–100,000" and "100,001–300,000" were merged to one.

    On the basis of consultations with Regional Council representatives areas of research were specified and subject to statistical analysis by the Pearson chi-square independence test.

Table 1: Contingency table

$X \backslash Y$	Y_1	Y_2	...	Y_j	...	Y_s	Σ_j
X_1	n_{11}	n_{12}	...	n_{1j}	...	n_{1s}	$n_{1.}$
X_2	n_{21}	n_{22}	...	n_{2j}	...	n_{2s}	$n_{12.}$
$\vdots$	$\vdots$	$\vdots$		$\vdots$		$\vdots$	$\vdots$
X_i	n_{i1}	n_{i2}	...	N_{ij}	...	n_s	$n_{i.}$
$\vdots$	$\vdots$	$\vdots$		$\vdots$		$\vdots$	$\vdots$
X_r	n_{r1}	n_{r2}	...	N_{rj}	...	n_{rs}	$n_{r.}$
Σ_i	$n_{.1}$	$n_{.2}$	...	$n_{.j}$	...	$n_{.s}$	N

Source: In-house pursuant to Hindls, 2002

Hindls: " *The test used for verification of independence in the combination table compares obtained (empirical, observed) frequencies with theoretical frequencies expected in the case of independence. These theoretical frequencies are identified as n´ij and for i=1,2…, r and j=1,2…., the following applies:*

$$n'_{ij} = \frac{n_{i.} n_{j.}}{n}$$

The test criterion quantity is

$$G = \sum_{i=1}^{r} \sum_{j=1}^{s} \frac{(n_{ij} - n'_{ij})^2}{n'_{ij}}$$

(1)

which in the case of independence and a sufficiently high number of distributions includes v = (r – 1)(s – 1) stages of freedom. The same applies to the minimum population of all fields of the table as was said after population of the groups using the chi-square test of good congruence. If the text criterion value exceeds the critical limit, which is a fractile of chi-square distribution with v = (r – 1)(s – 1) stages of freedom, then on the selected significance level you reject hypothesis H0 on independence and consider dependence of the two qualitative features as proven." (Hindls, 2002).

The comparative analysis and evaluation of the questionnaire refers to and is based on found data on the respondents (their own relationship to and application of CSR) found by previous inquiries.

3. Results

3.1. Perception of CSR Concept in Relation to South Moravia Region

Our research first inquired whether the companies were aware of CSR in connection with South Moravia Region:
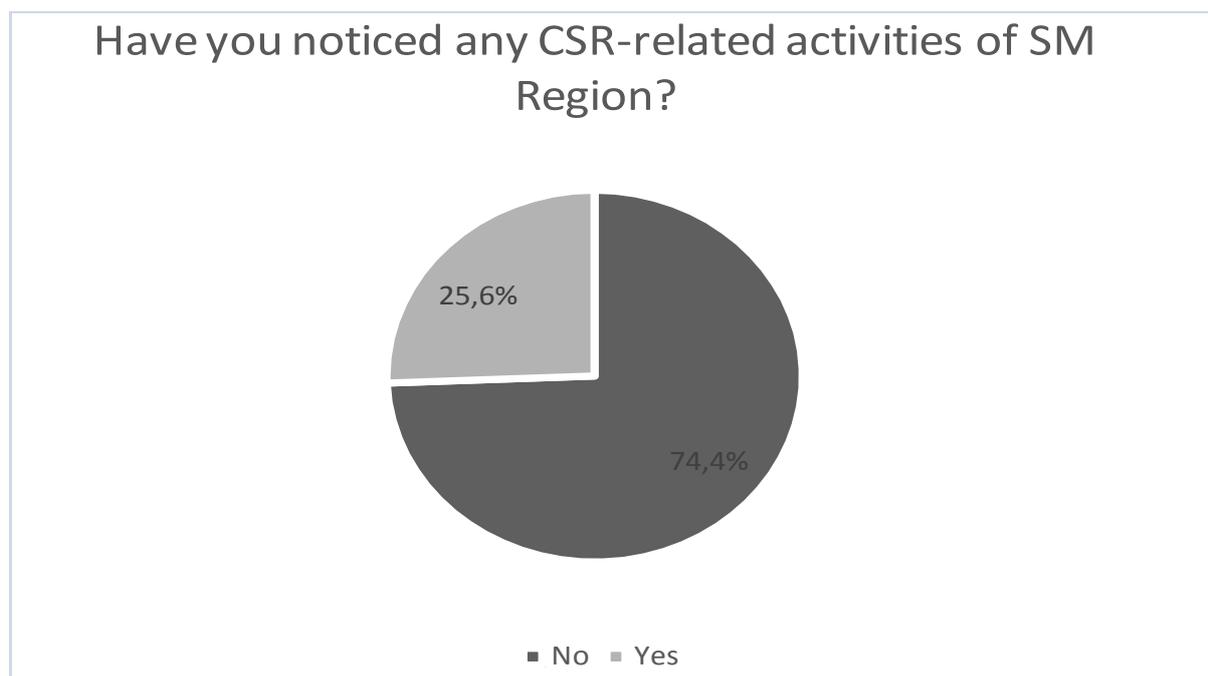
Figure 1: Have you noticed any CSR-related activities of SM Region?
Source: In-house research

Overall, only one fourth of the respondents realized any connected between corporate social responsibility and the South Moravia Region. When you compare the number of companies knowledgeable of the term CSR (241) with the number of companies connecting CSR to activities of South Moravia Region (88) you can conclude that only 36% of respondents who have ever heard of CSR were aware of CSR activities of the Region.

This gap points to insufficient communication of CSR activities of the region and a big area for future improvement.

The result of inquiry about particular CSR activities of South Moravia Region was similar to the result of general awareness of CSR activities of the region. Although the region of South Moravia organises and funds a lot of CSR activities, most respondents were not aware of them, or were unable to classify them as CSR activities or CSR activities connected with South Moravia Region. Only 26% of the respondents reported noticing some activities of the region related to CSR. The fact that businesses are aware of activities of the region but are unable to classify them as socially responsible activities of the region follows from answers to the question:

"Say whether you connect the following events/themes with South Moravia Region". The respondents chose their answers from 11 themes of regional CSR activities with practical examples of the activities and were asked whether they were aware of those activities. The mean score of knowledge and awareness of the activities was 36%. When comparing this value and the value of general awareness of CSR activities of the region you find a difference of 10 percentage points. The lowest was the number of respondents knowledgeable of the area of regional activity "CSR in general" (Prize of Governor of SM Region for CSR, conference "Corporate Social Responsibility in All Areas of Human Activity" etc.), where the percentage of awareness was mere 15%. The highest number of positive responses was obtained for the area of family policy where the awareness reached 75%. This result can be explained by the fact that the respondents met with these activities in their private life.

Another area of research concerned the source of information about CSR activities of South Moravia Region. The main source of information reported by more than one quarter of all respondents was the Internet, without the SM Region portal, which was subject of a separate answer. Another important source of information about CSR activities of the region was the press mentioned by nearly another quarter of the respondents.

Another question concerned the level of information of the respondents and their potential interest in obtaining more information about CSR activities of South Moravia Region.

Do you believe you are sufficiently informed about CSR activities of your region?

- 15,7%
- 40,3%
- 44,0%

■ Yes ■ No, not interested ■ No, but I would like to be better informed
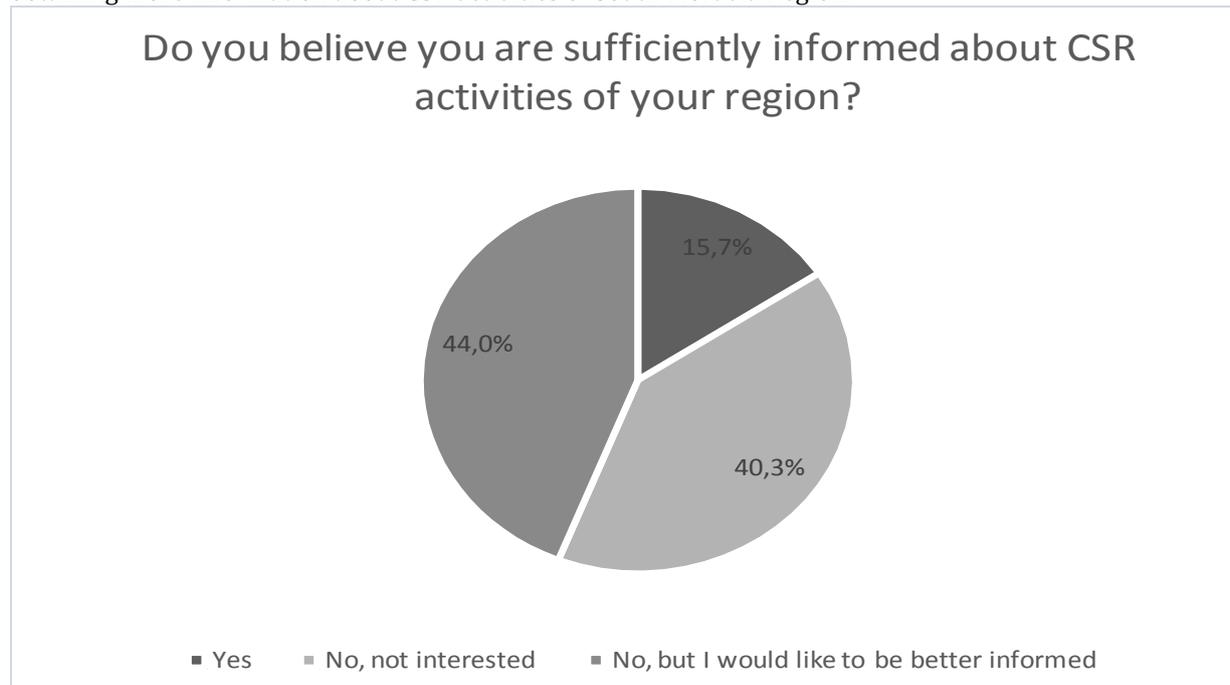
Figure 2: Do you believe you are sufficiently informed about CSR activities of your region?
Source: In-house research

The answers suggest a relatively low level of awareness of CSR activities of the region, already found out by earlier research. An important fact was however the level of interest in obtaining more information, mentioned in nearly one half of the answers. Statistical research further tried to find out in which municipalities, by size, the interest in more information was higher and whether the municipality size affected the level of the interest.

Table 2: Statistical analysis of answers

What is the population of the municipality you are seated in?	Do you believe you are sufficiently informed about CSR activities of your region? No, but I would like to be informed better.	Do you believe you are sufficiently informed about CSR activities of your region? No and I am not interested.	Do you believe you are sufficiently informed about CSR activities of your region? Yes.	Line totals
1 - 3 000	21	26	15	62
3 001 - 20 000	31	35	10	76
20 001 - 300 000	21	18	11	50
300 001 and more	95	75	24	194
All groups	168	154	60	382

Source: In-house research

Table 3: Statistical analysis of answers – expected frequencies

Summary table: expected frequencies			
Frequency of checked fields > 10			
Pearson chi-square: 9.57536, sv = 6, p = 0.143711			

What is the population of the municipality you are seated in?	Do you believe you are sufficiently informed about CSR activities of your region? No, but I would like to be informed better.	Do you believe you are sufficiently informed about CSR activities of your region? No and I am not interested.	Do you believe you are sufficiently informed about CSR activities of your region? Yes	Line totals
1 – 3 000	27.3	25.0	9.7	62
3 001 – 20 000	33.4	30.6	11.9	76
20 001 – 300 000	22.0	20.2	7.9	50
300 001 and more	85.3	78.2	30.5	194
All groups	168.0	154.0	60.0	382

Source: In-house research

If information of businesses about CSR activities of South Moravia Region was dependent on the size of the municipality where the business had its seat then the difference between the actual and the expected frequencies would be statistically significant. The result shows that the dependence of the actual and the expected frequencies was not statistically significant. Therefore mutual independence of the tested quantities may be assumed.

If you formulate hypothesis H0 as mutual independence of awareness of businesses about CSR activities of the region and the size of the municipality of the registered seat of the business and hypothesis H1 as mutual dependence of these two variables then hypothesis H1 must be rejected on the significance level of 5% for:

$$p = 0.143711 > 0.05$$

Dependence of these two variables was not proved. It may therefore be assumed that the impact of publicity and information tools on regional businesses is similar in different size municipalities.

3.2.   Outlook and Expectations of Businesses in Connection with CSR of South Moravia Region

This group of questions was focused on options of improvement of communication and CSR Activities of South Moravia Region towards businesses. The inquiry focused on the most appropriate communication channels between the SM Region and its businesses. More than one half of the respondents expressed preference for on line communication and information transfer. Rather surprising was the mere 10% preference of printed materials in relation to the current nearly 25% awareness of businesses about CSR activities of the region from the press. Hence although the respondents learn about CSR activities of the region from the press they would rather prefer on line communication. Another important aspect of communication is the periodicity of information provision. Communication should not be non-proportionally frequent in order not to discourage the subjects of interest but on the other hand should not be sporadic either to keep continuity of communication. The most preferred frequencies reported by the respondents were monthly (39%) and biannually (26%), with missing quarterly frequency preference, although quarterly was mentioned in the verbal formulations several times. Therefore quarterly frequency may be expected most acceptable for businesses. A good instrument of the communication would be a newsletter, mentioned in the answers of 37% of the respondents out of the total 57% of the respondents expressing an opinion on this theme.

The respondents further commented on activities they would like to see as regional support of the CSR concept. In addition to the already mentioned newsletter the businesses expressed the greatest interest in joint projects for public benefit. Nearly half of the respondents expressed their interest in them. The greatest number of positive responses in this area was provided by representatives of small enterprises where interest in the joint projects was expressed by more than half of the respondents. Further questions concerned interest in potential meetings with other organisations over CSR themes.

Nearly three quarters of the respondents were not interested in such meetings. On the other hand 27% of the respondents, representing 104 answers, would welcome some form of meetings over CSR themes. The region should focus on these and provide them with space or a platform for meetings.

As for the themes for the discussions most respondents were interested in environment protection and responsible management. The question is why more than half of the respondents were not interested in cooperation with local community.

The last group of questions dealt with the Prize of the Governor of SM Region for CSR. South Moravia Region has held this competition since 2015. The purpose of our

research in this area was to find out the level of awareness of the competition among South Moravian enterprises. As the year of our inquiry was the first year of the competition low awareness was expected.

Hypothesis H0 was defined as awareness of the SM Region Governor´s Prize for CSR not depending on the size of the municipality where the business is seated and hypothesis H1 was defined as awareness of the SM Region Governor´s Prize for CSR that does depend on the size of the municipality where the business is seated. Hypothesis H1 was rejected on the significance level of 5% for the reason of:

$$p = 0.051741 > 0.05$$

The result of the Pearson chi-square test was rather tight, for if 10% significance level was selected then the dependence between the variable would already become statistically significant. On the level of 5% significance no statistically significant dependence was proven, though.

4. Discussion and Conclusions

The research revealed quite interesting results. South Moravian Region currently organises a lot of activities underlining the CSR concept and so a new activity type would be hard to find. The problem, however, is in communication of these activities to the stakeholders, businesses in this case. The results of our research pointed to insufficient awareness of these activities caused just in some cases by lack of interest on the part of the private sector. CSR activities are not often connected with South Moravia Region as the organizer, but rather seen as organised for example by the city of Brno. Recommendations following from the results of the inquiry are that more attention would be deserved by support for joint projects for public benefit of the public and the private sector, support for regional businesses in contract awards or support for financial literacy of the population.

Very interesting are answers to the question whether the respondent would find relevant experience exchange with other organisations. The lowest number of answers related to development of relationships with the local community, with more than half of the respondents not answering this question at all. This is strange for overall standard of the society is reflected by the very local communities and their relations.

We may conclude that the concept of corporate social responsibility represents an instruction for organisations about how to achieve higher than only economic success and objective fulfilment. Our research was based on our own finding that businesses were relatively well aware of the CSR concept – 62% of the respondents knew the CSR concept, of which 30% were not sure whether they applied it in their own company. This is caused by only marginal knowledge of the concept, when the businesses know what CSR is but are not sure which activities of those they implement might be classified as CSR activities. This depends on the business size, though. For example Skýpalová et al. (2016), focusing her research on SMEs across the Czech Republic, found that only 30% of micro and small enterprises in CR knew and used the CSR concept in its complexity, engaging in all the three CSR pillars. About 30% of them were only engage in one, mostly the economic pillar. 30% of them did not apply the CSR concept in their own activities at all. A similar type of research was also implemented by Kuchtíková (2011), who was interested in the current status of CSR activities in seven enterprises seated in Brno and

surroundings. Her research focused on: general CSR awareness, company relations to their employees, philanthropy, quality orientation and approach to the environment. Kuchtíková´s research showed that the studied companies implemented large numbers of CSR activities, which, however, were fragmented and were not incorporated in strategic management of CSR and were not viewed in their complexity. Kuchtíková reported different results in the area of the level of overall awareness of the companies about the CSR concept. Her research showed that only one of the seven inquired businesses net with the term CSR for the first time. Statistically taken, only 14% of the businesses did not know the CSR concept. On the other hand the research performed by us found 37% lack of knowledge of CSR among businesses. The reason may be the selection of the companies enrolled in Kuchtíková´s research, the small representative sample, or the content of the questionnaire. Another similar research, again focused on the business sector, was the inquiry by Srpová, Kunz and Mísař entitled "Application of CSR Principles in Businesses in the Czech Republic" (Srpová, Kunz, Mísař, 2012). The research asked how CSR principles reflected in everyday corporate practice in CR. Most respondents (97%) saw their activities as CSR activities. On the other hand in the research focused on South Moravia Region businesses only 51% of the respondents confirmed application of CSR principles in their corporate practice. The difference probably follows from general lack of knowledge of the theme..

Generally the awareness of CSR activities in the Czech Republic as well as abroad shows a growing trend. A good example may be the research of Ubrežiová (2013) in Slovakia. The research has shown that majority of respondents are familiar or has at least heard of term CSR which clearly indicate its increasing popularity and importance. This fact encourages the assumption of increasing awareness of corporate social responsibility and probable spread of the concept across the business sector. This public administration cannot lag behind and must continue its activities and correctly communicate them to its citizens and businesses.

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Exchange rate risk and price of government bonds: A test of international arbitrage pricing theory

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Abstract

Currently interest rates are very low in the economies. In these economies are issued bonds with low yield or negative yield. In this paper, I empirically investigate what factors affect price of bonds and why investors buy investment without yield. I follow the international arbitrage pricing theory to determine relationship between factors and price of bonds. Data are monthly of government bonds in the period 2010-2015. Exchange risk influence prices of bonds. Currency movements can bring next yield for investors.

Keywords: Bonds, Exchange Rate, Asset Pricing, Risk Premium

JEL Code: G12

1. Introduction

The aim of my research is to investigate the impact of movements exchange rate on movements price of bonds. My study builds on the Asset-Pricing literature, my goal is to investigate factors affecting the price of bonds.

Following the seminal paper by Elton (2004), the question of what factors affects prices of bonds. He defined five factors: default risk, liquidity, different tax treatment, different recovery rate and maturity of bonds. There are several characteristics of bonds within a rating class into groups. Huang and Kong (2002) used default rates, the risk free interest rate, return and volatility of equity market, liquidity indicators from bond, and state of economy.

Huang and Kong (2002) used model price of corporate bonds. They apply empirical model for pricing corporate bonds. The authors used Fama-French high-minus-low factor in the equity market moreover. The high-yield bonds are more closely related with the interest rate and equity market factors. Brennan (2001) apply intertemporal asset pricing and the Fama-French portfolio. The Fama-French model have found to be associated with the HML and SMB portfolio returns. The Fama-French portfolio do predict the

real interest rate and the Sharpe ratio. The investors diversify their portfolio across international markets. The exchange rate risks affect returns of international investments (Sirr, 2011, Liu, 2012, Panda, 2013).

Solnik (1983) applied the international arbitrage pricing theory as first. The form of the international arbitrage pricing theory model is unchanged by investors with different home currencies, risk premiums very depending on the investor's home currency. Amstrong (2011) disentangle in underlying asset values and currency values. There are used cross-sectional regression analysis indicate that currency movement effects on market beta are priced in U.S. stocks. Huang and Kong (2002) determined risk of investment to bonds for investors: default loss, credit risk premium, liquidity and tax premium. The extra yield offered to compensate investors for the risks. Arbitrage pricing theory was applied for various commodities and markets (Malhotra, 2010, Middleton, 2001, Geambasu, 2014, Cho, 1986)

I apply this universal return decomposition to Solnick's international arbitrage pricing theory. In this paper, I seek proposition that currency movements affect systematic risk factors themselves in addition to residual exchange rate risk.

The rest of the article is structured as follows. Section 2 discusses the data. Section 3 presents the methodology used to measure factors affecting price of bonds. Section 4 displays the findings, and section 5 concludes.

2. Data

The bond data is extracted from database of company Thomson Reuters. This database contains monthly price and coupon of government bonds. I exclude some of the 68 countries because there are issued government bonds. They were selected several independent variables.

The monthly treasury bill rate is used as risk-free rate. The interest rate is represented by monthly government bond yield for long term fixed as percent per annum. The inflation is defined as producer price index. The exchange rate is determined as national currency per SDR index. The basket of currencies determines the value of the SDR consists of the U.S. dollar, euro, the Chinese renminbi, Japanese yen and pound sterling. The coupon is payments of bond for year. The macroeconomic data are from database of International Monetary Fund.

My monthly panel dataset covers the period from 2010 to 2015. Taking all the restrictions of the different data sources into account I end up with the dataset that contains over 3 312 observations for 46 countries available for the estimations. The descriptive statistics of the main variables as well as their correlations are displayed in Table 1 and Table 2.

3. Methodology

I use multifactor linear regress model for defining relationship between volatility of factors and movement of price bonds. I estimate time-series international arbitrage pricing theory regression models.

The 1st step is calculated return of government bonds. We write the log of the gross rate of return on the i-th asset in period t as:

(1)
$$R_{it} = ln\left(\frac{P_t}{P_{t-1}}\right),$$

where P is the price, and t is the period.

The 2nd step is applied the international arbitrage pricing theory. The arbitrage pricing theory is multivariate linear regression. This theory is specified an m-factor model of random returns arbitrarily over periods of time as:

(2)
$$R_{it} = E(R_{it}) + b_{1i}\delta_{1i} + \cdots + b_{im}\delta_{im} + \varepsilon_{it},$$

where $E(R_{it})$ is the expected return on the i-th asset in period t, δ_{mt} is the m-th zero mean common factor capturing systematic risk, b_{im} is the sensitivity of the ith asset to factor m, and ε_{it} is the random idiosyncratic error term.

The 3rd step is the definition of the following model which helps to understand the basic relationship among variables. Author can accomplish the following regression:

(3)
$$R_{it}^j - R_{ft}^j = \alpha_{it}^j + b_0(R_{mt}^j - R_{ft}^j) + b_1 X_{0t}^j + \varepsilon_{it},$$

where $(R_{it}^j - R_{ft}^j)$ is the return in excess of risk free rate of return, α_{it}^j is pricing error, b_0 is coefficients correspond to the universal component of factor loadings, b_1 coefficient capture the exchange risk component of factor loadings arising from home currency, $(R_{mt}^j - R_{ft}^j)$ is the excess market return factor, and X_{0t}^j is the scaled excess market return using the currency return instrument containing time t information.

In the estimation of (3) are compared the regress analysis for OLS, fixed effects model and random model. These regressions are used particularly for developing and emerging countries.

4. Results

This section presents the results for the impact of factors on prices of government bonds. Table 1 reports the indicated summary statics for monthly variables. Each variable includes 72 monthly observations from January 2010 to December 2015.

Table 1: Descriptive statistics for the main variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Price bond	3,007	122.8850	122.7423	42.3100	1,083.2850
Risk free rate	2,066	3.7830	4.3259	−1.2700	23.1375
Bond yield	2,297	4.3343	3.3228	−0.3100	18.0900
Inflation	2,235	107.3412	7.9885	80.2966	147.0110
National currency per SDR	1,648	738.4821	3,259.3740	0.8948	20,574.6200
Coupon of bond	2,808	4.1503	3.8119	0.0000	14.2000
Excess market return, or $R_m - R_f$	1,592	1.3454	2.8784	−13.1000	11.5188
Excess return of bonds, or $R_j - R_f$	1,853	−3.3323	4.0698	−21.1912	1.2741

Table 2 reports the correlation between variables. The strong correlation has occurred between bond yield and coupon of bond. The coupon of bond eliminated from the regression analysis.

Table 2: Correlation matrix for main variables

Variable	Price bond	Risk free rate	Bond yield	Inflation	National currency per SDR	Coupon of bond
Price bond	1					
Risk free rate	0.3147	1				
Bond yield	−0.4993	0.6851	1			
Inflation	−0.2751	0.4423	0.2878	1		
National currency per SDR	−0.0493	0.2873	0.3441	0.2974	1	
Coupon of bond	−0.2602	0.6268	0.8514	0.3077	0.5084	1

Table 3, Table 4 and Table 5 set out the main results. Time-series regression results for the international arbitrage pricing theory are presented the results for OLS method, fixed effects and random effects. It provided regress analysis for all countries in the dataset. Time-series regression results for OLS method are show in Table 3. The inflation was included in the regression because of its significance. In emerging markets and developing countries are more significant yield of bond than exchange rate risk. These results obtained OLS method can inaccurate because there is unobserved heterogeneity.

Table 3: Main estimation results for OLS

Variable	All countries	Emerging markets	Developing countries
Cons	8.9280***	−9.0654***	6.5827***
	(1.0848)	(1.9158)	(0.7886)
National currency per SDR	−0.0072***	−0.0065***	0.0066***
	(−0.0005)	(0.0005)	(0.0008)
Bond yield, or $R_m - R_f$	0.7809***	0.8641	0.8396***
	(0.0192)	(0.0807)	(0.0125)
Inflation	−0.1055***	0.0522**	−0.08155***
	(0.0102)	(0.0180)	(0.0075)
R^2	0.8059	0.4481	0.9513
N	763	267	496

Time-series regression results for fixed effects are presented by Table 4. The inflation is excluded for emerging markets and developing countries due to not significant. The bond yield has the same effect for emerging and developing countries. The exchange rate risk affects in emerging markets more than developing countries. The bond yields affect the price of bond more than the exchange rate.

Table 4: Main estimation result for fixed effects

Variable	All countries	Emerging markets	Developing countries
Cons	−2.8075***	−8.7581***	−2.7431***
	(0.8112)	(0.3830)	(0.1761)
National currency per SDR	0.0383***	0.0433***	0.0166***
	(0.0026)	(0.0036)	(0.0040)
Bond yield, or $R_m − R_f$	0.7626***	0.7606***	0.7914***
	(0.0242)	(0.0837)	(0.0178)
Inflation	−0.0170**		
	(0.0078)		
R^2	0.6906	0.5224	0.7783
N	763	274	575

Time-series regression results for random effects are in Table 5. The inflation is not significant. The independent variables affect the price of bonds in emerging markets more than in developing countries. All variables are significant at the 5 percent level. There is a positive coefficient for the exchange rate risk and for bond yield too.

Table 5: Main estimation result for random effects

Variable	All countries	Emerging markets	Developing countries
Cons	−4.6513***	−6.8207***	−2.6415***
	(0.4687)	(0.7395)	(0.4163)
National currency per SDR	0.0269***	0.0275***	0.0115***
	(0.0023)	(0.0033)	(0.0034)
Bond yield, or $R_m − R_f$	0.7993	0.8175***	0.7935***
	(0.0206)	(0.0913)	(0.0177)
R^2	0.6831	0.5006	0.7777
N	849	274	575

It was used the panel regression analysis for time series. In this case, the best model is model with random effects. Taking this into account, we interpret our results as providing strong support for the positive relation between exchange rate and price of government bonds. The price of bond is influenced by bond yield positive too. The bond yield affect the price bond more than exchange rate. These factors have more influence in emerging markets than developing countries.

5. Concludes

In this study, I investigate the impact of factors on prices of bonds in countries that issued the government bonds. Results were obtained by a panel regression analysis of time series for the period from January 2010 to December 2015.

It was found some evidence that the exchange rate risk creation role of price of bond. Exchange rate risk is positively associated with price of bond. It is also show that exchange rate is not influence more than bond yield. Bond yield affect the price of bonds

positive too. Exchange rate and bond yields have more influence in emerging markets than developing countries.

My findings have two implications. First, they contribute to the literature on the Pricing Asset by displaying the influence of factors on prices of bonds. While several studies have looked at the determinants and measures of factors affecting prices of bond, my work is the first to bring out the impact the exchange rates on prices of bond across several countries. Second, my result provides more insights as to the impact of factors on prices of bond for several countries. As such, my result suggest that exchange rates contribute to prices of bonds.

In any case, to deepen our understanding of the relation between exchange rate and price of bonds. This topic needs to be further explored.

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Suggestion system in selected company

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Abstract

The main goal of this paper is to analyze the current system of suggestions in a big sized engineering company and propose some possibilities that would make it more effective. For this purpose, the internal documents were studied and interviews with the quality manager and employees were conducted.

The main shortcoming of the system is almost zero awareness about the suggestion system among the employees and management. Other shortcomings are the insufficient motivation of employees, low awareness about current events in the system of suggestions and the fact that it is taking too long to approve suggestion and to start its realization. There is also no education of employees in the area of suggestions.

To remove the first deficiency a training, that emphasizes the benefits of a well-functioning system of suggestions, is suggested. After the training should follow workshop that would teach employees and their managers to cooperate and allow them to experience the process of innovation in practice. Optimalization of reward system should be done to increase the motivation of employees to create suggestions. Author of suggestion should get a proportionally higher reward, which derives from the benefits of implementing his suggestion. As an additional element to motivate employees a yearly competition in individual innovations is suggested. Lack of information within the suggestion system can be easily solved by creating boards that will contain the necessary informations. To faster the evaluation process it is proposed to involve the evaluation of suggestions into the job descriptions of the relevant heads of the departments and it is also proposed to exclude the financial manager from the process of approval and evaluation of the suggestions if the amount of reward will not exceed 10 000 CZK. To increase employees skills needed for creating suggestions further trainings in this area are strongly advised.

These proposals will start the process of individual innovations within the company and therefore enhance its competitiveness.

Keywords: innovation, individual innovations, competitivnes, incremental innovations, suggestion system

JEL Code: O310, O320

1. Introduction

Competitiveness of the company more and more depends on how businesses can innovate. If the company wants to be in today's environment which is full of changes successful, then it is necessary to actively innovate. One of the ways to constantly innovate is through so-called incremental innovations. One of the main ways to use this type of innovations is by creating an effective system of employee suggestion system which would allow employees to invent innovations by themselves.

2. Literature review

Human resources management is one of the most important activities of managers. It focuses on everything that concerns the company employees. In most companies, it is personnel department which is responsible for it. In some larger enterprises it is a specialized division of human resources management, which is in charge of training and development, motivation etc. (Milkovich, 1997).

People and their knowledge, skills, and abilities can be the biggest competitive advantage of the company. It is important to ensure that the personnel of the organization is so unique and inimitable to actually be the biggest competitive advantage (Armstrong, 2009).

Enterprises need to be aware of the fact that successful human resources management is not just about hiring capable people but also about managing them in the right way, taking care of their development, motivating them etc. (Koubek, 2011).

Motivation is an inner process and it is not possible to cause it but only influence it. Each person is motivated by something else. Some may be motivated by the money, others by promotion or by their further development. A major influence on the performance of the employee has the attitude to his work. Human resources management can affect the attitude by a verbal appreciation of work effort, recognition of success, by creating and supporting creative working environment, by supporting teamwork etc. (Janišová, D., Křivánek, M., 2013).

Motivation should bring together the interests of employees and the company. It is not easy to motivate employees in a right way because it is difficult to recognize the individual needs of employees but it is a necessity. Managers must apply the basic principles of motivation, such as:

- create a positive and motivational environment – familiarize employees with corporate objectives, strategies, etc.,
- collectively communicate and agree on individual and team goals,
- assess performance regularly and give feedback etc. (Srpová, J., Řehoř, V. 2010).

Motivation and development of employees significantly contribute to the creation of suggestions for improvements. Imai (1991) is proposing that careful attention should be paid to the ability of top management to listen and to encourage employees to come up with creative suggestions. The main theme of these suggestions is mostly:

- improvement of employee's own working process,
- savings of energy, materials and other resources,
- improvement of working environment,

- improvement of machines and processes,
- improvement of aids and tools,
- improvement of quality of products or services,
- ideas for new products or services etc.

Kaizen focuses on individuals and it is often considered as an instrument to increase staff morale and quality of products and services. According to Imai (2012) management doesn't always need to insist on the immediate economic effect of suggested improvement. Attention, encouragement and recognition of the leadership is the key to making the employees become "thinking employees" which are constantly thinking about the ways they could do their job better.

The foundation stone of KAIZEN is an effective system of suggestions. This system of individual suggestions of improvements is currently, in some form, implemented in approximately half of the big companies.

A man that is supposed to create something new, to create suggestion, needs a creative working environment that will support his creativity. Creativity is a source of new ideas and proposals. It can be seen as a first step towards the creation of something new, of the creation of suggestion of improvement (Franková, 2011).

The creativity of employees is one of the factors that enterprises need to support if they want to work systematically on innovations and continuous improvement. Strategy for continuous improvement is based primarily on the creativity of employees and effective suggestion system that will allow the use of that creativity (Jac, Rydvalová, Zizek, 2005).

3. Methodology

The aim is to identify the key positive aspects and shortcomings of the current system of individual suggestions and make proposals for changes in order to increase its effectiveness. Selected company is big-sized and it operates internationally. To obtain necessary information were used methods in the following order:

1. analysis of the internal documentation,
2. a semi-structured interview with quality manager which is the author of the current system of suggestions,
3. a semi-structured interview with employees.

Analysis of the internal documentation was used as basis for creating a semi-structured interview for quality manager.

Results of analysis of the internal documentation and the semi-structured interview were used as basis for creating a semi-structured interview for employees. Fifty randomly chosen employees from top management to workers were addressed with the semi-structured interviews. Twenty three of them decided to participate in the interview. Four of them were from top management, eight from middle management and eleven of them were workers.

Semi-structured interview for employees were created deliberately short so it would not dissuade employees to answer it. There were only ten questions. One filter

question, one identification question and eight open questions focused on the suggestion system itself.

The main findings are described in the chapter five.

4. Characteristics of current Suggestion system

The selected company which Suggestion system is subject of this paper is a big-sized engineering company. This company has three divisions and it operates internationally. It is also certified by norms ČSN EN ISO 9001, ČSN EN ISO/TS 16949 and ČSN EN ISO TS 14001.

4.1. Suggestion process

Any kind of improvement, rationalization or innovation coming from employees needs to go through the suggestion process. The first thing that employee has to do is to fill out a suggestion form which he can find right next to the suggestion box where he needs to drop the filled form. Suggestion box is at every workplace.

If the form is filled correctly it is accepted, registered and evaluate by the head of the department, hereinafter called evaluator. Evaluator is assigned according to the department where should be the suggestion, in the case of his realization, implemented. Suggestions are reviewed by evaluator from a technical, organizational, financial, commercial and environmental perspective and also from the aspects of human resources, the safety of work and its influence on the quality of production and product. Final evaluation of suggestion has to contain recommendation if it should be implemented or not, or if it should be firstly verified in practice and then implemented permanently or removed. It also has to contain information about benefits, costs and possible changes associated with the suggestion. If the suggestion is complex the designated evaluator can engage other people to help him evaluate the suggestion.

The suggestion has to be evaluated within two months. If the suggestion is going to be approved the evaluator will propose a financial reward for the author of suggestion. The specific amount he needs to discuss with the head of division and author of suggestion. After that the evaluator creates a proposition of contract of "Approval of suggestion and financial reward" and he consults it with the director of finances which also has to approve it.

If the suggestion is approved, then the evaluator is responsible for its implementation. Costs related to the implementation will pay the department that will benefit from it.

If the suggestion is not approved then it has to be explained in the final evaluation why it was not approved.

Every suggestion, approved or not, are registered in the company database of suggestions.

4.2. Motivation of employees

Employees are motivated to create suggestions by different kinds of financial rewards. The basic reward can be obtained just for proposing the suggestion to reward and support their initiative. Reward for rejected suggestions, without solution for

implementation, is 50 CZK and if the suggestion has a specified solution for its implementation it is 250 CZK.

If the suggestion is approved then one of the two types of reward follow. It is either a one-off bonus or long-term reward.

4.2.1. One-off bonus

This form of reward is used in cases where the impact of suggestion is relatively low and its implementation is relatively easy. The bonus is calculated as the difference between costs of implementation and estimated benefits it will bring in the first 12 months after implementation. The amount of the difference is the basis for calculating the final amount of bonus and it is calculated by using table 1. This kind of reward is paid off within two months from implementation of suggestion.

4.2.2. Long-term reward

The second kind of reward is a long-term incentive. It is used in cases where the suggestion can be exploitable in the long-term period and its benefits can be clearly quantified as the difference between the costs before and after the implementation. To quantify the resulting savings the reduction of materials, salaries, overhead, energy, the cost of maintenance etc. are monitored for 12 months. Evaluator of suggestion is responsible for monitoring these data.

The reward is normally paid within two months after the 12 months period of monitoring the savings. The author of the proposal can ask for a deposit of 25% of the estimated reward. This deposit, if required, is usually paid within two months since the implementation of suggestion. The calculation of the amount of reward is carried out according to the following table:

Table 1: Scheme for calculating the financial reward

Total savings (CZK)	Reward in percentages + specific amount in CZK	Reward in CZK	
		Min.	Max.
till 5 000	25%	300	1,250
5 000–10 000	20% + 250	1,250	2,250
10 000–50 000	15% + 750	2,250	8,250
50 000–100 000	10% + 3 250	8,250	13,250
over 100 000	5% + 8 250	13,250	100,000

The main difference between these two types of reward in the method of calculation. The one-off bonus is used mainly for relatively small suggestions and the amount of reward is based on estimated savings it will bring in the first 12 months after implementation.

The long term reward is used mainly for the relatively big suggestions with large influence and the amount of reward is based on the monitored savings it had brought in the first 12 months after implementation. The reward is therefore in the form of retroactive pay.

4.2.3. Reward for improving working environment

If the implementation of suggestion leads to improvement of safety and to the better working environment there is one additional type of reward. It is called simply "Reward for improving working environment" and it is calculated according to the next table:

Table 2: Scheme for calculating reward for improving working environment

Type of improvement for the working environment	Reward according to the number of employees that will be affected by suggestion			
	till 5 employees	6–25 employees	26–100 employees	over 101 employees
Improvements in working conditions, hygiene or lowering the exhausting level of work and its severity etc.	600	1,000	1,500	2,000
Improving the safety of work, removal of potential causes of injuries or illnesses	1,200	2,000	2,500	3,000
removal of potential causes of injuries or illnesses that had already once happened	2,000	2,500	3,000	4,000
removal of potential causes of injuries or illnesses with regular occurrence	3,000	4,000	5,000	6,000

4.2.4. Rewards for coauthors

If another employee in some way contributed to the development, testing or deployment of suggestion he is also rewarded. He can ask for this reward till the one week after implementation of suggestion. The minimal amount of this reward is 200 CZK and maximal amount is 3,000 CZK per suggestion.

If there are multiple authors of a suggestion than they split the reward between themselves according to the percentages on which they have agreed in advance, or they split the reward equally.

4.3. Suggestion contract

Before implementation of the suggestion, the contract between company and employee has to be signed. A basic condition which has the contract include is the amount of reward. If the author of suggestion is not satisfied with the reward calculated as listed above, then the director of the company can set individual terms. If even the director is not able to come to terms with the author of a suggestion than the suggestion is rejected and remains unused.

5. Conclusions

Analysis of the documentation showed a few weaknesses. The suggestion process was taking too long. Rewards to motivate employees to create suggestions was not optimally set. Communication method which would allow to spread news about the current events inside the suggestion system was not established and there was no training for employees that would be focused on improving their skills which they need to come up with suggestions for improvement. These weaknesses were confirmed by the quality manager during the interview.

The biggest weakness of the current system occurred after execution of the semistructured interviews among the employees. Eighteen of the twenty three employees answered "No" to the filtration question "Do you know about the suggestion system in your company". Quality manager confesed that this is caused by the fact, that they never promoted the system among the employees and managers. They only created it to get

the certificate of quality which they needed and the information about the system is spread only through the quality manual where it had to published.

Thus it makes sense that most of the employees don't know anything about the fact, that there is some system of suggestions in their company. No system can work effectively if nobody knows about it. Logically, the first and most important step, to make this system as effective as possible, is to let the employees know, that there is some suggestion system in their company and encourage them to use it. Possible way how to do that is described in chapter 5.1. and 5.2.

5.1. Bigger support from management

Support for suggestions coming from management starts at the stage of evaluation or implementation. Employees can come to the managers for the consultation and help with the finalization of their suggestion.

For an effectively functioning system of suggestions, however, the top-down encouragement and support from management for creating suggestions is of one of the key factors.

The main way to increase support from managers is by training. This training should be divided into the next four parts:

- Benefits of effective suggestion system – the aim of this part would be to present to the managers the potential of effectively working system of suggestions. Such a system has not only economic benefits, but it affects positively also the quality of production, morale and employee qualifications.
- Suggestion process – the second part would involve clarification of how the suggestion process itself should work.
- The motivation for suggestions – third part would teach managers how to motivate employees to create suggestions and fairly evaluate them.
- Effective cooperation with employees – managers would be taught different techniques of cooperation with employees and how to help them with suggestions.

5.2. Higher engagement of employees

The top-down encouragement of the suggestions would be in the current state wasted. Thus, the training for managers needs to be complemented by the training of employees. Employees should become the main source of suggestions, and therefore this step is as important as training of managers. Training would consist of the following elements:

- Benefits of the suggestion system – presentation of benefits of the system e.g. different kinds of rewards, better working environment, the potential of more effective processes and thus less demanding job etc.
- Suggestion process – clarification of the suggestion process itself.
- Workshop with managers – in this part the managers and employees could learn by practice different techniques how to identify potential suggestions and how to implement them properly, and especially they could test their mutual cooperation. This should result in workers' confidence that their activity may actually contribute to the better working company.

5.3. Shortening of the suggestion process

About the acceptance and implementation of the suggestion decides the head of the department where the suggestion will be implemented because he has the largest overview of what is happening in the workplace, and he can best assess the potential benefits of the suggestion.

Drawback of the current suggestion process is relatively slow evaluation of the suggestions that can take up to two months. The reward for implemented suggestion can be also paid within two months after implementation. These facts can have a very demotivating effect on the author of suggestion.

One of the ways to shorten this waiting time is to include the need to deal with suggestions to the job description of the relevant evaluator. It is important that these evaluators will deal with every suggestion for improvement, and this of course takes time. It is necessary to ensure that they will have enough time for that. It is possible to secure that time by either better organization of their work time, or by delegating some of their responsibilities to other workers, or by paying extra money for their overtimes, which they spend over these suggestions.

Another way to shorten this period is to simplify the administration of suggestion process. Currently, when accepting the suggestion, the cost of its implementation and the amount of final reward needs to be discussed and agreed with the financial manager, evaluator of the suggestion and the author of suggestion. In the case of the larger amount of money that needs to be invested in the implementation of suggestion, it is okay. But if the implementation costs and the amount of final reward do not exceed for eg. 10 000 CZK the financial manager could be left out from the process of accepting the suggestion. This would shorten the time needed to evaluate the suggestion and it would allow the implementation to start sooner and author of suggestion would also obtain the reward sooner.

5.4. Changes in motivation

Three of the five employees that participated in the interwievs answered, that the financial reward for suggestions is too low and therefore it is not worth the amount of their time and work they would spend over the suggestions.

The current system of motivation is based on financial reward. The employee will obtain percentual part of savings that will originate from his suggestion. Thanks to that can every employee easily calculate how much the company benefits from his suggestion and how little he will actually obtain. That can be demotivating for employees and it can discourage them from creating suggestions.

Logicall modification of the motivation system is a fairer distribution of the savings that originate from the suggestion between the company and author of the suggestion, in the form that is shown in the following table.

Table 3: Suggested scheme for calculating the financial reward

Total savings (CZK)	Reward in percentages + specific amount in CZK	Reward in CZK	
		Min.	Max.
till 5,000	60%	300	3,000
5,000–10,000	55% + 250	3,000	5,750
10,000–50,000	50% + 750	5,750	25,750
50,000–100,000	45% + 3,250	25,750	48,250
over 100,000	40% + 8,250	48,250	without limit

This modification would motivate employees more because they would obtain bigger financial reward and it would also induce the feeling that the company is treating them fairly.

Another additional form of motivation, except the financial rewards, could be an "Improvement competition" with different kinds of categories.

Typically it should be the following categories:

- suggestion Improvement with the biggest savings,
- author of most suggestions,
- most innovative suggestion,
- innovator of the year.

A win in this competition should be rewarded not only by financial reward but also by respect from other employees.

During the year, it is possible to increase the motivation through the support from the relevant managers and by posting information about implemented suggestion on a bulletin board of suggestions. (see section 5.5), so that everyone can appreciate the authors of the suggestions.

5.5.   Awareness about the suggestion system

An important element, which is currently neglected is good awareness about news in the system. One possible way to improve this is to create a bulletin board of suggestions. Information about successful and implemented suggestions would be posted on these boards. On the board would also be information about the actual results of the company, its goals, and current problems. This would allow employees to focus on areas where it is currently required.

5.6.   Knowledge, skills, and abilities of employees

It is critical to not only motivate employees to create improvement suggestions but it is also important to ensure that they have the necessary knowledge to do it.

Initial skills needed to do so they will receive the initial training and workshop suggested at chapter 5.1. and 5.2. However, their development must be continuous without a break.

Extra attention needs to be paid to the development of talented employees and enthusiastic innovators. They have a big impact on morale in the workplace and they can inspire and motivate other workers.

6. Summary

This paper deals with the suggestion system in a selected big sized engineering company. At the beginning of this paper is a brief literature review. Analysis of suggestion system follows after literature review. Main shortcomings of the current system are:

- almost zero awareness about the current suggestion system in the company,
- motivation system set in favor for the company,

- low awareness about the news within the suggestion system,
- the fact, that the evaluation of suggestion can take up to two months and payment of the reward for suggestion can also take up to two months,
- no training of employees focused on developing their skills in the area of creating and realizing suggestions.

The proposals that should remove or at least lower these shortcomings are:

- training and joint workshop of employees and managers focused on suggestion system to increase awareness about the suggestion system,
- modification of motivation system so the employees would obtain higher rewards. Improvement competition is also proposed to increase motivation,
- suggestion boards that will inform about the news within the suggestion system,
- involving the evaluation of suggestions into the job descriptions of the relevant heads of the departments and exclusion of financial manager from the process of approval and evaluation of the suggestion if the amount of reward will not exceed 10 000 CZK,
- further trainings in area of creating suggestions.

This gradual and nonviolent allows to the company to gradually implement the Kaizen principals, which can be used to create lean and flexible enterprise.

Main result of this study that can be applicable in other organizations is the set of trainings for managers and their subordinate employees to increase their awareness about the suggestion system of the company. This is so because in today's business environment a great emphasis is placed on the different kinds of certifications. To get these certificates organizations often creates some systems, in this case it was suggestion system, to meet the requirements of these certificates. The main problem with this kind of approach is that these systems are often created in an effective way but they work only "on the paper" because nobody knows about them and nobody is using them. If there is in organization some "paper system" the trainings and workshops to promote them is the first step to make them work in a proper way. If it is a suggestion system then the similar approach as was proposed in this paper can be used.

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Mapping the Social Responsibility in Public-Private Hospitals of Portugal

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Abstract

The paper aims to show how Social Responsibility (SR) is fundamental to consolidate, reformulate and implement the changes of social rules of hospitals in the period of social contestation. The study applies methods and techniques of qualitative kinds. During the process identification of data, is applied the documental analyze while in the process of treatment of data, the technique of thematic and structural analyzes. In the paper the visibility of the hospitals in the national press is analyzed. We treated press notices published about public-private hospitals between 2002–2015 in two daily newspapers 'Jornal Diário de Notícias & Jornal Público and another one weekly newspaper 'Jornal Expresso'. The research shows that SR practices grew up when healthcare sector was crossing a strong phase of criticisms by the public-private partnerships consolidated with Portuguese State.

Keywords: social responsibility, hospitals, public-private partnerships, governance

JEL Code: M14, Q01

1. Introduction

1.1. Hospital Social Responsibility

Actually, Social Responsibility (SR) is one of the themes most discussed among academicians and politicians. At the beginning SR was considered as a management tool developed by enterprises in 50th decade with the objective to silence the social pressure generated by the social movements (Almeida 2010). Bowen (1953) defines CSR as the obligations of organizations to make their policies and decisions compatible with the values of society. Some authors consider SR a managerial model adjustable to every sector, because its values and practices create efficiency gain to organizations, as so as contributes to resolution of social and environmental problems of societies and to legitimation of Capitalism System (Blowfield and Murray 2008; Battistini and Gazzola, 2015). Whatever,

this model is contested among the economists. According to (Friedman 1970) the main social responsibility of enterprises is creating jobs and paying taxes to governments. The social assistance is a government´s duty, not a duty of enterprises. Carroll's (1991) considers SR a combination of economic, legal, ethical, and philanthropic characteristics. Vogel (2006) argues that this managerial model is not supported by a strong system of regulation of practices inclusively in developed, what barriers its evolution

The foundation of SR actually refers to the role of organizations in society, and to management practices that have a positive impact on society and environment. The European Union, through its European Commission on CSR, in 2011 defines SR like "the responsibility of enterprises for their impacts on society" (European Commission, 25/10/2011). This definition considers all the impacts of the organizations on society that integrates social, environmental, ethical and human rights in their activities and strategy (Gazzola and Colombo, 2014), in close collaboration with its stakeholders, with a double aim: on one hand to maximize the creation of value for its shareholders and other stakeholders and the community, through a long-term strategic approach to CSR and development of products, services and innovative business models; on the other hand to identify, prevent and mitigate its possible negative impact (Gazzola & Mella, 2015; Garriga & Melé, 2004). In general, social responsible organizations has to live up to certain public expectations and pursue public welfare (Brandao, C., Rego, G., Duarte, I., & Nunes, R. 2013).

With the transition from the "social goods" model to the "economic goods" model for public services, in many countries, the privatization of public services may unintentionally weaken SR (Brandao, C., Rego, G., Duarte, I., & Nunes, R. 2013, Cerny, 1990). The healthcare system is a typical example. Many hospitals, that before delivered the essential health services, now has to manage the scarce resources under conditions of financial constraints (Silvestre & Araújo, 2009; Liu, W., Shi, L., Pong, R. W., & Chen, Y., 2016). As a result, many hospitals have progressively perceived the importance of SR (Abreu R, David F, Crowther D. 2005). More and more hospitals have realized that they should have a SR strategy to deal with various stakeholders.

In Portugal, two political agendas concurrencies to establishment of guidelines of social responsibility goals to healthcare sector: ENDS (2005–2010) – Estratégia Nacional do Desenvolvimento Sustentável and PNS (2012–2016) Plano Nacional de Saúde.

1.2. The Contributions of Private Sector and NGOs to Promotion of SR in Portugal

The implementation of SR in Portugal was promoted essentially by large enterprises and Non Governmental Organizations (NGOs). In general way, public sector does not influence the process of SR. While large companies leaded the majority of the initiatives, the contribution of NGOs respected a lot to the creation of normative guidelines to implementation, certification and professional training. The public sector in Portugal, characterizes by weak adherence to SR management models as well as by weak participation in SR initiatives, likewise those are promoted by governmental institutions. In sum, private companies and NGO leaded the implementation of SR in Portugal, as promotors or merely partners of another one. Still 2005, World Health Organization is coming to promote values and practices of SR. One of its main efforts is the publication of the first international orientations in 2005. Portugal adopted these guidelines only in 2012 through National Plan for Health, "Plano Nacional de Saúde" (PNS). The PNS 2012 defined SR as the compromise of all organizations to participate in the process of creation of positive indi-

cators of health, empowering people to take good decisions likewise eat healthy and practice physical activities.

SR has, in general ways, promoted the diffusion and the changing of ethical values and practices in many sectors, including, in the healthcare. In many countries, the performance of private sector and NGOs have been decisive to implementation process of SR. The main contribution of NGOs has been the lobbing upon government institutions to approve friendlier environment and social laws while, the contributions of private sector, are specially related to the diffusion of new ethical values and managerial practices through implementation of social responsibility programs. Kinderman (2011) identified that Business in the Community (BITC) was the NGO responsible for the high adhesion of enterprises to SR programs in United Kingdom during the Margaret Thatcher's government.

In Portugal, the role of NGOs was also very important, principally to the creation of guidelines and training programs in social responsibility area. The Portuguese NGO "Sair da Casca" leaded an advisement program on SR in Portugal in 2005 as also leaded the creation of first "National Ranking on Social Responsible of Enterprises" in 2010. The role of private sector was very important also to the development of SR in Portugal. One of the most important contributions of this sector were undoubtedly the personal endorsements by managers to adhesion to values and practices of social responsibility.

The large companies are responsible for the majority of social responsibility/ sustainability reports published in Portugal. In our view, the fact of them occupy top places in international rankings like as the Dow Jones Sustainability Index are leading them to adopt this practice.

During 2008–2015, public-private hospitals were responsible for implementation of 331 programs of social responsibility in Portugal, while entrepreneurial public hospitals, are not implementing social responsibility management models. Two of three public- private hospitals in Portugal implemented management models for Social Responsibility in a couple of years. The programs were implemented in areas as: preventive health, efficiency energy, innovation of managerial practices, volunteering and philanthropy. Majority of these programs were supported by internal and external network of partnerships but few of them became themselves in clusters of health.

2. Methodology and Data

The study applies methods and techniques of qualitative kinds. During the process identification of data, was applied the documental analyze while in the process of treatment of data, the technique of thematic and structural analyzes. Our research is developed under a comprehensive model of analyze using qualitative techniques of identification and treatment of data (e.g. documental analyze). The theory framework adopted in this study integrates principles typical of Institutionalism, Pragmatism and Social Rule Regime. The treatment of data was executed supported on authors from Sociology and Economy Sciences.

The documents analyzed were political agendas, press notices and notices of websites. We treated around 298 press notices published about public-private hospitals between 2002–2015 in two daily newspapers 'Jornal Diário de Notícias and Jornal Público and another one weekly newspaper 'Jornal Expresso'. In some figures we consider only the notices between the periods 2008–2015 for the low increasing on the number of the notices divulgated about the hospitals during 2002 e 2007.

We choose to access notices though newspapers' websites because its access is quickly and relatively cheaper. But, we met various difficulties in this phase, like as the notices were dispersed through different places within websites, the access was suppressed after 50 notices visualized and notices were not ranked through keyword inserted.

The research shows, through data, how social responsibility programs contributed to criticisms' avoiding produced by public-private partnerships in healthcare. In our view, these theories contribute to understandings about governance systems and SR of healthcare, because allow to identify what are the controversies, the struggles of power and knowledges shared by actor within networks of partnerships.

Few studies tried to understand how network of partnerships work, which goods are exchanged and how are negotiated the personal and collective values among the members (Zadeck 2003; Uzzi, 2004). The author Santos (2011) and Porter (2006) believe people and organizations prefer the strategic motivations of SR, contrarily to what was defended by Almeida (2010). According to this author, actors are most motivated to act when are moved by the altruistic principles of Social Responsibility.

3. Results: The Visibility of the Hospitals in the Portugal Press

The Diário de Notícias Press (Figure 1) was responsible for the publication of the majority of notices involving the public-private hospitals during 2014. In our opinion, some facts contributed to it likewise the increasing of strikes' occurrences and the various collective demission of employees from the hospitals.
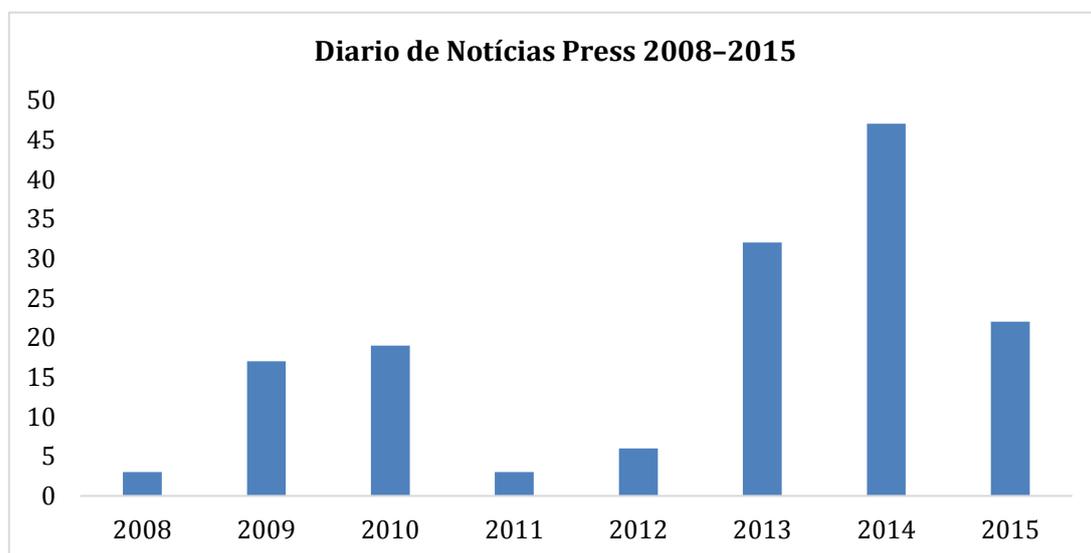
Figure 1: Diario de Notícias Press notices

From 149 notices published at this press, 104 were centralized on hospital organizations while 45 on other institutions than as Medical Association. This indicates that the exigencies of legitimation are falling much more on the privatized hospital than on another ones (Figure 2).
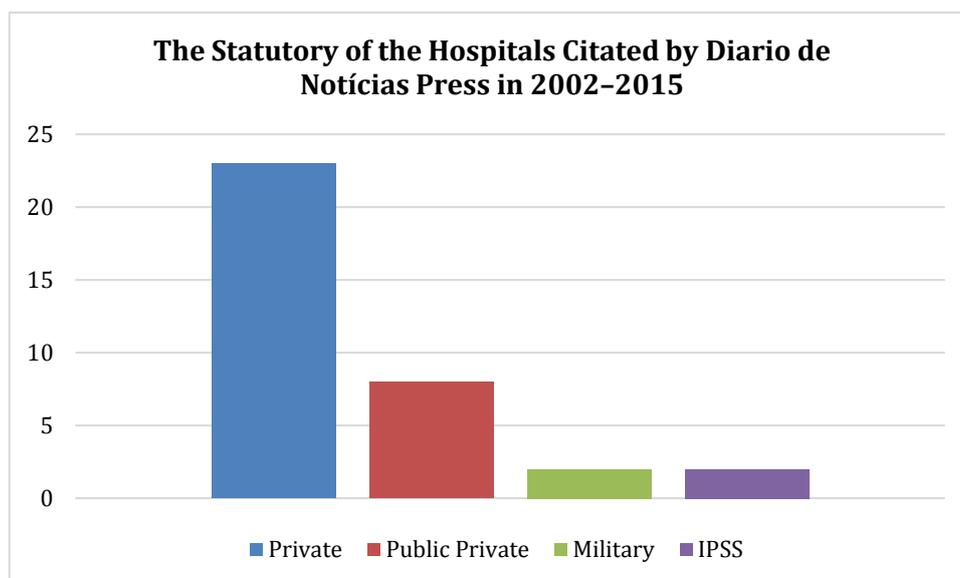
Figure 2: The Statutory of the Hospitals Cited by Diário de Notícias Press in 2002–2015

During the period analyzed, the Jornal Público published 128 notices involving organizations from healthcare being that, 61.72% reported to hospitals and 38.28% to another ones that were not referred by methodological reasons. The Figure 3 shows had a low increasing on the number of the notices divulgated about the hospitals during 2002 e 2007. One of the motives was undoubtedly the criticisms produced around the public-private partnerships in healthcare.
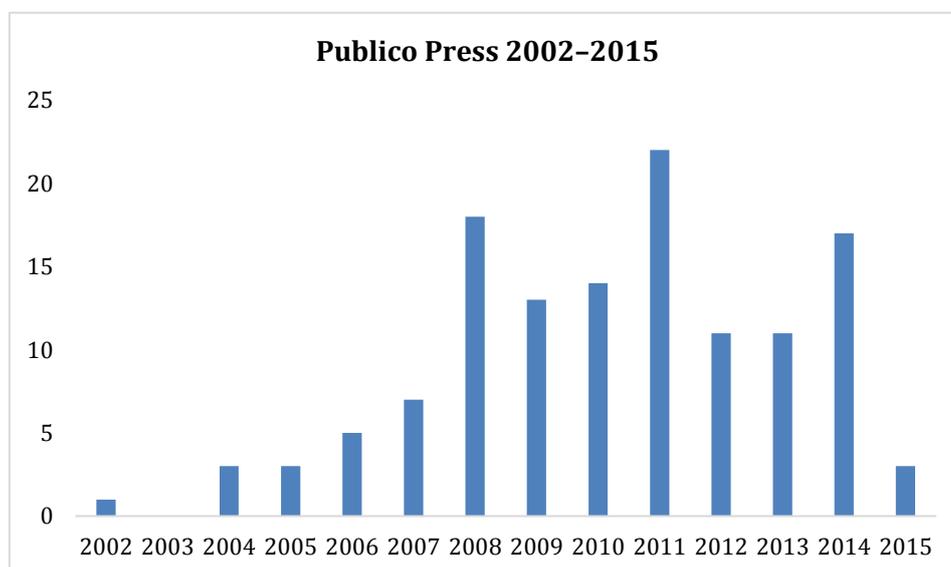
Figure 3: Publico Press 2002–2015

The private hospitals were the most cited in this newspaper 63.29%, following the IPSS 15.19% and for last, EPE 6.3% (Figure 4).

The Statutory of the Hospitals Cited by Publico Press in 2002–2015
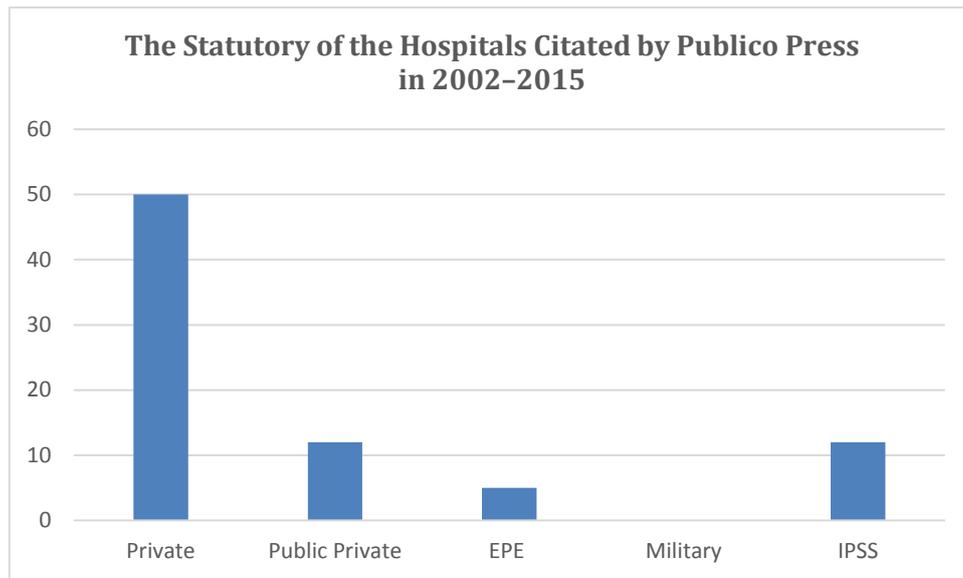
Figure 4: The Statutory of the Hospitals Cited by Publico Press in 2002–2015

The "Jornal Expresso" (Figure 5) wrote the majority of notices about the Hospitais Privados HPP de Portugal. In the second place following the José de Mello Saúde JMS. The criticisms created around these hospital´s groups is based on the high increasing of the private market of the health (Expresso Journal, August 25 of 2008)

The Most Citated Hospitals by Expresso Press 2002–2015
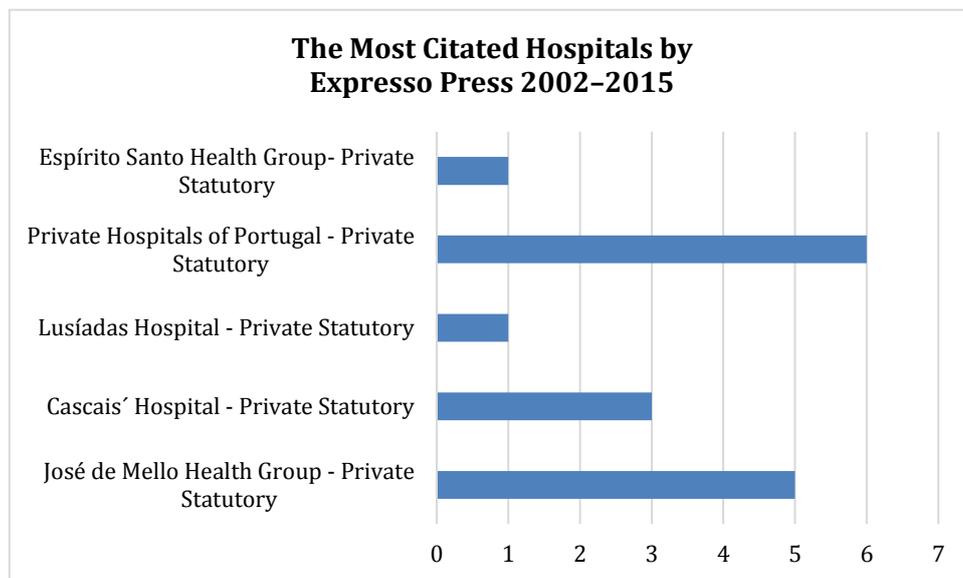
Figure 5: The Most Citated Hospitals by Expresso Press 2002–2015

The Figure 6 shows was a decrease on the number of notices divulgated about the hospitals during the period 2008–2015. Whatever, there was a small increasing in 2014.

Expresso Press 2008–2015
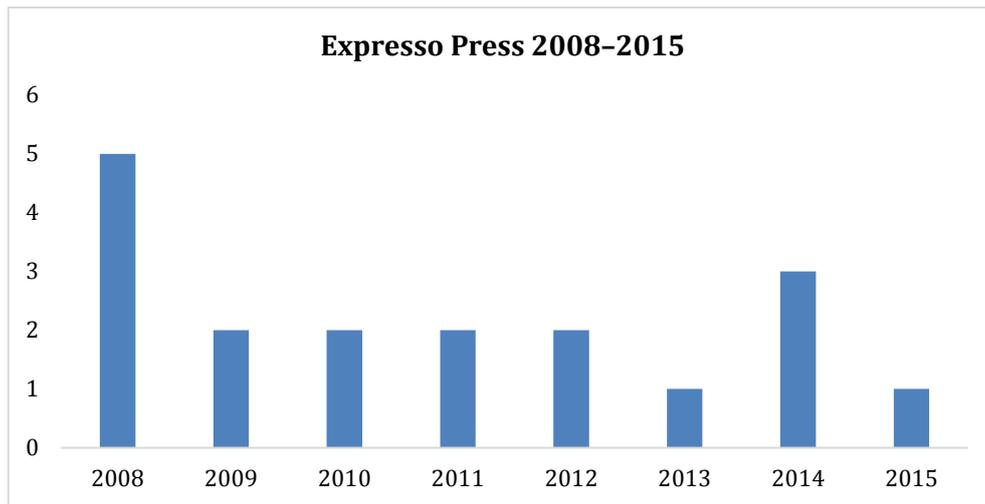
Figure 6: Expresso Press 2008–2015

During 2008, were published the majority of the notices formulated about the healthcare. The privatization of organizations and management models were not accepted by professional orders, associations of patients and autarchy presidents.

The SR started in public-private hospitals in 2008 when Private Hospitals of Portugal (HPP) (actually, Lusiadas Health) inaugurated its first hospital managed under public-private partnership "Hospital of Cascais". Two years later, the Social Responsibility was incorporated within the management model of the José de Mello Health Group, and three years later, within the Holy House of Mercy of Lisbon. These hospitals defend that the SR can be understood as a strategical tool of management, because, contributes to minimization of social controversies and legitimize new managerial models in health simultaneously.

The criticisms formulated around public–private hospitals always diminished when the programs of Social Responsibility were applied. After their implementation, only 7.69% of all criticisms were directed to them, while to private hospitals 22.12% and to entrepreneurial public hospitals (EPE, Entrepreneurial Public Entities) 66. 35% (Figure 7).
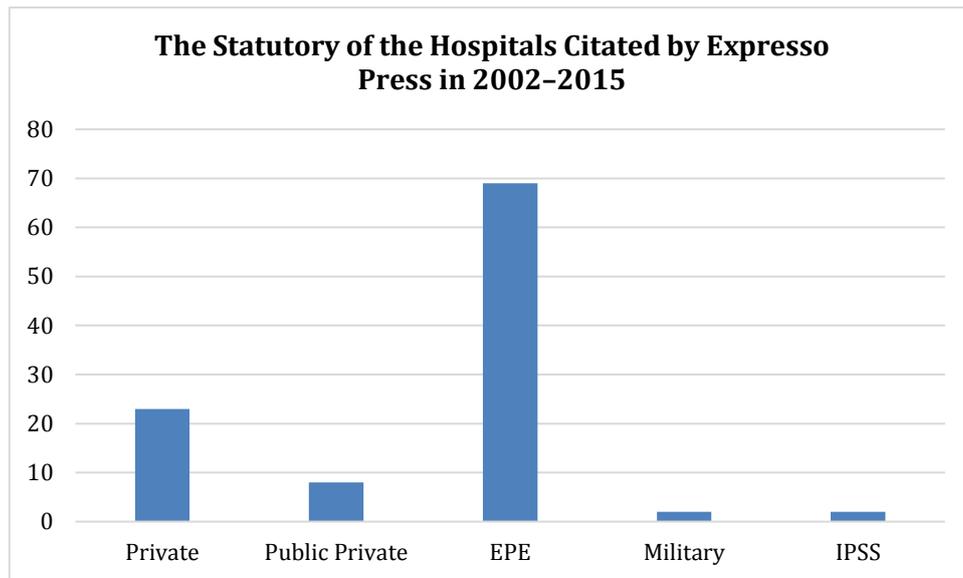
Figure 7: The Statutory of the Hospitals Cited by Expresso Press in 2002–2015

Only one group not advanced with the implementation of the SR programs when the agreement was established with the Portuguese State. One hypothesis is that the statutory of institutions finds connections with the criticisms formulated "around the social protection" in context of society. The Private Institution of Social Solidarity (IPSS) statutory showed generating least prejudices to institutions in terms of reputation and institutional image. The institution considered excusable to take extra responsibilities in social and environment ways. Despite this protection, the public criticisms increased in 2013. Successive accusations of bad managerial practices originated criticisms around the productive activities of the hospitals after only one year, what conducted to develop a strategy for SR and to publish the first "Sustainability Report".

4. Discussion and Conclusions

The study showed that controversial times are very fruitful to implementation of SR in healthcare because it generates social immunities and that the hospitals are adopting similar behavior, symbols and languages to legitimate new management models in healthcare.

The Social Responsibility seemed to be a new way through what organizations and professional of the health could to achieve the social license that they need to operate. The public-private hospitals decided to implement it when they were under strong social contestation. The social contestation was appointed by authors as being fundamental to consolidation, reformulation and implementation of changes including social rules (Burns and Nora 2014). According to Boltanski and Thèvénot (1999) actors invoke a limited group of justification logics to justify their actions nonconsensual practices.

Healthcare, private hospitals leaded and continues to lead the diffusion of values and practices of SR since 2008. One of the motives that contributed to hospital mobilization was the necessity to achieve the equilibrium between the demands of universal access to healthcare and the demands of economic efficiency production within all managerial decisions took by managers and clinicians.

Whatever, Social Responsibility finds institutional and cognitive barriers that difficult its expansion. To win these threats, hospitals are developing network of partnerships and negotiation models in very different modes.

The authors believe controversies lead people to negotiate values and practices between themselves, as well as, to active justification logics socially legitimated. Actors believe that adhesion to common systems of judgment is advantageous to people and organizations because minimize the uncertainties originated by introduction of codices and rules not shared by all members within networks of partnerships (Burns and Nora 2014) (Boltanski and Thèvénot 1999). The necessity of consolidate negotiation models is conducting people to adopt new governance systems, what impose a new social regime. In this new social regime, the frontier that separated what to own to public and private interests disappeared through negotiation of individual values and practices.

Despite the advantages, engagements in network of partnerships create diverse social constraints to its members. One of the motivations to do so, is closed to the fact of orientating individual choices in moral and legal ways, minimizing the uncertainties provoked by non-shared legitimation systems and, allowing people to prosecute with their productive activities without any impediments (Burns and Nora 2014).

The network of partnerships produce reputational gains to members (Burns and Nora 2014) as well as social capital. Social capital can increase or decrease the costs produced by acquirements of supplies dependently of the situation. If a member is saw as trusty people, their partners opt for not increasing the transactions´ cost because the possibilities of happening contractual failures are insignificant or null, as so as, activing judicial instances.

In Boltanski and Thèvénot (1999) bad behaviors or failures of conduct occur when actors are moved only by personal interests, while good behaviors occur when actors are moved to find an equilibrium between collective and individual goals, maintaining vulnerable people engaged in networks of partnerships.

Through Social Rule Regime Framework, we can visualize the moral rules that guide the social life within the communities, as well as, the elements that provoked its changing and evolution along the time.

In conclusion, adequate corporate governance and corporate strategy are the gold standard of SR. In a competitive market hospital governance will be optimized if the organization culture is reframed to meet stakeholders' demands for unequivocal assurances on ethical behavior. Health care organizations should abide to this new governance approach that is to create organization value through performance, conformance and responsibility (Brandao, C., Rego, G., Duarte, I., & Nunes, R. 2013).

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Impacts of application expenses on self-employment revenues

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Abstract

The method of applying expenses on revenues from self-employment, in accordance with Act no. 586/1992 Coll., on Income Taxes – Art. 7, has a significant impact on the level of a tax base. This paper focuses on issues of claiming expenses as a percentage portion of revenues (Lump sum tax) from self-employment. Moreover, the article is evaluating impacts of Lump sum tax on a tax base and on the tax liability of entrepreneurs. The implications using Lump sum tax on a number of deductions of health insurance and social security from income of self-employed person will be analyzed in details. The paper also evaluates results of changes in legislation, when claiming Lump sum tax, to the tax collection of individual taxpayers. Concluding part of the article compares differences between claiming the Lump sum tax in the Czech and the Slovak Republics.

Keywords: income tax, lump expenses, actual expenses, social insurance

JEL Code: K34

1. Introduction

The income from independent activities is defined by the Act no. 586/1992 Coll., On Income Taxes (hereinafter ITA), specifically Art.7. This article covers income from agricultural production, forestry and water management, income from commercial/trading activities, income from other business/commercial activities, capital incomes from shares of a public company and incomes of the general partner of a limited partnership in profit. Furthermore, income from the use or provision of industrial property rights, copyright – including rights related to copyright, income from personally executed pro-

fessional services and income from a rent of business assets. According to this article, the tax base (or partial tax base, Art. 7) is calculated as a total revenue, reduced by expenses incurred to generate, secure and maintain the business activity within the one taxable period.

ITA Art. 7 = Revenues – Costs to generate, secure and maintain income

The value of partial tax base (hereinafter PTB, Art. 7) is influenced by the form of taxpayer's record of expenses. The evidence of expenses can be held in the real amount of incurred/real expenses or taxpayer may apply flat-rate expenses, i.e. claim lump sum expenses. The applicable amount of expenses claimed by a lump sum varies from 30% to 80% depending on the type of income. Within the frame of this method, the taxpayer should also respect the absolute maximum limit of revenues. Křemen (2014) stated that the absolute limit of revenues would lead to partially mitigated differences of tax returns between self-employed and employees. This limit corresponds to an income in the amount of CZK 2,000,000 with respect to a specified percentage of lump sum expenses. This restriction applies to lump sum expenses between 30% and 40% since 2013 and for the lump sum expenses from 60% to 80% since the year 2015. The amendment to the ITA, pending by the time of writing this article, is decreasing the absolute limit of lump sum expenditure. The new limit value of total revenue will be CZK 1,000,000. The proposed effective date of the new amendment is 1. 4. 2017, therefore updated restriction of lump sum expenses will be firstly applicable within the tax period of the year 2018.

Application of the lump sum expenses is bringing many advantages as well as disadvantages for the taxpayer. The advantage, which was the main reason for the introduction of the amendment, is a reduction of the administrative burden as Vančurová (2016) stated. As a result, entrepreneurs can save time as well as extra expenses associated with the tax advisor assistance. At the same time according to Ptáčková Mísařová and Otavová (2015), this system can also minimize errors in tax returns which may arise from the uncertainties regarding the tax deductibility of an individual type of expenditures. Brychta (2015) states, that the percentage rates of lump sum expenses are high which is beneficial for the taxpayer who can significantly optimize the tax liability (the actually incurred expenditures are typically lower and not causing such an optimization). The situation is very similar in the case of social security and health insurance, which will be discussed later in this article. According to Kolembus (2015), when applying flat expenses principle, the tax burden is in a legal way optimized to the proportion of taxpayer turnover and profitability of the business activity within the specific industry. Also, Klimešová (2014) states, that currently there is a wide variety of options how to minimize tax liability of the taxpayer. The method of claiming flat expenses against revenues and the current percentage rate of lump sum expenses in the Czech Republic is very generous, as shown in the following table.

Tab. 1 Development of lump sum expenses from earned income

Type of income/year	2004	2005–2008	2009	2010–2012	2013–2014		2015–2017		2018	
	%	%	%	%	%	Max (CZK)	%	Max (CZK)	%	Max
Agricultural production,	50	80	80	80	80	—	80	1,600,000	80	800,000
Craft activities	25	60	80	80	80	—	80	1,600,000	80	800,000
Other activities,	25	50	60	60	60	—	60	1,200,000	60	600,000

Type of income/year	2004	2005–2008	2009	2010–2012	2013–2014		2015–2017		2018	
	%	%	%	%	%	Max (CZK)	%	Max (CZK)	%	Max
Copyright	30	40	60	40	40	800,000	40	800,000	40	400,000
Other business/	25	40	60	40	40	800,000	40	800,000	40	400,000
Rent of business assets	—	—	—	From 2011 30%	30	600,000	30	600,000	30	300,000

Source: Authors interpretation base on ITA

Additional restrictions for taxpayers flat applying expenses are resulting from the Act no. 586/1992 Coll., On Income Taxes, specifically Art.35ca in force since the year 2013. According to this Article, the taxpayer cannot apply for a tax credit on children or a tax discount on a spouse with no income, in a case of self-employment income only. In case confluence of incomes from multiple types of activities, the taxpayer is entitled to get a tax relief on maintained child if the sum of the tax bases (created by applying lump sum expenditure) will be less than or equal to 50% of the total tax base. This provision shall be dissolved by proposed amendment in the year 2018. If the entrepreneur applies new restrictions on lump sum expenses up to a maximum amount of income CZK 1 mil. in 2017, the new amendment will allow claiming a spouse tax discount and tax benefits on children already for the taxable period 2017.

When a taxpayer applies to lump sum expenses, it is necessary to realize it covers total expenses of taxpayer associated with generating income from independent activities. In cases where the taxpayer has multiple sources of income different percentage rate of the lump sum tax needs to be applied. Vančurová (2013) states, application of a lump sum expenses in case of many different tax rates is slightly losing sense because the redistribution of each individual income and assigning the correct percentage rate of spending has a negative impact on the administrative burden. While the taxpayer is determining the partial tax base according to Art. 7 on Income Taxes, the unified method for all expenses generated the total revenue must be used.

Taxpayers with income from independent activities in addition to personal income tax contribution must also pay to the social security and health insurance. In the context of these payments, such a taxpayer is referred to self-employed persons and the basis of assessment for contributions is closely related to the partial tax base from independent activities. Assess base for social security contributions is calculated as 50% of the partial tax base on the Art.7 of the ITA. The rate of social security for the self-employed is 29.2% of the assess base, where minimum assess base and the minimum insurance securing is define. The minimum monthly deposit for 2017 represents the amount of CZK 2,061. Assess base related to the health insurance contributions is calculated as 50% of the difference between revenues and expenditures in accordance with Art.7 of the ITA. The rate of health insurance is set at 13.5%. The minimum monthly deposit of health insurance contribution is set at the amount of CZK 1,906.

2. Data and methodology

The aim of this paper is to compare the impacts of claiming lump sum expenses on the tax base of personal income and tax liability of entrepreneurs. Moreover, the purpose of

this article is to identify methodological procedures in connection with tax return obligations and display the impact of the total contributions to the state budget. The key prerequisite for the analysis is data collection from sources closely related to the field of study. The initial point is the level of a tax liability of a self-employed entity. By using the comparative method, impacts of changes in lump sum expenses legislation to the volume of tax collection were evaluated. The comparative method was also used to identify differences while applying flat expenses on revenues within the Czech Republic territory and countries of the Visegrad Group (hereinafter V4). Following model, an example was compiled to compare payment liabilities of a self-employed person in the Czech and Slovak Republics. These tax return liabilities will be studied within a legal framework of the new amendment of the year 2017, which shall be in force in the Czech Republic from the year 2018. All foreign currencies were converted to CZK by using exchange rate announced by Czech National Bank on 31st January 2016. The tax liabilities were determined in a scope of the legal framework (Income Tax Act), social security and health insurance contributions as per relevant legal provisions. Information about the income tax collection was taken from the website of Financial Authority Offices. The recommendations of changes in the structure of the current tax system are developed on the fundaments achieved from the analysis. These suggestions and recommendations should lead to an improvement of the tax collection. In this article, in addition to the basic scientific methods were also used methods based on the principles of logical/analytical thinking, particularly the method of deduction. The results are arranged in tables and graphs. In order to draw conclusions synthesis method is applied.

3. Results and Discussion

3.1. Comparison of tax liabilities of self-employed entities within the V4 countries

As previously mentioned, the limit amount of lump sum expenses in the Czech Republic is set at very generous level. This fact can be confirmed by comparing the limit amount of lump sum expenses in the Czech Republic and in other V4 countries. The following in-depth-focus analysis is devoted to the Slovak Republic. The following table shows the trend of a number of lump expenses applicable in Slovakia.

Tab. 2 Development of lump sum expenses in the Slovak Republic

Revenues/ year	2009–2010	2011–2012	2013–2017	
	%	%	%	max. EUR
Business – craft trading	60	40	40	5,040
Other commercial activities	40	40	40	5,040
Other commercial activities	40	40	40	5,040
Rent	40	40	—	—
Copyright	40	40	40	5,040

Source: Authors' interpretation base on Act no. *595/2003 on Income Taxes – The Slovak Republic, amendments, and related provisions*

The table above shows that the Slovak Republic unified the amount of lump sum expenses for all types of income categories at 40% since 2011. At the same time, the Slovak Republic applies a maximum limit of lump sum expenses in the absolute value of

EUR 5 040 per year, which represents the equivalent of approximately CZK 136 180, since 2013. This is a significant difference compared to the Czech Republic.

If we make a comparison with Poland and Hungary, where a taxpayer also has the possibility of applying lump sum expenses, we find the very similar situation. The maximal allowance is also considerably lower compared to the Czech Republic. Especially, in Hungary, this system of flat expenses shall be applied only if the entrepreneur does not exceed the annual income of HUF 15 billion (CZK 1,308,150). Once this assumption is accomplished lump sum expenses shall be than 10% of the revenue. In Poland, the self-employed taxpayers shall apply the flat rate only to certain types of income and these expenses have a fixed range from 20 to 50%.

If we focus on the assess bases for calculating social security and health insurance contributions, it is clear that the Czech and Slovak Republic are likely to favor a group of self-employed persons over employees. For self-employed persons, the assess base for calculation of the social security contribution is 50% of the partial tax base from the independent activities. The assess base related to the health insurance is calculated as 50% of the difference between revenues and expenses in accordance with Art. 7 of the ITA. The Slovak Republic legislation is also practising similar calculation of an assess basis, however in this case basis is increased by paid contributions to health and social security (due to a previous deduction of this insurance payment as an expense to generate, secure and maintain income and due to a failure of introduction the Super-gross wage) and then divided by a coefficient of 1,486. Therefore, it is a significantly higher value compared to the assess base in the Czech Republic, precisely it is approx. 67% of increased partial tax base. The Slovak Republic also introduced minimum assess base for social security payments. The minimum assess base for social security is still significantly lower (about half) than in the Czech Republic. In Hungary and Poland, the self-employed person is required to pay premiums of a non-decreased tax base. However, the rate of the social security is lower in comparison with the Czech Republic.

3.2. Model example of differences of payment liabilities from self-employment in the Czech and the Slovak Republic

In the following chapter, a model situation for Czech and Slovak territory will be demonstrated according to the Income Tax Act for fiscal year 2017 and its proposal of amendments for fiscal year 2018. The tax levy will be calculated for a self-employed person as a percentage amount of the total revenue. For the purposes of these calculations, we assume the self-employed person is performing craft and non-craft commercial activity. The second assumption is, the taxpayer is single and childless. The income from a business at the end of the tax period reached the amount of CZK 570,000 and CZK 3 000 000. The taxpayer is applying lump sum expenditure on revenues. In the Czech Republic, the craft commercial activities shall apply 80% of earned income and non-craft businesses shall apply 60% of earned income. In the Slovak Republic, lump sum expenses, in this case, represent 40% of the revenue. At the same time in both examples, the maximum absolute value of lump sum expenses is respected.

Tab. 3 Financial burden of mandatory levy of self-employed person in the Czech Republic

	Craft Trading Activities			Non-craft Trading Activities		
Year	2017	2017	2018	2017	2017	2018
Level of income	570,000	3,000,000	3,000,000	570,000	3,000,000	3,000,000
Expenses	80%	1,600,000	800,000	60%	1,200,000	600,000

	Craft Trading Activities			Non-craft Trading Activities		
Year	2017	2017	2018	2017	2017	2018
Tax	0	185,160	364,300	9,360	275,991	408,300
Social security	24,732	204,400	321,200	33,288	262,800	350,400
Health insurance	22,872	94,500	162,000	22,872	121,500	162,000
Tax burden	47,604	484,060	847,500	56,160	660,291	920,700
The amount of levy in %	8.35	16.13	28.25	9.85	22.01	30.69

2018: based on the proposal of amendments of Income Tax Act, which eliminates the application of lum-sum expenditure from the base of the income up to the amount of CZK one million.

Tab. 4 Financial burden of mandatory levy in the Slovak Republic

Currency	CZK	EUR	CZK	EUR
Level of income	570,000	21,096	3,000,000	111,029
Expenses	40 % max 5,040 EUR			
Tax	40,827	1.511	519,432	19,224
Social security	89,841	3.325	439,507	16,266
Health insurance	42,044	1.556	187,114	6.925
Total levy	172,712	6,392	1,146,053	42,415
Financial burden of mandatory levy in %	30.3		38.2	

Source: Authors' interpretation base on Act no. *595/2003 on Income Taxes – The Slovak Republic, amendments and related provisions*

The conclusion of the comparative analysis is obvious; the system of applying lump sum expenses in order to generate, secure and maintain income is set in favor of the self-employed person in the Czech Republic more than in Slovakia. Therefore, we can assume that self-employed Slovak person at higher levels of income will decide to claim rather expenses in the actual amount.

3.3. Development of income tax collection from independent activities

A number of flat expenses together with other conditions for application of the lump sum expenses has a significant impact on a level of income tax collection from independent activities. The tax authority does not report separately income tax collection from a different type of independent activities, but they publish the total amount of personal income tax (hereinafter PIT) collection if the natural person submitted a tax return. The resulting figure is representing a sum of income tax from independent activities, capital gains, rents and other revenue.

Tab. 5 Development of personal income tax collection (in billion CZK)

Tax/Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
PIT from tax return	26.6	17.9	17.0	17.7	5.6	8.0	2.9	3.3	2.7	1.1	2.5	6.8
PIT from employment	110.7	111.6	126.4	115.2	111.0	111.8	119.4	119.8	126.1	130.9	136.1	149.4
Sum of PIT	137.3	129.5	143.4	132.9	116.6	119.8	122.3	123.1	128.8	132.0	138.6	156.2
Percentage share from tax return	19.4	13.8	11.9	13.4	4.8	6.7	2.4	2.7	2.1	0.9	1.8	4.4

Source: CZ Tax Authority

As it can be seen from the table no. 5 and the figure No. 1, in the year 2005 collection of personal income tax calculated from submitted tax return was CZK 26.6 billion. This number represents 19.4% of total tax collections of PIT (excluding withholding tax). Based on the increase in lump sum expenses since 2005, the tax collection from tax returns decreased in 2006 to CZK 17.9 billion and the proportion of the total tax collection of PIT was also reduced to 13.8%. A further increase of the allowance in lump sum expenses during the year 2009 showed in combination with the impact of the world economic crisis a gradual decline to a value of CZK 1.1 billion in the year 2014.
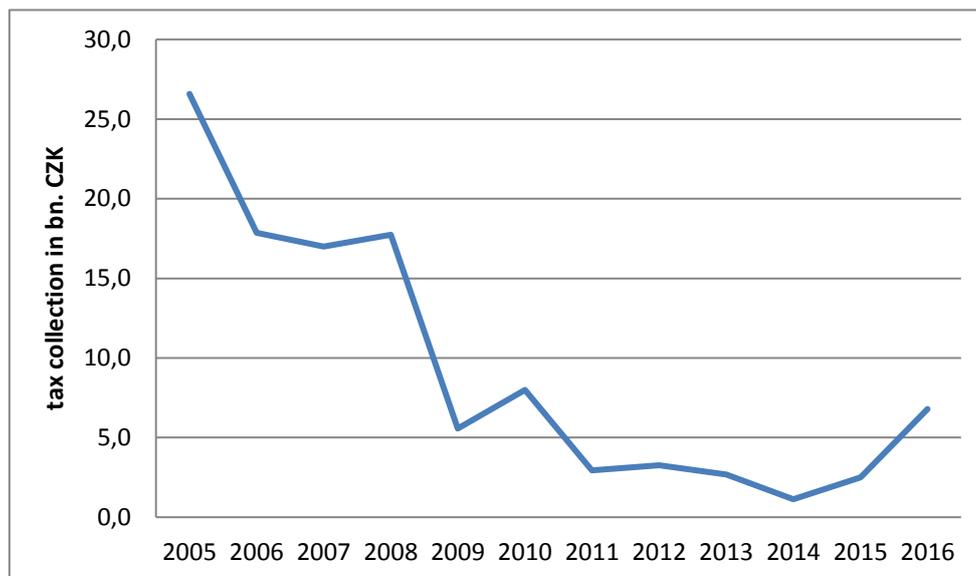
Figure 1: Development of PIT collection from submitted tax return
Source: CZ Tax Authority

In 2015 the income tax collection from submitted tax returns slightly increased to CZK 2.5 billion after several years. This increase was partially affected by limiting the application of lump sum expenses during 2013 and the inability to claim children tax benefit and discounts for a spouse. The income tax collection of individuals submitting tax return significantly raised to CZK 6.8 billion, in 2016. An important role in this increase played the additional restrictions of applying lump sum expenses (in force since 2015), where all entrepreneurs could apply flat expenses on revenues in the maximum amount of CZK 2 billion.

The significant growth of the income tax collection of natural persons submitting tax returns during 2015 and 2016 was certainly positively affected by the economic growth in the Czech Republic. On the contrary, a negative impact on income tax collection had the increases in child tax benefits.

4. Conclusion

In the context of the mandatory levy from self-employment, the application different method of claiming expenses on revenues plays an important role. Selected method has a direct impact not only on the amount of tax collection but also on the level of social security and health insurance. As demonstrated earlier in this article, the allowance of

flat rate expenses is significantly higher in the Czech Republic compared to other countries. This leads to very common and unfair practice of so-called "Schwarz System". The main reason for the introduction of flat rate expenses was the reduction of administrative burden for businesses. However, lump sum expenses are often perceived by society as an advantage for the selective group of self-employed at the expense of employees. Lawmakers are dealing with this issue which can be seen from the introduction of various restrictions related to the use of flat rate expenses. The last legal regulations of the flat rate expenses introduced the absolute limit for all percentage groups.

Fixed amount of percentage expenses significantly affects the income tax collection of individuals. Figure No. 1 is showing, an increase in lump sum expenses since 2005 was one of the major factors which contributed to a significant decrease in personal income tax collections of submitted tax returns. Stricter conditions for percentage expenses have slightly increased the tax collections in recent years. The growth trend can be expected during upcoming years together with the new amendment, which will further tighten these conditions.

Despite some limitations, the percentage levels applied on expenses are noticeably high the Czech Republic compared to other countries V4. The collected contributions of the social security and health insurance are also significantly lower in the Czech Republic compared to other V4 countries. This may lead to a future problem of state retirement payment inability. A possible solution would be a reduction of the percentage of lump sum expenses which would be more realistic regarding the type of business activity. However, this restriction must be examined with regard to other factors, e.g. Unemployment, etc.

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Interactive Collective Decision Making Integrated by Mobile ICT

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Abstract

The development of information and communication technology (ICT) changed the known way of living and penetrated many facets of our lives. Through the affordability and huge usability, ICT tools spread among population across the planet and became omnipresent. Today, students are equipped with smart phones that allow unexploited possibilities. This paper focuses on a greater participation of students in decision making during the academic study. The aim of this paper is to describe a concept of a decision making process that allow students´ participation on the evaluation and assessment of peers´ accomplishments in a study subject at the university via proposed mobile application architecture. Such an involvement in performance assessment of their peers may enrich their experience already during their academic study that may foster their ability of giving constructive feedback and critique that denotes an essential core activity for managerial profession in business practice.

This paper proposes a concept of such an assessment within a model situation in a study subject. However, the proposed concept can be analogically used in decision making during team discussions and negotiations in a business company in private sector independent on academic study.

Keywords: mobile information and communication technology, group decision making, management study

JEL Code: M150, M190, O310

1. Introduction

With the emergence of digital technology, the information and communication technology (ICT) was developed and irreversibly revolutionized our lives (Dávideková & Greguš ml., 2016) by allowing real-time communication and collaboration across any distance

(Dávideková & Hvorecký, 2017). It changed every facet of our lives: the way people work, communicate, learn, spend time, and interact (Jorgenson & Wu, 2016). No other former technology has had such an immense global impact as ICT (Al-Rodhan, 2011).

In 1909 Nicola Tesla developed the first concept of a device combining computing and telephony technology (Lim, 2010). Since then a combination of many technological advances has made modern smart phones the enormous success they are today (Mallinson, 2015). The smart phone integrates several technologies into one small device that can accompany us everywhere thanks to its tiny dimensions and small weight (Dávideková & Greguš, 2016).

Smart phones represent flexible mobile phones technologies that provide possibilities and constraints for our lives (Wellman & Rainie, 2013). Through their flexibility, small dimensions, versatile usability and omnipresent connectivity smart phones gained popularity all over the world (Lee, Ahn, Choi & Choi, 2014). These powerful devices can be used in many innovative ways (Guenaga, Mentxaka, Eguiluz, Romero, Zubia, 2012) and their versatility found many applications in several activities of our everyday life (Wang, Xiang & Fesenmaier, 2014). They are considered handheld computers rather than traditional phones (Ahn, Wijaya & Esmero, 2014) as they allow far more processing possibilities.

Smart phones spread among students and young generations by an immense speed providing the comfort of being online anywhere at any time (Agger, 2011) becoming an integral part of their life (Hurlen, 2013). Students are using it to communicate with their peers, taking photos, recording audio and video records, for calculations, as e-book readers etc.

This paper proposes an innovative integration of smart phones into educational process during university classes. This concept is based on the belief, that the widespread ICTs will improve the quality of life, as well as active participation (Veselý, Karovič & Karovič ml., 2016). It aims to increase the interactivity through innovative use of omnipresent ICT means, to enhance the quality of academic study by active participation of students in assessment process during their education and to equip future managers with valuable experiences by training soft skills that are essential for professionals in managerial positions in business organizations as the availability of skills has become the key to achieving innovation (Volná, Kohnová, Bohdalová & Holienka, 2015) and assurance of sustainable successful existence of business entities.

This paper is organized as follows: Section 2 provides a brief description of proposed concept model for collective decision making that can be implemented by means of mobile ICT. This particular section demonstrates its use through a possible scenario of a standard use case during the managerial academic study at the same time. The conclusion summarizes the motivation of the proposal as well as opportunities offered by the integration of presented concept model that may provide an added value in form of priceless valuable experiences to students that may foster their professional development.

2. Concept Proposal

For the convenience of the reader, this section provides a visual presentation of proposed concept with a description of the process depicted in it. It also describes a scenario of a use case.

The purpose of presented proposal is to enable interactive collective participation in decision making with instant evaluation allowed by means of mobile ICT. The proposed concept model will be described in terms of uses in a university lecture of a study subject in a managerial study program as such a use represents the main targeted utilization. However, there are no limitations avoiding its use in other situations like brainstorming meetings or other discussions requiring the same or analogue functionality supplied by the proposed concept. It intends to foster the collecting of experiences in decision making that represents a significant activity in managerial positions in any type of an organization. It aims to enhance the collecting of necessary experiences already during the academic studies of any business specialization with sufficient room for internalization through several iterations, analysis of conducted practical exercises to gain knowledge from lessons learnt and facilitating the development of soft skills by a guidance of lecturing experts.

2.1. Architecture

The proposed concept is based on combining available and affordable technology into an intrinsic system that provides required functionality with versatile usability. The system consists of following necessary parts that are further described in subsequent subsections:

- Entry point
- Database with user data
- Processing system
- Database with object data
- Presentation system

2.1.1. Entry point

Entry point may denote a Mobile Application for smart phones, tables or other mobile devices enabling the access to the processing system set up on an online server over the Internet. Another recommendable option for integrating the entry point denotes an access through a web page portal optimized for computer internet browsers. Based on the omnipresence of smart phones and connectivity as well as considering the targeted use, a mobile application for smart phones will denote the standard entry point further in this paper. An end user would access the system via the mobile app by providing his/her user credentials and remain signed for a limited or even unlimited period of time.

The integration of entry point optimized for computer internet browsers is highly recommended as it may represent a more comfortable and convenient access for setting up of new objects or for other applications the proposed concept may find application in where various settings can be placed on one page without excessive scrolling. Next aspect to consider is also the comfort of lecturers who might be more proficient with working on a computer and therefore prefer this entry point.

2.1.2. User Data Database

The credentials are to be verified against a *database containing all user accounts* allowed to access the application. This may be represented by a separate database where those user accounts are set up e.g. manually by an administrator or in another database of given institute and accessed through an application programming interface (API). APIs allow to compose flexible and business specific applications (Kryvinska & Greguš, 2014).

In the analyzed utilization case, the institution is represented by a management faculty of a university and users denote students attending academic lectures. It is possible to communicate with university information system via designed API for accessing those relevant data with no need of additional separate database. The authors will further consider an API for communicating with university information system.

2.1.3. Processing System

Next necessary item of proposed conceptual architecture is represented by the *processing system*. A recommended implementation denotes the integration in form of a web application running on an online server accessible via Internet that collects data of sent requests and processes those in a query by providing resulting responds. The system counts the votes for a specific object and processes those according to set up rules. This is possible to implement also with several various checks like: only one vote per user ID for a particular object, to determine how many users of all voted, how many times a user voted and with which answer etc. The system stores all the information in an appropriate database.

2.1.4. Object Data Database

A separate *database for object data* stores data assigned to each voting event. Those data may include but are not limited to: a list of users that voted, optionally list of users not allowed to vote, occurrences of various voting options, the number of all users authorized to vote, date and time, name of the user creating given object, title of given object, categorizing attributes for later listing options etc. It is also possible to differentiate various indicators or aspects that end user shall assess.

2.1.5. Presentation System

Last part of proposed concept model denotes a *presentation system*. This could be the same mobile application that denotes also the entry point. However, as the concept is designated to serve in an academic lecture class attended by students, it is recommendable to implement also a web interface accessible through an internet browser that would display the results of occurred voting in a window easily projectable through a projector on a wall or plane. This may increase the collective visibility to everyone and simplify the post analysis of results as well as possible defense of submitted voting of a participant (described later).

2.1.6. Concept Visualization

The described architecture is shown in fig. 1 below.

It is recommendable to search for possible involvement of any existing scalable voting mobile applications to implement a finished solution instead of own in-house development or contracting of external software company. It is important to consider how an integration of an existing app with its constraints may impact its utilization for targeted purpose described in following subchapter.

The concept depicted in fig. 1 demonstrates the high level architecture of proposed concept. Here it is necessary to consider the security of user credentials and data, the possibility of limiting the number of voters and how the group of users entitled to vote may be populated, how the connection on internal databases shall be ensured, how data from conducted voting shall be preserved, how the proposed model can be made scalable to needed level for various utilization cases, etc.
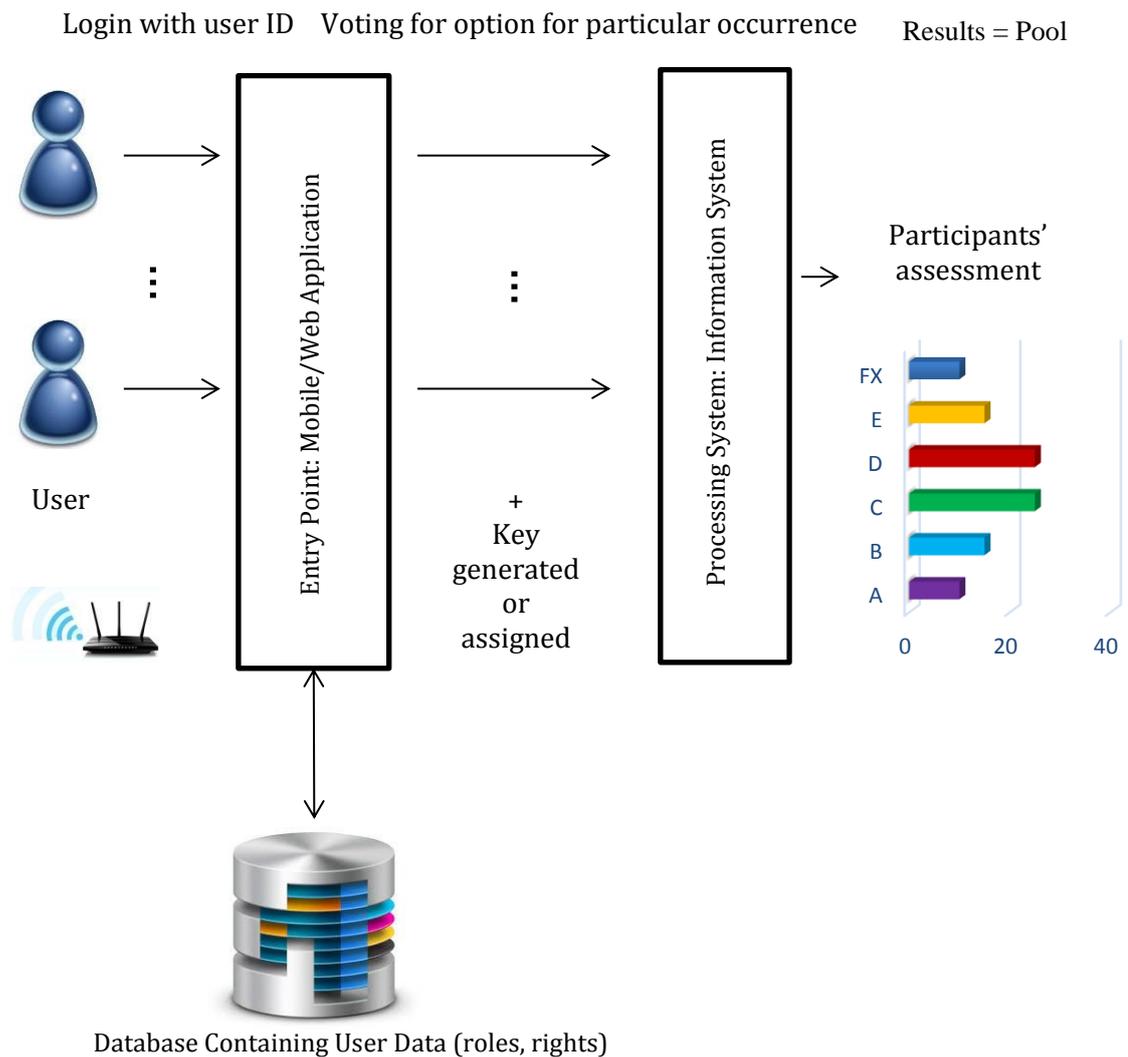
Figure 1: Simple concept for voting integrated by ICT means
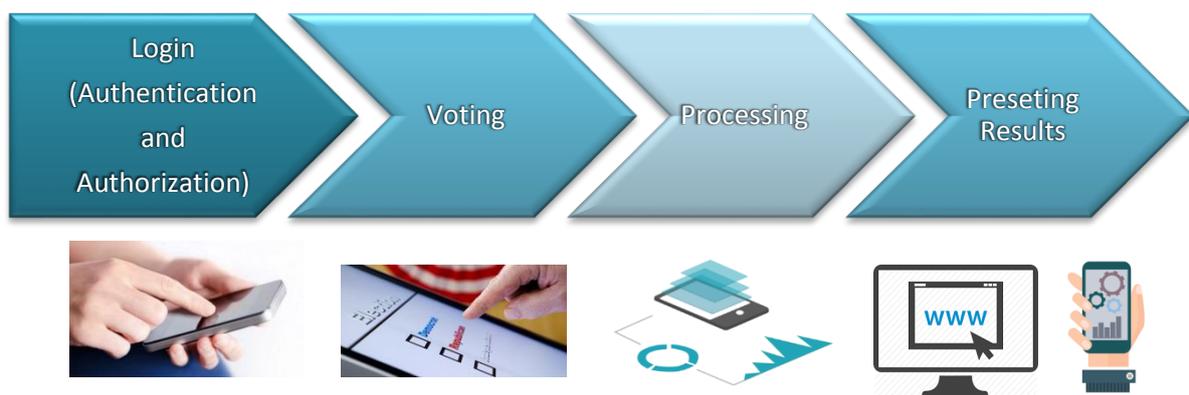
Figure 2: Process flow of proposed concept

2.2. Use Case Scenario

This subsection demonstrates a typical use case that was targeted to be solved by pro-vided concept proposal.

University students are often assigned to elaborate various projects that shall be presented in front of the whole group and the lecturer assesses the conducted work with a note, eventually by a number of points or other corresponding evaluation. This represents a typical assessment and decision making process. Such a situation offers the opportunity of including students into decision making where they can collect experience in assessment and through comparing other students among themselves. They can develop their soft skills in various fields, e.g. giving and receiving constructive feedback, defending their decision and viewpoint with arguments, making fast valid decisions based on relevant aspects.

In typical use case scenario, the lecturer determines and distributes assignments to students or students groups that are to be elaborated until a given specified deadline. After the deadline students are presenting the results of their work in front of their peers.

The lecturer sets up a new object or item in the system through an entry point by providing some description and optionally some attributes for later categorizing that may be used for later data mining analysis like which study subject etc. The setting up could already include using of a preset template that may foster easy and fast set up. The system would generate an ID. There are several options how to generate such an ID. It could be also a combination of an arbitrary word entered by the lecturer combined with a consecutive number referring to the number of occurrences of given key word. Or it may consist purely of a sequential number of given created object. Although there are several ways, the authors of this paper recommend a combination of an arbitrary entered word by the lecturer and a consecutive number as the setting up is considered to be comfortable for lecturers.

The system would further automatically populate some fields like date and time, faculty, subject, optionally name of the lecturer etc. This data is possible to be automatically populated based on user accounts data. It may simplify the setting up for lecturers and become a user friendly environment.

After the setting up is closed, the object may become available for users to send requests, in other words, for students to vote. After any presentation students representing the audience may send their votes in points or by selecting an option from provided offered choices and evaluate the performance of their peer on that way.

The lecturer would open the object for viewing results in appropriate presentation system and the processing system would update the results by any new received vote. The lecturer may discuss the voting results with students and draw their attention to not considered aspects, mistakes done etc. There is also room for further analysis and discussion of various aspects by students at time of their voting about their reasoning like why they chose conducted option for a given result. On this way, students may be more motivated and animated to listen to contributions of their peers as they are requested to assess their work and have to explain their decisions. At the same time, students may get motivated for giving a better performance as they will be evaluated objectively by a broader group of evaluators: a whole group of their peers and not only subjectively by one lecturer.

The exemplified application of presented concept denotes only a very simple use case of various possibilities. It is also possible to use such voting style also for discussion events, analyzing historical events by asking how students would behave (decide to act on different ways based on projected situation), or even giving comparisons of voting results of performances of various students.

2.3.   Possible Misuses, Extensions or Further Applications

In order to achieve the goal of an objective assessment, it is important to prevent students voting always in superlatives for all their peers by desiring only good notes for all or only for particular peers. Therefore, the voting itself is not determining the resulting note of a student, but the lecturer does. It is only an opportunity to collect the opinion of every one student within a very short time and to combine them into one collective decision. It represents a way of gathering experience in making objective decision based on prescribed assessing aspects and opens the possibility of training in giving constructive critical feedback towards given performance.

In case the application stores the whole voting of each user separately, it is possible to choose some of the assessing users (one or more) to explain the assessment they gave and eventually to let them confront each other against their assessments. This proposes a new opportunity to vote for assessment and evaluation of given performance that is represented by giving explanations to given voting and taken position. If an end user is forced to objectively explain his/her decision, the motivation to participate is higher than by an anonymous voting. At the same time, it may enhance the whole process with the aspect of giving constructive and critical evaluation when the end user is forced to defend his/her opinion against an opinion of someone else with relevant arguments and explaining them to everyone in the group. The ability to defend a standpoint or conducted decision represents a skill that is significantly important and essential for managerial positions and management professionals.

The selection of "assessment defendants" could be implemented by random choice or by a pseudorandom selection from a group that fulfills some criteria (e.g. users who were mostly negative, positive or neutral or even including the aspect whether the user already absolved the defending of his/her assessment already in the past), based on some statistical evaluation e.g. whose voting is outside the median or conducted manually.

It is also possible to use such a voting application for other purposes: collective decision making among lecturers about any topic during their meetings, brainstorming within a team in a business company, decision making in any big group analogue to using color cards for vote expression used by agile project management processes, etc.

A great extension to proposed concept model shall be represented by the opportunity to ask questions that would be visible on the pane and the presenter could answer those at appropriate time. These questions would be collected also through such an online system in real time providing a smooth processing without any delays caused through the collecting step.

The analysis of applications provided by given studied academic institution showed only one application provided in app stores of mobile app providers. This application represents only a very limited read access to very few information of academic information system not allowing interaction similar to proposed concept. Therefore, the authors of this paper intent do highlight the innovative ways for the utilization of the omnipresent affordable technology to provide more student focused interactive study with greater room for skills development as the availability of skills nowadays represents the key in achieving innovation (Volná, Kohnová, Bohdalová & Holienka, 2015) and success in contemporary business environment.

Also a search for other applications of academic institutions in Slovakia in the application stores had negative results.

A possible threat in terms of unhealthy competition among students is reduced through the facilitation of whole process by the lecturer who shall intervene in any adverse effects or dangerous situations. Unhealthy effects of smart phones on physics of people have not been confirmed through scientific research (Hardell, Hallquist, Mild, Carlberg, Pahlson and Lilja, 2002).

3. Conclusions

The development of information and communication technology (ICT), in particular the emergence of mobile ICT in form of smart phones, revolutionized our lives by changing the ways of processing and conducting of daily activities. Nowadays, a small tiny device, the smart phone, enables real time communication with another user or even with whole group across any distance. The digital environment created new ways of executing activities by allowing processing of large volumes of data within a very short time as well as their spreading through continuously increasing pace of informational dissemination to a much broader group.

Smart phone – the modern combination with all the high-end technology allows many devices to be integrated in one small device at hand (Dávideková, 2016). It represents a very powerful device that can be used in many innovative ways (Guenaga, Mentxaka, Eguiluz, Romero & Zubia, 2012) through various software mobile applications opening new ways of interaction even in academic institutions. A typical academic institution offers wireless access to its students that represents the core premise for proposed concept. Still, academic institutions are not excessively using the communication channel denoted by smart phones to animate students for interactive participation in lectures and developing their soft skills on this way.

This paper proposed an inventive interactive involving of students into dynamic collective decision making within a lecture class to enhance the academic business oriented studies of future management professionals. It offers the opportunity to collect experience and practice in fast decision making, assessment of their peers, giving and receiving constructive feedback and defending of their opinion against the opinions of others through formulating arguments.

The proposed conceptual model provides an innovative option for enriching business oriented lectures with greater interactivity by involving students in voting and creating more room for fruitful discussions targeting professional personal development and training of soft skills including decision making of future managers as those are of significant importance and essential in managerial positions.

The proposed concept was tailored to the needs of provided use case describing a lecture class of business oriented academic management study. However, as aforementioned, there are various opportunities for a possible application of proposed concept model not only limited to utilization by an academic institution, but it can be used also by business organizations in their operation.

Acknowledgements

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Deferred tax materiality reporting in accordance with Czech national legislation and with IFRS

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Abstract

The paper is concerned with the influence of a financial reporting system on a deferred tax reporting. The continental and Anglo-Saxon reporting systems are compared. The materiality of the deferred tax item is used a means for evaluation of the impact of deferred tax reporting. The category of deferred income tax is assessed on a sample of companies operating in the chemical industry (NACE 20.1) and reporting in accordance with the Czech accounting legislation (representative of continental reporting system) in the time series from 2005 to 2015. The results are compared with the results of author´s previous study concerning the reporting of deferred tax according to IFRS (representative of Anglo-Saxon reporting system).

Keywords: the category of deferred income tax, Czech Republic, the materiality level

JEL Code: M41

1. Introduction

The deferred tax arises due to the differences between taxation and accounting rules, due to book-tax differences. The issue of book-tax differences is related with three economics areas, namely accounting for income taxes, earnings management and capital market anomalies. In the quantification of the impacts of the deferred tax on fiscal position of companies, it is necessary to research the connection or disconnection between the taxation and accounting rules in respective country. The objectives of the financial reporting and taxation are quite different and both are depending on local circumstances. While the aim of financial reporting is concentrated on fair reporting to users of financial information (i.e., financial results must not be overestimated), the aim of taxation is to collect the taxes (i.e. to ensure the revenue for the state budget). A high number of studies concerning the relationship between taxation and financial reporting (e.g. Walton, 1992, Nobes, Parker, 2010, Doupnik, Salter, 1995, Hoogendoorn, 1996, Lamb,

Nobes, Roberts, 1998, Blake, Fortes, Amat, Akerfeldt, 1998, Aisbitt, 2002 – Nordic countries) can be found. The relationship between taxation and financial reporting in the conditions of the Czech Republic was measured by Nerudová (2009). Due to these facts, the reported profit or loss differs from the income tax base in a majority of states. The majority of studies deals with the relationship of tax and accounting rules for the income measurement. The most significant studies were carried out by Lamb, Nobes, Roberts (1998), Holland (1998), Freedman, MacDonald (2007), Eberhartinger, Klostermann (2007).

The level of difference between a profit or loss and a tax base is dependent on a relationship between the tax system and the financial reporting system used in a particular country. There are two significant financial reporting systems (continental and Anglo-Saxon). These systems differ in the main features. The Anglo-Saxon system is based on the consistent application of the fair view principle and satisfaction of the information needs of external users. The corporate accounting standards are typically set by independent accounting standards setters (Financial Accounting Standards Board-FASB, International Accounting Standards Board IASB). The accounting standards are approved by functional financial markets (IFRS, US GAAP). Accounting treatments are intended to insure uniformity of companies' financial statements and accounting methods, similar activities may be treated very differently for tax purposes. The financial reporting is quite independent on the tax rules. The continental system of financial reporting is significantly influenced by the tax legislation. The information needs of government, tax authorities are the main objectives of the financial reporting. Despite the fact that the book-tax differences (BTDs) arise in both systems, it is supposed that the BTDs are lower in the continental system.

There are two types of BTDs – permanent and temporary. Permanent differences´ effect (in the form of reduction or increase of taxable income comparing with reported income) is definitive. Temporary differences give rise to an accounting category called deferred tax. The deferred tax reflects the fact that the tax and rules for financial reporting in most countries differ.

Various approaches to the level of deferred taxes recognition are used in individual reporting systems (depending on special criteria – size, type of entity, financial reporting system used). These are ignoring of deferred taxes through their partial recognition to full expression. Each of these approaches has a different effect on the financial statements and consequently provides a different information base for decision making of many users of these statements.

Non-recognition of deferred tax approach does not provide information applicable for a correct estimation of future tax payments, due to absence of insight into the future tax savings and tax payments. This approach does not consider business transactions which are recognized in that period when they are recognized by tax authorities, which may be before or after the period when the event itself is recognized in the financial statements. It does not record the relationship between accounting income and income tax expense in the income statement and it leads to distortions in the net profit after tax.

The treatments for deferred tax reporting (for companies obliged for deferred tax reporting) do not differ significantly in particular financial reporting systems, while the income tax rules could be significantly different in particular countries.

The topic of deferred tax is a subject of IAS 12 in the IFRS and ASC 740 in the US GAAP in the case of Anglo-Saxon reporting system. According to the IAS 12 temporary differences are differences between the carrying amount of an asset or liability in the statement of financial position and its tax base. The tax base of an asset or a liability is

the amount attributed to that asset or liability for tax purposes. The reporting of deferred tax represents an instrument for distributable profit or loss regulation in a form of an accrual or a deferral, when in a period of lower payable income tax, the company postpones the part of the reported profit in a form of deferred tax liability. In a period of higher payable income tax, the company increases the reported profit by creation of deferred tax asset or by use of deferred tax liability.

There is a similar treatment for deferred tax reporting in the CAL, it is the Czech Accounting Standard No. 003 Deferred Tax. The CAL is a representative of continental financial reporting system, similarly as Germany, France, Austria, and Spain.

According to Schnader, Noga (2013), there is one more reason for reporting of the differences between firm´s book income and its taxable income. It is a questionable reason. The questionable reasons are based on an intentional manipulation with financial statements, tax evasion, etc. However in the situation the most effective firm management is expected to take advantage of legal tax planning techniques, the unusually large differences between book and taxable income can potentially indicates the company uses illegal options for decrease its tax base or increase a profit for external users of financial statements. There are many studies concerning this issue (Desai, 2003, Manzon, Plesko, 2002, Plesko, 2004, Phillips, Pincus, Rego, 2003, Landry, Chlala, 2005, Hanlon, Hoopes, Schroff, 2014, Chi, Pincus, Teoh, 2014, Noga, Schnader, 2013, Laux, 2013, Blaylock, Shevlin, Wilson, 2012, Donohoe, McGill, 2011 , Haskins, Simko, 2011, Colley et all, 2012, Crabtree, Maher, 2009,Weber 2009, Shackelford, Slemrod and Sallee, 2009 Jackson, 2015). The majority of them was carried out using the data of corporations incorporated in the USA listed on the US Stock Exchange. The dataset usually covers period after 1994. It is clear that the conclusions are very similar. The studies approved a relation between book and tax reporting and firms' incentives to engage in earnings management activities, and an increase in the risk of the non-achievement of planned goals. For example, there is the study of Landry and Chlala (2005), they synthetize available sources considered this issue of differences between book and taxable income and concluded that the BTD is an indicator of certain trends and discrepancies, and of a risk of failure to achieve sufficient income in the future. Further analysis of earnings quality is demanded. It is possible only with the reconciliation of accounting and taxable income, combined with other methods of analysis such as the relationship between accounting income and cash flow from operations. Also Hanlon (2005) found that the companies with unusually large temporary BTDs have less persistent accruals and earnings. She found that investors interpreting large positive BTDs as a "red flag" and reducing their expectation of future earnings persistence.

Leach and Newsome (2007) and Rosner (2003) found that companies, which manage their earnings by BTDs has greater probability of bankruptcy. The changes in firm BTDs could be a reason of changes in income caused by the management activity.

The conclusions of study of Weber (2009) demonstrates that unusually large BTDs are underestimates by market itself and therefore credit rating agencies should incorporate this indicator into their calculations of rating.

Shackelford, Slemrod and Sallee, 2009 in their study researched the relation between accounting earnings and cash flow and the impact of BTDs on these indicators. Based on the conclusion they formalized the idea that the attractiveness of some investment decisions is enhanced because they provide managers with discretion over the timing of taxable income and/or book income.

Chi, Pincus and Teoh (2013) found evidence that investors misprice information contained in BTDs, measured as ratio of taxable income to book income.

The topic of temporary component of book-tax differences was examined in many studies, namely Philips et al., 2003; Hanlon, 2005; Blaylock et al., 2012,Philips et al. (2003) assessed if the usefulness of deferred tax expense in detecting earnings management. They provided the evidence that deferred tax expenses generally being incrementally useful for total accruals and abnormal accruals. For examined this hypothesis they use two Jones-type models in detecting earnings management to avoid an earnings decline and to avoid a loss.

Blaylock et al. (2012) examined book-tax differences as a signal of earnings persistence. They find that there are multiple potential sources of book-tax differences. Then they examined the differing implications of large positive book-tax differences for earnings and accruals persistence depending on the source of those book-tax differences. They illustrated the importance of the source of the book-tax differences.

Lev and Nissim (2004) were the first who investigated the association between the ratio of tax-to-book income to predict earnings growth and abnormal stock returns to explain the earnings-price ratio in the period before and after the implementation of Statement of Financial Accounting Standards (SFAS) No. 109 in 1993. They dealt with both temporary and permanent BTDs as well as tax accruals, such as changes in the tax valuation allowance. They also find that the tax fundamental is strongly related to contemporaneous earnings-price ratios and weakly related to stock returns. That can indicate improvement in investor´s perceptions of the involvement of the tax information for future earnings during the time.

Also it is worth to mention the study of Hanlon (2014) that is dealing with the relation between tax enforcement and financial reporting quality. They find that the government, because it has tax claim on firm´s profits is actually the largest minority shareholder in almost corporations. There is the evidence that higher tax enforcement by the tax authority has a positive correlation with the quality of financial reporting.

It is difficult to find similar studies carried out for European firms. There are only studies of Gordon, Joos (2004), Bohušová, Svoboda (2005), Chludek (2011), and Vučković-Milutinović, Lukić (2013).

The study carried out by Vučković-Milutinović, Lukić (2013) deals with the 20 largest non-financial companies and 20 banks in Serbia. The research uses financial statements data for the period 2009 – 2010. The research examines the materiality of DTA and DTL. The conclusions of study of Bohušová, Svoboda (2005) have shown the materiality of the deferred tax category in the Czech Republic – the median of deferred tax/total income tax ratio is 15.21% resp. 7.4% in the researched samples. As the most complex, the research of Chludek (2011) can be considered.

2. Methodology and Data

The paper is concerned with the materiality of deferred tax category in the financial reporting of the Czech non-financial companies obliged for deferred tax reporting and preparing financial statements according to the CAL and the impact of the deferred tax reporting on the level of distributable profit or loss.

The study is built on conclusion of previous study made by author (Habanec, 2016). That study dealt with the materiality of the deferred tax category in financial statements prepared according to the IFRS. The dataset covers the financial statements of the publicly traded companies operating in the chemical industry in the Czech Republic (NACE 20.1).   The financial statements are covering period starting in 2005 up to 2015. The

year 2005 is the first year of obligatory application of IFRS for publicly traded companies within the EU.

The analysis utilizes the publicly available financial statements and their notes data of companies operating in the chemical industry (NACE 20.1). The system of the Czech Ministry of Finance (ARES) was used for their identification. The number of 11 companies was identified. Companies which did not present their financial statements in a suitable, and did not present all the information during the researched period were excluded. The researched sample consists of 6 companies (Colorlak, a.s.; DEZA, a.s.; Lach-Ner, s.r.o.; Linde gas, a.s.; Lovochemie, a.s.; Silon, s.r.o.) and covers the series from 2005 to 2015. The dataset includes 66 firm-years.

The calculation of the materiality was based on gross profit and total assets. The International standards of audit (hereinafter ISA) 320 – Materiality methodology was used for the materiality definition. Due to the fact that neither ISA 320, nor IFRS set any quantitative criteria for materiality calculation, the study of McKee, Eilifsen (2000) granted by the Norwegian Research Council was used for setting quantitative criteria of materiality. According to this study, there are four possible approaches to materiality quantification (Single rules, Variable of size rules, Blend of averaging methods and Formula methods).

The materiality level for the P/L statement items was computed as a percentage of gross profit. For balance sheet items materiality level was computed by single rule:

$$Materiality\ level = total\ assets \cdot 0.05 \qquad (1)$$

$$Materiality\ level = gross\ profit \cdot 0.05 \qquad (2)$$

If the balance sheet items and profit and loss statement items were interrelated the lower of the both amounts is considered. The materiality level is defined in USD according to the Norwegian Research Council , the criteria were converted to the approximate amount in the CZK. The criteria for materiality level were set in the following way.

- 2 to 5% of gross profit if it is less than 500,000 CZK,
- 1 to 2% of gross profit if it is between 500,000–25,000,000 CZK,
- ½ to 1%of gross profit if it is between 25,000,000–2,500,000,000 CZK,
- ½% of gross profit if it is over 2,500,000,000 CZK.

The results are compared with results of the previous study carried out in this issue (Habanec, 2016).

3. Results

The Variable of size rules for the deferred tax (expense, income)) reported in the profit and loss statement and the single rule for the deferred tax asset or liability reported in the statement of financial position for setting the materiality level. The following tables describe the level of the deferred tax materiality in researched companies.

Table 1: Colorlak, a.s. Deferred tax materiality (based on variable of size rules and single rules) in thousand CZK

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	average
Gross profit	22 839	39 014	38 645	22 968	15 236	18 964	11671	12437	7 103	29 287	33 384	22868
DT (P/L)	−24	48	−57	32	8	416	402	702	393	−194	193	224
DT mater. %	N; 0.11	N; 0.12	N; 0.15	N; 0.14	N; 0.05	Y; 2.19	Y; 3.44	Y; 5.64	Y; 5.53	N; 0.66	N; 0.58	N; 0.98
Total assets	461030	499116	558402	637225	600622	615865	661994	642003	654812	689121	738219	614401
DT (BS)	203	251	194	226	233	650	1 411	2 133	2 560	2 312	2 505	1153
DT mater. %	N; 0.04	N; 0.05	N; 0.03	N; 0.04	N; 0.04	N; 0.11	N; 0.21	N; 0.33	N; 0.39	N; 0.34	N; 0.34	N; 0.19

Table 2: DEZA, a.s. Deferred tax materiality (based on variable of size rules and single rules) in thousand CZK

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	average
Gross profit	269528	294933	382587	446104	67359	1075523	1089670	750623	393471	434283	308710	501163
DT (P/L)	54897	13896	−38720	−52031	14 645	24 978	−11742	−1 651	−7 536	−3 446	13 675	22474
DT mater. %	Y;20.37	Y; 4.71	Y;10.12	Y;11.66	Y;21.8	Y; 2.32	Y; 1.08	Y; 1.55	Y; 1.92	N; 0.79	Y; 4.43	Y; 4.48
Total assets	5283	5909	6074	6831	4411	4642	5217	5515	5632	5469	5079	5460
DT (BS)	227032	240927	202207	150176	164821	189799	178057	166406	158870	155424	169099	182074
DT mater. %	Y; 4.30	Y; 4.08	Y; 3.33	Y; 2.20	Y; 3.74	Y; 4.09	Y; 3.41	Y; 3.02	Y; 2.82	Y; 2.84	Y; 3.33	Y; 3.33

Table 3: Lach-Ner, s.r.o. Deferred tax materiality (based on variable of size rules and single rules) in thousand CZK

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	average
Gross profit	5 415	2 551	−1 309	2 818	2 605	8 567	6 901	6 562	6 725	15 961	15 869	6 844
DT (P/L)	25	575	1 432	569	597	580	72	1 472	−523	1 860	714	765
DT mater.	N; 0.46	Y;22.54	Y;109.40	Y;20.19	Y;22.92	Y;6.77	N; 1.04	Y;22.43	Y;7.78	Y;11.65	Y;4.50	Y;11.18
Total assets	67527	62 222	6 583	61 650	58 334	93546	113360	131337	130425	135250	143597	91257
DT (BS)	195	7 661	6 229	5 660	5 063	4 482	4 410	2 939	3 462	1 602	888	3 872
DT mater. %	N; 0.29	Y; 12.31	Y; 94.62	Y; 9.18	Y; 8.68	Y; 4.79	Y; 3.89	Y; 2.24	Y; 2.65	Y; 1.18	Y; 0.62	N; 4.24

Table 4: Linde gas, a.s. Deferred tax materiality (based on variable of size rules and single rules) in million CZK

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	average
Gross profit	1010	1030	1183	1358	1106	1256	1400	1365	1513	1533	1507	1296

Year	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*average*
DT (P/L)	24258	34727	17661	7118	272	3735	1001	8247	3859	1521	46845	13568
DT mater. %	Y; 2.40	Y; 3.37	Y; 1.49	N;0.52	N;0.02	N;0.30	N; 0.07	N; 0.60	N; 0.26	N; 0.10	Y; 3.11	Y; 1.05
Total assets	6 839	6 562	6 465	5 450	5 284	5 574	5 294	5 458	5 573	5 538	5 658	5 790
DT Amount (BS)	98 036	63 309	44 922	52 524	52 252	48 517	47 516	39 269	47 776	44 801	80 734	56 376
DT mater. %	Y; 1.43	Y; 0.96	Y; 0.69	Y; 0.96	Y; 0.99	Y; 0.87	Y; 0.90	Y; 0.72	Y; 0.86	Y; 0.81	Y; 1.43	Y; 0.97

Table 5: Lovochemie, a.s. Deferred tax materiality (based on variable of size rules and single rules) in million CZK

Year	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*average*
Gross profit	157760	138383	91528	658022	200105	205946	492292	685549	326777	406004	373862	339657
DT (P/L)	15 980	22 538	2 481	20 371	6 952	6 540	7 230	3 071	6 635	3 484	45 030	12 756
DT mater. %	Y;10.13	Y;16.29	Y;2.71	Y;3.1	Y;3.47	Y;3.18	Y;1.47	N;0.45	Y;2.03	N;0.86	Y;12.04	Y;3.76
Total assets	2 829	3 157	3 060	3 318	2 908	2 911	3 889	3 664	4 025	4 281	5 146	3 563
DT Amount (BS)	60 824	83 380	83729	61 647	67 481	72 916	78 891	81 962	75 327	78 811	123841	78 983
DT mater. %	Y; 2.15	Y; 2.64	Y;2.74	Y; 1.86	Y; 2.32	Y; 2.51	Y; 2.03	Y; 2.24	Y; 1.87	Y; 1.84	Y; 2.41	Y; 2.22

Table 6: Silon, a.s. Deferred tax materiality (based on variable of size rules and single rules) in million CZK

Year	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*average*
Gross profit	45 134	83 454	132 375	15 432	72 316	34 248	93 963	53 491	52 315	161140	206543	86401
DT (P/L)	5 121	19 277	7 685	253	4 407	687	2 841	2 680	5 749	8 473	9 552	6 066
DT mater. %	Y;11.35	Y;23.10	Y;5.81	N;1.64	Y;6.09	Y;2.01	Y;3.02	Y;5.01	Y;10.99	Y;5.26	Y;4.62	Y;7.02
Total assets	852	912	1 933	1 920	1 708	1 737	1 739	1 736	1 593	1 475	1 674	1 571
DT (BS)	15 837	34 664	42 350	42 603	47 010	46 323	49 164	46 484	52 233	41 275	31 723	40 879
DT mater. %	Y;1.86	Y;3.80	Y;2.19	Y;2.22	Y;2.75	Y;2.67	Y;2.83	Y;2.68	Y;3.28	Y;2.80	Y;1.89	Y;2.60

From the tables 1–6 is apparent that for the deferred tax category is significant for majority of companies. Also for almost all reporting firms, the deferred tax category is significant except Colorlak, a.s. Nevertheless it can be said that the deferred tax category is less significant in comparison to companies reporting according to IFRS (average 6.6%). The average deferred tax level in business companies reporting in accordance with the CAL is 4.1%. It is influenced the reporting system applied. The CAL is influenced by the tax system. The book-tax differences, which caused the deferred tax category, are smaller. The Anglo-Saxon accounting system (representing by IFRS) is relatively independent on the income tax legislation, the book -tax differences are higher in comparison to the continental system. The deferred tax category is more significant. These conclusions correspond with author's previous study (Habanec, 2016) where was founded that deferred tax is highly significant accounting category.

4. Discussion and Conclusions

The category of deferred tax is a specific issue that interconnects the area of accounting and the area of income tax. The main object of this paper was to analyze the significance of the deferred tax category reporting in accordance with Czech accounting legislation and to compare the significant of deferred tax category reporting in accordance with IFRS. There was investigated the sample of six companies namely Colorlak, a.s.; DEZA, a.s.; Lach-Ner, s.r.o.; Linde gas, a.s.; Lovochemie, a.s.; Silon, s.r.o., in the time period 2005–2015. The dataset includes 66 firm-years. The results indicate that the deferred tax category reporting in accordance with Czech national legislate is less significant than deferred tax category reporting in accordance with IFRS. The results were compared with previous study (Habanec, 2016) and confirm expectations state above – deferred tax reporting in accordance with Czech accounting legislate (representing continental accounting system) is less significant than deferred tax category reporting in accordance with IFRS (representing Anglo-Saxon accounting system). Lev and Nissim (2004) and Hanlon (2005) investigate that the tax-base provide information about growth in earnings and the persistence of earnings. In their conclusions the deferred income tax provides information to external users and this conclusion support the conclusion of this paper – the category of deferred income tax is significant in both accounting systems. Poterba (2011) investigate whether the category of deferred income tax may affects behavior and incentives of the company. Because the category of deferred income tax is significant the assumption should be that the behavior and the incentives will be affected by the deferred income tax in both accounting systems. The assumption was confirmed.

Nevertheless the results are based on limited data due to limited amount of publicly traded companies in the Czech Republic.

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How is a hotel's turnover affected by foreign exchange interventions in the Czech Republic?

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Abstract

Even though the current paper has focused on the hotels which take a place in our country within their business, some other financial issues are also connected to that problematic. The global financial crisis and its impact on the small open economy as the Czech Republic is, as well as the monetary policy of the Czech National Bank (CNB), both has affected not only the business of entire hotel industry. The aim of the paper is to investigate whether or not as well as how the future restrictive monetary policy could affect the hotel's turnover in the Czech Republic. As the main estimation method it is used the GMM regression with pooled data of the hotels. It is obtained time series for the hotels' profit and loss statements from Bureau van Dijk's Amadeus international statistical database and exchange rates as well as the CNB foreign exchange trading from their online database. According to the CNB, which has decided to use the koruna exchange rate as an additional instrument for easing the monetary conditions in 2013, they will still not discontinue the use of the exchange rate as a monetary policy instrument before 2017 Q2. Therefore, suggestions for the hotels to hedge naturally have been made. Finally, there are some ideas for future research in that area, too.

Keywords: Hotels, Global financial crisis, Czech Republic, FX interventions

JEL Code: D22, D24, D31

1. Introduction

An economic importance of the tourism as well as of the hotel industry as a whole, both has still attracted the attention of the researchers from entire world (Atan and Arslanturk, 2012; Chou, 2013; Dwyer *et al.* 2004; Onetiu and Predonu, 2013). That should have not been underestimated in a small open economy, as the Czech economy is well known. Even though that specific business industry of the Czech hotels suffered by the impact of the global financial crisis (GFC) in 2009 and 2010 (Heryán and Kajurová,

2016), the hotels had to affect a new situation on the market as the rest of the Czech businessmen. This situation has started according to expansionary monetary policy of the Czech National Bank (CNB) when its board members accepted the monetary intervention in November 2013. It caused strong depreciation of the Czech currency (CZK) which is affected by that intervention till nowadays. Nevertheless, the time has changed and the CNB has informed the public about a possible end of its interventions on the market in the near future, this year.

The aim of the paper is to investigate whether or not as well as how the future restrictive monetary policy could affect the hotel's turnover in the Czech Republic. The estimated period is from 2008 till 2014, so the period affected by the GFC as well as by the interventions of the CNB. This study contributes to the issue of the policy implications not just within the business of the hotels. From results it is possible to deduce the implications for other business industries, as well. Foreign tourism in contrast with economic development is the frequent issue among the research abroad. However, Czech hotels have more revenues in foreign exchange than costs. Therefore it is not investigated the impact on the earnings. Otherwise, it is investigated relationship with the revenues.

The paper is structured as follows. After the Introduction the Section 2 is divided into two parts. Firstly, it has been reviewed recent literature focusing on the economic and financial issues of the hotels, and secondly, it has been described selected economic events in the Czech Republic within estimated period. Section 3 describes used data as well as the methodology. Whereas in Section 4 it has been reported our results for the panel regression analysis, Section 5 finally concludes through the economic suggestions for the hotels within a final discussion.

2. The current state of knowledge

This Section is divided into two parts. As the first it is made a review of a few selected papers connected with financial and economic issues of the hotel business. As the second it is described a few economic events which has affected the Czech economy.

2.1. Selected empirical studies within the hotels' financial issues

Chou (2013) examines causal relationships between tourism spending and economic growth in 10 transition countries for the period 1988–2011. Panel causality analysis, which accounts for dependency and heterogeneity across countries (including V4 countries), is used herein. The empirical results support the evidence on the direction of causality. He mentioned that the relationship between tourism spending and economic growth for both developing and developed countries has been extensively researched over the past several decades. In detecting causal linkage between tourism spending and economic growth, he utilize the panel causality approach instead of the time series method, since panel data sets include information not only from the time series dimension but also the cross-section dimension. Based on this advantage of panel data analysis, non-stationary panel tests (unit root, cointegration and causality) have become a more powerful econometric methodology in recent years. (Chou, 2013)

It is argued by Dwyer *et al.* (2004) that the importance of tourism to economies is well recognized. As the result, when tourism changes or policy shifts are being considered, there is an interest in determining what impact on the economy they might have,

they mentioned as well. However, the approach to economic evaluation typically undertaken in the tourism context, is both incomplete and misleading. Among others they mentioned a few interesting research questions. (i) What impact will a change in domestic or international tourism, have on economic activity in a country or region? (ii) What impact will an increase in outbound tourism have on activity in the home country? (iii) What impact on economic activity within a state will intrastate tourism have? (Dwyer *et al.* 2004)

It is argued by Atan and Arslanturk (2012) that tourism is the world's largest industry and one of the fastest growing sectors, accounting for over one-third of the value of total worldwide services trade. They also argue that the tourism, in the last few decades, has become an indispensable source of income for developing countries, Turkey in particular, and this aspect of tourism has managed to catch the attention of a number of countries, principally developing ones. The tourism literature abounds a number of studies into tourism and economic growth nexus through a variety of methods such as Granger causality, cointegration as well as regression analysis.

However, there are hardly any studies incorporating input-output analysis according to them. According to their opinion, in Turkey, tourism is growing very fast and its contribution to the economy is highly significant. According to their results for output multiplier values of the tourism, especially for the output significance of hotel and restaurants indicator of tourism sector to be transformed into growth of the economy, sectors that benefit from it should be equally vibrant. Identification of such sectors is important of policy purposes as they may constrain the growth impact of tourism due to them. Their analysis shows that tourism sector has important and significant impact on economy especially with hotel and restaurant indicator. In conclusion tourism is not the key sector in economy, but especially for hotel and restaurants and supporting and auxiliary transport activities; activities of travel agencies indicators, tourism sector has high backward linkage in the economy, as well. According to their results, it has been also seen that the total amount of the input from the other sectors for the output in tourism sector is high and tourism sector is in a structure of nurturing other sectors hence, it is thought that tourism sector will support the production in other sectors, with a considerable impact on growth. (Atan and Arslanturk, 2012)

Oneţiu & Predonu (2013) argue that efficiency is a fundamental development and tourism is an integral part of the economy of a state, is considered very important for both social and economic development of that country. In their paper they intend to show economic and social efficiency that can bring tourism to a state. First of all, to show the economic efficiency of tourism in Romania, they started from the principle of economic efficiency, by comparing the effects with the effort. Second, tourist activity, using resources available to that, generates not only economic, but also social and these effects have been analyzed in the study, as well as economic and social indicators such effects and efficiency of each component separately. Furthermore, they show which factors can lead to economic efficiency and the social, from the general formula for determining the efficiency. Last but not least, they argue that tourism is very closely related to the civilization and culture, between them instituting an interdependent relationship. By harnessing the natural resources, human and financial placed at its disposal, tourism generates these economic and social effects that increase the economic efficiency, progress and civilization. According to that they considered this issue with particular relevance and importance to the growth and economic development and social welfare as a whole. (Onetiu and Predonu, 2013)

2.2.   Current economic events within the Czech economy

According to the Czech National Bank (CNB, 2017) the aim of using the exchange rate as an additional monetary policy instrument – and therefore of using foreign exchange (FX) interventions to weaken the koruna – is the same as in the case of interest rates. In line with the CNB's statutory mandate, the objective is to maintain price stability in the Czech economy, which is expressed by the CNB's inflation target of 2%. In other words, the aim is to prevent deflation, to ensure that the 2% inflation target is achieved in a sustainable manner and to accelerate the return to a situation where the CNB will again be able to use its standard tool, i.e. interest rates. The use of FX interventions as an appropriate tool for countering deflation risks was recommended by an IMF mission in 2013. So, The CNB Bank Board decided to use the exchange rate as a monetary policy instrument, and therefore to commence FX interventions, on 7 November 2013.
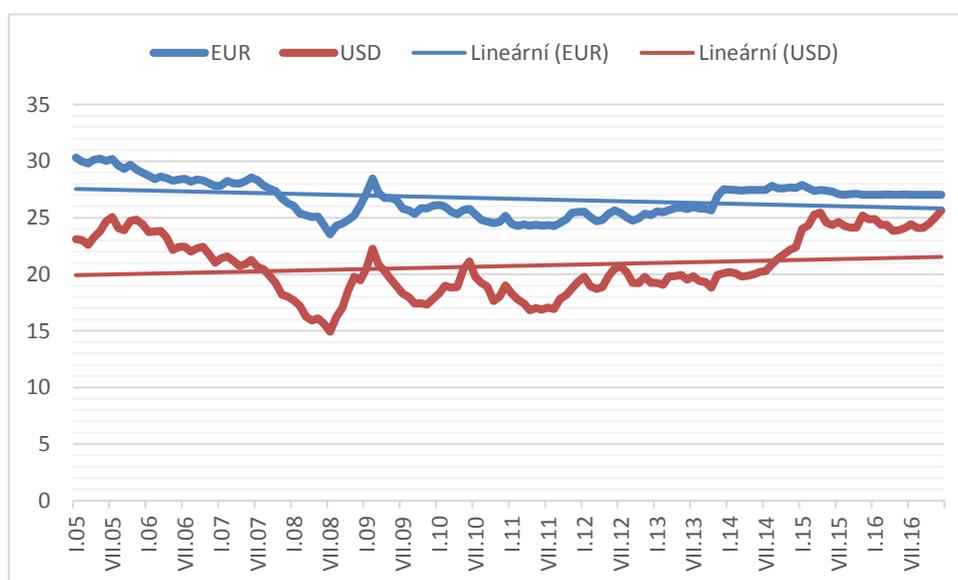
Figure 1: Development of selected foreign exchange rates

In the Figure 1 we can see that the 2013 monetary intervention of the CNB has influenced both selected foreign exchange rates, the CZK against the EUR as well as against USD. Recent events have showed that a need to maintain expansionary monetary conditions to the current extent persists. The Bank Board therefore states again that the Czech National Bank will not discontinue the use of the exchange rate as a monetary policy instrument before 2017 Q2. The Bank Board still considers it likely that the commitment will be discontinued around the middle of 2017. (CNB, 2017)

Nevertheless, even the banking sector itself has affected by the situation on the market. The Czech National Bank argues in its monitoring (CNB, 2016, p. 12) that the current central question is whether banks will continue to earn enough money to be resilient and stable. The central bankers argue also that opinions are divided, however, on the issue of how to solve the difficulties facing the European banking sector. One side argues that banks must radically alter their business models, while the other side argues that this will not be enough to end the sector's plight and that further market consolidation is needed, which means a further reduction in volume in the banking and financial system.

3. Methodology and Data

It is obtained time series for 1484 Czech hotels from Bureau van Dijk's Amadeus international statistical database. Annual data has been obtained for period from 2005 till 2014. Among the pooled data of those hotels it is used their turnover in mil. EUR, from profit and loss statements. To estimate whether or not there are some significant relations between foreign exchange market and its impact on the business of the hotels in the Czech Republic exchange rates (against to EUR as well as against to USD) and also the CNB foreign exchange trading from their online database. All of the data has been obtained in panels and furthermore, it has been standardized through the examining of the natural logarithms and percentage changes.

3.1. GMM model

As the key estimation method it has been used the two-step Generalized Method of Moments (GMM) with data in panels. To reach the aim of the paper these three selected relations has been investigated through the estimation of equations (1), (2) and (3):

$$TO_{it} = \alpha_{it} + TO_{i(t-1)} + FT_{i(t-1)} + \varepsilon_{it} \,, \tag{1}$$

$$TO_{it} = \alpha_{it} + TO_{i(t-1)} + EUR_{it} + \varepsilon_{it} \,, \tag{2}$$

$$TO_{it} = \alpha_{it} + TO_{i(t-1)} + USD_{i(t-1)} + \varepsilon_{it} \,, \tag{3}$$

where the endogenous variable TO_{it} is the growth rate of the turnover of *i* hotels in percentages in time *t* in all three equations (1), (2) and (3). Among exogenous regressors it has been employed $FT_{i(t-1)}$ which means a growth rate of whole amount of the CNB foreign trading from previous year in percentages in the first equation (1). In the second equation (2) exogenous EUR_{it} means a percentage change within average exchange rate of the Czech koruna against the euro currency. And finally, variable $USD_{i(t-1)}$ means a percentage change within average exchange rate of the Czech koruna against the U.S. dollar from the previous year in the third equation (3). According to the usage of the GMM estimation method with the pooled data it has been used variable $TO_{i(t-1)}$ which is the growth rate of the turnover of *i* hotels in percentages in time *t* from lagged by one year (see Heryán and Tzeremes, 2017).

Table 1: Descriptive statistics of the regressors

	TO_{it}	$FT_{i(t-1)}$	EUR_{it}	$USD_{i(t-1)}$
Mean	125.3211	4.4768	–0.8714	–2.5272
Median	–1.4326	8.5730	–2.0534	–2.9705
Maximum	361 523	56.5475	5.8156	11.0504
Minimum	–539 066	–64.6435	–10.6637	–17.3985
Std. Dev.	10 542	39.1164	5.2349	9.2477
Observations	6 611	11 872	13 356	11 872

Two facts should be highlighted: firstly, (i) from the correlation point of view it is obvious that we cannot use all three regressors $FT_{i(t-1)}$, EUR_{it}, and $USD_{i(t-1)}$ in one equation to estimate different relations due to the problem with multicollinearity among

those regressors. Therefore they have been used separately. And secondly, (ii) all of our time series are stationary according to the tests in EViews 9.5 (individual as well as common unit roots have been rejected in all cases). In the Table 1 below we can see descriptive statistics of all our variables.

4. Results

According to the problem with multicollinearity among regressors it has been estimated three models with each exogenous variable, separately (please see the Appendix).

Table 2: Estimation results

Variable	Model 1	Model 2	Model 3
$TO_{i(t-1)}$	−0.0012 [a]	−0.0013 [a]	−0.0011 [a]
$FT_{i(t-1)}$	−18.2562 [a]		
EUR_{it}		−125.5763 [b]	
$USD_{i(t-1)}$			79.9780 [a]
PERIOD EFF. 2008	741.9087 [a]	414.7194 [a]	782.5697 [a]
PERIOD EFF. 2009	228.6452 [a]	−1106.4360 [b]	951.7824 [a]
PERIOD EFF. 2010	265.0742 [a]	252.1118 [b]	1083.5560 [a]
PERIOD EFF. 2011	−678.6325 [a]	−655.8162 [a]	−717.8175 [a]
PERIOD EFF. 2012	1242.7020 [a]	−469.5311 [a]	236.4934 [b]
PERIOD EFF. 2013	1393.3040 [a]	−88.4382 [a]	1007.7340 [a]
PERIOD EFF. 2014	−563.6040 [a]	−260.8311 [a]	−577.1698 [a]

Note: Symbol [a] or [b] means statistically significant results at 1% or 5% level.

From the results of the panel GMM models it is obvious that all three exogenous are statistically significant. Interesting finding has also been reached among the fixed period effects, when it is evident the enormous numbers in the period affected by the global financial crisis (2009/2010) as well as in 2013, when the CNB has accepted the interventions within the foreign exchange market. However, the most interesting thing is significant period effects in previous year (2012) within the case of the CNB foreign exchange trades.

Whereas the change of all variables has been estimated as the significant with one year lag, only the change of the EUR exchange rate has been estimated as the significant without any lags. Furthermore, according to its value, it means that this exchange rate affected the most the business of the Czech hotels. Its negative sign means opposite relation, so when the appreciation of the CZK due to the FX interventions has highly increased the exchange rate, otherwise the hotels' turnover has decreased.

Authors among recent literature, e.g. Atan and Arslanturk, 2012; Chou, 2013; Dwyer et al. 2004; Onetiu and Predonu, 2013, have mainly estimated relations between GDP and the tourism development. Here we can see what affect the hotel's turnover. In times of higher foreign exchange rate volatility among the EU is necessary to see how exchange rates can affect the output of not only the hotels. However, if the hotel's turnover is affected, it can analogically have impact on the earnings as well as whole GDP.

5. Discussion and Conclusions

The aim of the paper was to investigate whether or not as well as how the future restrictive monetary policy could affect the hotel's turnover in the Czech Republic. It has been proved that development on the foreign exchange market really affected the business of the Czech hotels. Therefore it is impossible to ignore financial development in the Czech economy, especially nowadays, when the Czech National Bank is planning to reject the exchange rate intervention which has started in November 2013. Nevertheless, according to that fact, hotel managers should pay more attention to the problematic of the financial hedging within exposures of exchange rate risk, especially nowadays.

The impact of those changes within selected variables of foreign exchange market are evident. Nonetheless, how the possible end of foreign exchange interventions and its future restrictive monetary policy would have affected the business of the Czech hotels is obvious, as well. When the Czech koruna (CZK) will have appreciated due to the end of the interventions, the hotel revenues earned in foreign currencies will have decreased when they will be changed into the CZK. According to our results it would be suggested to the hotels to use the cheapest way of hedging through taking a loan in foreign currency (EUR). This loan should be immediately changed into the CZK and whole amount of the money should be used as a long-term deposit to secure that loan in foreign currency. Through that way a bank will not be affected by foreign exchange risk and the interest rates on the loan would be at their minimum. Every time, when hotels will earn foreign currency (EUR), they would paid that money to a bank as installment of the loan. Through that natural hedging hotels managers will have not been afraid of the shocks connected with the changes on the foreign exchange rate market due to future restrictive monetary policy of the Czech National Bank. Furthermore, they will also lead the financial costs to their minimum (compared to other ways of the hedging i.e. through financial derivatives).

Within a future research it could be interesting to examine an average turnover from the business of the hotels from the point of a number of arrivals from abroad to separate domestic transactions of hotel clients. A comparison among a few countries such as Visegrad countries should be interesting, too.

Acknowledgement

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20th International Scientific Conference
"Enterprise and Competitive Environment", March 9–10, 2017,
Brno, Czech Republic

Student Entrepreneurs: Doers, Procrastinators, and Dreamers

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Abstract

Entrepreneurship as one of the potential career paths is an actual phenomenon among university students. However, as shown by recent GUESSS (Global University Entrepreneurial Spirit Students' Survey) findings, the action-intention patterns are rather varied. While a bunch of students already start their businesses (= "doers"), few of them declare their intention to start-up after completing their studies (= "procrastinators"), and even greater share of student population indicate a postponed intention to start a business in the mid-range future (= "dreamers"). The aim of this exploratory study is to analyse differences between actual, would-be and „perhaps sometimes later" entrepreneurs among European university students. To do so, we utilize the 2016 GUESSS project individual-level data from 25 European countries (n=68,828), and search for similarities and differences between the above-mentioned groups of university students. Our findings contribute to the body of knowledge on this under-researched perspective on youth and student entrepreneurship.

Keywords: entrepreneurship, students, activity, intention, postponement, realization

JEL Code: L26

1. Introduction

Student entrepreneurship is an important phenomenon within the overall entrepreneurial dynamics. In environment of universities, students have access to broad knowledge and networks, and their student status gives them, in general, certainly more freedom and space for experimenting than after entering the "real" life with all its duties

and responsibilities. However, as in the general population, while some students get engaged in the enterprising efforts or report interest to start their businesses in closer or less proximate future, the others remain distant. If we agree that having entrepreneurs is beneficial for population in general, having student entrepreneurs is even more important. With business activities established already during the studies, the transition from student life to economic activity is smoother. Also, if an individual enters the entrepreneurial path in the beginning of the economically active life, it is more likely he/she will remain on this path in the future life.

There are several good preconditions to support student entrepreneurship, including (potential) exposure to educational and training programs, easy targeting of support services and schemes, unprecedented access to networks and knowledge, synergies from interactions and interdisciplinarity etc. However, efficient entrepreneurship support requires good understanding on why some individuals abstain from entrepreneurship, how entrepreneurial intentions are formulated and whether and how they convert into real activities. Thus, the aim of our study is to provide an initial exploration under an innovative perspective dividing student population into entrepreneurship doers, procrastinators, dreamers and abstainers. The main research question of our study is: what are the differences between student entrepreneurial doers, procrastinators, dreamers and abstainers?

2. Student entrepreneurs, intention and action

2.1. Universities, students and entrepreneurship

Entrepreneurship has been taught at universities already for decades. According to Katz (2003), the first entrepreneurship course was offered at Harvard's Business School in United States in the February 1947. Gradually, other universities started adopting entrepreneurship into their curricula. Currently, majors in entrepreneurship or small business can be found on hundreds of higher education institutions worldwide. Moreover, universities have moved far behind providing only courses on entrepreneurship. Instead, it has become, besides educating students and conducting research, something like their third mandate (Slinger et al., 2015). Universities produce new knowledge and innovation, and their scientific and pedagogical staff hand them on to young people who are supposed to apply the obtained know-how in practice. Part of students do not wait until the completion of their studies, but start to realize their talents through own entrepreneurial activities. Therefore, a category of student entrepreneurs arises.

According to Marchand and Hermens (2015), student entrepreneurs can be defined as individuals attending award classes at university and conducting innovative and revenue generating entrepreneurial activities. However, if we adopt broader definition of entrepreneurship, we can consider all students involved in actively running any enterprising activities, i.e. acting upon identified opportunities and developed ideas, and transforming them into value for others. While doing so, student entrepreneurs can take many advantages of university resources such as specialized professors, support services or spaces such as incubators, patent and copyright protections provided by the university and sometimes also their classroom learning (Mars et al., 2008). Further, they might use universities and their faculty members or students to market products, services and processes. In such conditions, providing only entrepreneurship education alone is not enough. The role of universities in stimulating entrepreneurship has to be

understood in a broader context. An integrated ecosystem should be created, with close linkages between science, engineering, business, law and other groups (Slinger et al, 2015). As Slinger et al. (2015) state in their Student Entrepreneurship Encouragement Model (SEEM), universities should encourage students through three groups of activities, namely stimulating (creating awareness of the entrepreneurial opportunities, presenting role models and success stories, etc.), educating (teaching the necessary skills, business plan creation, etc.), and incubating (various forms of support to start-up teams).

2.2. Entrepreneurial intention, action and their drivers

According to the results of the systematic literature review on entrepreneurial intentions (Liñán & Fayolle, 2015), the decision to become entrepreneur is influenced by a combination, respectively the interaction of several factors, including: core entrepreneurial intention model, personal level variables, entrepreneurship education, context and institutions and the entrepreneurial process.

The standard theoretical models to explain students' entrepreneurial intentions and ultimately entrepreneurial intentions are Shapero's model of the entrepreneurial event (Shapero, 1982) and Ajzen's (Ajzen, 1991) theory of planned behavior (TPB). In these intention-based models, entrepreneurship is seen as an intentional process. In the psychological literature, intentions have proven to be the best predictor of planned behavior. Entrepreneurial intentions are seen as the product of an individual's self-efficacy, attitude and the subjective norms toward entrepreneurial behavior (Krueger, Reilly, & Carsrud, 2000). According to these theories entrepreneurial intentions are seen as one of the strongest predictors of entrepreneurial behavior.

Determinants of individual entrepreneurial intention and/or consequent involvement in entrepreneurship have been subject to theory development and empirical research for decades. Especially regarding students (or "youth" category, where students usually fall into), these drivers can be found among demographic attributes, individual personality, human capital and social capital characteristics, and environmental enablers and characteristics. Demographic characteristics include mainly gender and age, with being female inhibiting entrepreneurial activity (e.g. Zamfir et al., 2013) and increasing age being its driver (e.g. Minola et al., 2014, Zamfir et al., 2013). Also, in some countries, migrants have been identified to be more enterprising comparing to local populations (e.g. Kloosterman, 2010). Individual attributes studied for their effect on entrepreneurship include personality traits, such as risk-taking, need for achievement or autonomy, creativity, innovativeness or locus of control (Rauch and Frese, 2012), then entrepreneurship competencies (Unger et al., 2011) and education. There are ambiguous evidences on effect of education in general (Minola et al., 2014), so its exploration is directed to more specific perspectives, such as exposure to special entrepreneurship education or entrepreneurship-related field of study (Holienka et al., 2016). As for social capital characteristics, frequently established drivers of individual involvement are namely entrepreneurship-favoring climate and support from close social groups (e.g. Wyrwich et al., 2016) and parent entrepreneurs (e.g. Lindquist et al., 2015).

3. Methodology and data

Our analysis is based on data from Global University Entrepreneurial Spirit Students' Survey, a worldwide academic study on entrepreneurial activities and related attributes among university students (Sieger et al., 2016). The project collects data using an online survey instrument from population of higher education students using the convenience sampling. We utilize data from 2016 wave with coverage on 50 countries and total sample of 122,509 respondents. We focused our analysis on European countries only, with condition of minimum sample size of 100 respondents. This resulted into the sample of 68,828 individuals from 25 different European countries.

To classify the respondents according to their inclination to entrepreneurship, we computed a dummy variable labeled "action_intention" with four values (being an active or nascent entrepreneur=doer; not being and entrepreneur yet but indicating the planned career as entrepreneur after completing the studies=procrastinator; indicating the plan to become entrepreneur five years after study=dreamer; no entrepreneurial activity or plans to become an entrepreneur=abstainer).

Our investigation on differences among entrepreneurship inclinators with comparison to abstainers covered selected demographic characteristics, individual entrepreneurship-related attributes and contextual attributes related to university and personal background. Variables utilized in the analysis are described below.

The demographic characteristics included the following variables: gender, age category (18–19, 20–24, 25–29, 30 and more), field of study (original category "law and economics incl. business sciences = business; other categories aggregated as non-business), year to finish university studies (current year (t), $t + 1$, $t + 2$ and $t + 3$ and more), and being a migrant (lives up to 5 years in the current country of residence=yes, else=no).

The examined individual attributes included locus of control (Likert-type scale 1–7 comprising of 3 items), attitude to entrepreneurship (Likert-type scale 1–7 comprising of 4 items: attractiveness of entrepreneurial career, would become entrepreneur if had opportunities and resources, satisfaction if became entrepreneur, preferring entrepreneurship to other options) – both scales were tested for reliability and values of Cronbach's alpha were acceptable (locus of control: 0.726, attitude towards entrepreneurship: 0.953). Also, self-assessment of selected entrepreneurial competences was included in the individual attributes, namely: identifying opportunities and creating products, managing innovations and commercializing new ideas, leadership and networking, and managerial competencies.

The contextual attributes covered the university context as well as family and personal background characteristics. The first included perception of university entrepreneurial atmosphere (Likert-type scale 1–7 comprising of 3 items: assessing atmosphere inspiring to develop new business ideas, favorable climate for becoming an entrepreneur and encouragement for students to start entrepreneurial activities; Cronbach's alpha = 0.901) and intensity of entrepreneurship education (no entrepreneurship course=1, elective course=2, compulsory course=3, entire entrepreneurship study program=4). The latter included three variables indicating perceived support to become entrepreneur from close family, friends and fellow students (each one on Likert-type scale 1–7, very negatively – very positively), as well as a dummy variable indicating whether an individual has parent entrepreneurs (none, mother only, father only, both parents entrepreneurs).

For each of the variables in our analysis, we either provide variable frequencies for the examined categories of entrepreneurship inclinators (doers, procrastinators,

dreamers) and abstainers, or mean value of the variable for the examined categories. As we use scales with different number of items, mean values are normalized to interval 0–1. Results of our analysis are presented in structured tables that are further described and discussed.

4. Results and discussion

In the first part of this section we present the basic characteristic of our sample in terms of inclination to entrepreneurship in general, as well as in different countries. As can be seen in Table 1, almost two thirds of European university students completely abstain from entrepreneurship. On contrary, more than each sixth university student in Europe is currently running or actively attempting to start his/her own business activity (i.e. "doer"). Also, there are students who indicate their wish to enter the entrepreneurial path, but postpone this step to the future. While a smart part (1.4% of university students population) procrastinates starting a business to the end of their studies, almost 19% students dreams about starting a business in a more distant future – in five years after completion of the university studies.

Table 1: Inclination to entrepreneurship among university students, entire sample

	%	Sample size
Doers	16.2%	11,160
Procrastinators	1.4%	990
Dreamers	18.8%	12,914
Abstainers	63.5%	43,740

Source: GUESSS 2016 international data, own calculations

As can be seen from Table 2, differences in students' entrepreneurial inclination across European countries are considerable. Most abstainers can be found in Germany, Switzerland and Austria, while the lowest percentage of students declaring no interest in entrepreneurship can be found in Belarus, Russia and FYR Macedonia. Interestingly, while the inclination is higher in the latter countries in all its categories, the highest difference is observed in the share of "procrastinators". Therefore, the results suggest a pattern related to characteristics of country or group of countries. This would correspond with the pattern observed by other studies on general population linking competitiveness level and entrepreneurial activity (e.g. Kelley et al., 2016). However, closer inspection of this direction is behind the scope of this paper, and is encouraged for further research.

Table 2: Doers, procrastinators and dreamers in selected European countries

Rank[1]	Country	Doers	Procrastinators	Dreamers	Abstainers
25	Germany	9.2%	0.4%	11.8%	78.6%
24	Switzerland	9.1%	0.8%	15.6%	74.5%
23	Austria	11.2%	0.9%	15.0%	72.9%
...					
3	FYR Macedonia	31.5%	3.2%	21.8%	43.5%
2	Russia	28.1%	4.2%	28.2%	39.4%
1	Belarus	24.3%	3.5%	35.1%	37.2%

The following part of the results section represents the core of our analysis. We explore the differences among different categories of inclination to entrepreneurship as well as in comparison to entrepreneurship abstainers in selected demographic characteristics (Table 3) and individual and contextual attributes (Table 4).

Table 3: Demographic characteristics vs. entrepreneurial action and intention

Attribute		Doers	Procrastinators	Dreamers	Abstainers
Gender	*Female*	12.3%	1.3%	19.1%	67.3%
	Male	22.4%	1.6%	18.2%	57.8%
Age categories	*18–19*	13.5%	3.0%	27.4%	56.1%
	20–24	14.7%	1.5%	20.4%	63.5%
	25–29	16.0%	0.8%	15.7%	67.4%
	30+	26.2%	1.7%	11.7%	60.4%
Years to finish	*t + 0*	16.9%	0.8%	16.2%	66.1%
	t + 1	16.6%	1.1%	17.1%	65.2%
	t + 2	15.7%	1.6%	19.7%	63.0%
	t + 3 +	15.4%	2.3%	22.8%	59.5%
Field of study	*Business*	19.4%	1.8%	21.9%	56.9%
	Non-business	14.8%	1.3%	17.4%	66.6%
Migrant	*Yes*	24.9%	1.3%	21.1%	52.8%
	No	15.9%	1.5%	18.9%	63.8%

Source: GUESSS 2016 international data, own calculations

As can be seen from our results in Table 3 above, there are considerable differences between the examined categories in certain demographic attributes. First, as for gender, male students exhibit almost twice as high involvement in "doing" entrepreneurship than their female counterparts. On contrary, shares of procrastinators and especially dreamers among genders are very similar, while the rest of the difference between the two is mirrored in share of abstainers. Thus, it seems that while entrepreneurial activity is domain of men, being a dreamer or procrastinator seems to be gender-indifferent.

Second, as for age, our findings show that the share of doers increases by age category, while the share of dreamers decreases. The share of procrastinators among student population shows a U-shaped curve pattern, and is the highest within the youngest age category. The share of abstainers shows a reverse U-shaped pattern peaking in 25–29 category. These findings suggest that dreaming about future entrepreneurship career is more likely for younger students. With the increasing age, students tend to be more "real" about entrepreneurship (share of dreamers in 30+ category is almost three times lower compared to 18–19 category). The highest activity and drop in abstainers in the 30+ category could be explained by its specific nature, as it frequently comprises of more senior active professionals acquiring further qualification and degrees (e.g. PhD., MBA).

Third, our results indicate a clear linear pattern in relationship between number of years to complete university studies and inclination to entrepreneurship. The closer are

students to finish their studies, the more doers, the less procrastinators or dreamers, but also the more abstainers are found within their population. Thus, like in case of age (that is significantly correlated with years to finish study, –0.380**), it seems that as students are getting closer to the edge of the "real life", the more realistic they are about their future career and those who have not yet started a business are beginning to give up entrepreneurial dreams.

Fourth, as for the field of study, different pattern in inclination to entrepreneurship is indicated comparing business to non-business students. While business students show higher entrepreneurial action or intention in all its stages, there are more abstainers among non-business students. This is obvious to the extent that business students are, by definition, being prepared to manage and run businesses (including their own ventures). However, it is usually the non-business students who hold certain domain of expertise in their field of study that could be capitalized upon via starting their business.

Finally, there are significantly more doers among migrant students. As the share of procrastinators and dreamers is very similar as among non-migrants, the most of the difference lies in share of doers and abstainers. Such pattern corresponds well with the observed situation in general populations in developed economies (where most European countries fall into) with higher early-stage entrepreneurial activity of migrants compared to non-migrants (Xavier et al., 2013). As students are the future economically active individuals, they will most likely contribute to preserve this disparity also in the future.

Table 4: Individual and contextual attributes vs. entrepreneurial action and intention

Attribute		Doers	Procrastinators	Dreamers	Abstainers
Loc. of control		0.749	0.716	0.706	0.681
Attitudes		0.822	0.805	0.765	0.429
Entre. comp.	*Opp. & creat.*	0.708	0.713	0.633	0.479
	Soft skills	0.754	0.760	0.704	0.583
	Innovation	0.728	0.734	0.666	0.518
	Management	0.757	0.773	0.703	0.527
Uni. atmosph.		0.868	0.858	0,892	0.762
Educ. intens.	*No course*	11.1%	1.4%	17.1%	70.5%
	Elective	22.6%	1.5%	21.2%	54.7%
	Compulsory	20.4%	1.4%	21.6%	56.6%
	Program	36.4%	1.8%	21.3%	40.5%
Support from	*Family*	0.822	0.823	0.818	0.707
	Friends	0.832	0.827	0.830	0.733
	Peers	0.760	0.773	0.768	0.692
Parents entre.	*None*	14.2%	1.4%	18.0%	66.4%
	Father only	18.9%	1.6%	21.1%	58.5%
	Mother only	19.4%	1.6%	20.1%	58.9%
	Both	24.0%	1.7%	18.8%	54.8%

Source: GUESSS 2016 international data, own calculations

As can be seen from Table 4, there is no general pattern for all examined individual and contextual attributes, but each of the attributes provides a specific insight to the nature of the examined categories of entrepreneurial inclinators and abstainers.

First, in case of having an internal locus of control, our results indicate moderate gradual increase of this attribute with entrepreneurial intention and its increasing seri-

ousness. The strongest internal locus of control is exhibited by doers, while the lowest mean value is shown within abstainer population. The differences between categories are relatively moderate, and despite indication of a particular pattern, its confirmation with our data would require further inquiry that is behind the scope of this paper.

Second, in case of attitude to entrepreneurship, there is no particular pattern of difference within entrepreneurship inclinators category. Thus, we can expect that positive attitude itself would not lead individuals to stop dreaming about own business or procrastinating its start, and make them actually start it up. On contrary, significantly lower attitude is exhibited by abstainers, which is perfectly understandable, as the scale measures attitude to become an entrepreneur.

Third, also in case of entrepreneurial competences, there is no considerable difference nor any gradual pattern among inclinators. The differences are rather low, but in all cases, procrastinators outperform doers and dreamers. However, significant differences are observed in case of abstainers, who indicate lower self-assessment in each of the considered competences. Therefore, our findings suggest there is a relationship between perceived level of entrepreneurship competencies and interest in entrepreneurial career. This pattern could originate in effort of inclinators to develop their qualities, and lack of interest among abstainers. Looking at particular competencies, the biggest difference between inclinators and abstainers is seen in ability to identify opportunities and create new products, qualities relevant for starting a new business. Thus, entrepreneurship training for future potential entrepreneurs should especially consider these skills.

Fourth, our results indicate rather small differences between doers, procrastinators and dreamers in perceiving university entrepreneurial atmosphere. Interestingly, most positive perception is observed among dreamers. As for abstainers, they indicate slightly less positive atmosphere in favor of entrepreneurship at their universities.

Fifth, our entrepreneurship inclination distribution analysis within categories of entrepreneurship education intensity shows several interesting findings. For example, there is almost the same share of dreamers within students who experienced any training, irrespective its intensity. Also, among students without any training, there are only 11.1% doers and as many as 70.5% abstainers. On contrary, among students enrolled in special programs one can find more than one third active entrepreneurs. Interestingly, 4 in 10 such students don't consider entrepreneurial career.

Sixth, our findings indicate that perceived support from family, friends and peers (each assessed separately) if one would become an entrepreneur is very similar among doers, procrastinators and dreamers. On contrary, abstainers indicate lower support from each of the above mentioned social groups. However, this difference is quite moderate, so we are not able to determine the clear pattern from our data.

Finally, we looked at distribution of activity and intention within categories determined by parent entrepreneurship. Interestingly, there is similar share of both procrastinators or dreamers, irrespective if an individual has entrepreneur parent(s) or not. However, we can observe a clear difference between share of doers and abstainers. There are 10% more doers and almost 12% less abstainers among students whose both parents are entrepreneurs, compared to students with non-entrepreneur parents. Students with one parent entrepreneur are somewhere in the middle between the two, while it makes no difference whether it is mother or father who runs a business.

Summing up, there is a difference in individual entrepreneurship-related and contextual attributes between abstainers and inclinators (either in terms of action or close/future intention). However, there is no clear pattern observed after decomposing

inclinators into doers, procrastinators and dreamers. On contrary, there seems to be a relationship between individual maturity and "seriousness" of entrepreneurial propensity. As students come closer to "real" life, they are also becoming more "real" about entrepreneurship. There are almost twice as many doers and nearly two thirds less dreamers between 18–19 and 30+ age groups. Also, the same pattern can be observed in case of years to completion of studies. Thus, it seems that even though some part of student population can be attracted by developing their entrepreneurship-relevant attributes and influence from supportive environment and background, but the actual decision to become entrepreneurs comes with the finishing studies and approaching to real life outside universities with all its duties and responsibilities.

Thus, to promote entrepreneurship among students, it is necessary but not sufficient to create a favorable university climate and develop entrepreneurial competencies and qualities. It generates a mass of inclinators, but it is simply not enough. In addition, the inclination should be captured and nurtured until the very end of the study, to convert the most of it into real entrepreneurial activity. The enthusiasm about entrepreneurship among young students is gradually reducing as being confronted with obstacles and challenges related to entrepreneurship in "reality". Universities that aim to encourage entrepreneurship among their students should guide them throughout their entire studies and instruct how to overcome these barriers.

Also, considerable role in determining whether students start businesses (e.g. become doers) is played by factors established as drivers on general population, such as gender and migrant status. Thus, we might conclude that these generally present patterns are being transferred to university environment that does not moderate them.

5. Conclusion

The findings of our exploratory study on differences between doers, dreamers and procrastinators, in comparison with entrepreneurship abstainers lead us into following recommendations and implications.

Entrepreneurship education at universities should be customized according to level of inclination to entrepreneurship. There are many doers that are interested in other things (helpful for their nascent or active activities) than the rest of inclinators. Also, dreamers should be guided to become doers instead of abstainers. And, equally important is the education among current abstainers, who should be linked to opportunities to discover their enterprising talents. Here, interdisciplinarity is the key. Students with lack of entrepreneurship education and/or coming from non-business fields of study are often equipped with specific proficiency suitable for commercialization. Thus, they should be linked to business students with higher entrepreneurial appetite. Finally, support at universities should be provided to students during their entire studies, building on initial enthusiasm and helping them to create sustainable entrepreneurial activities.

Further entrepreneurship research should inquire deeper into the evolution of entrepreneurial intention and action of students throughout their studies. Longitudinal approach could be useful with this respect. Our exploratory study has provided several potential directions with this respect. Role of maturing and approaching end of studies, adoption of competencies or exposure to different types of training are examples of such directions for individual-level studies, together with studying effect of national culture, cultural and social norms to entrepreneurship, and national-level economic indicators.

Acknowledgements

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The impact of foreign direct investment on economic development of regions of Ukraine

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Abstract

The paper is devoted to the study of the influence of foreign direct investment (FDI) on the selected economic indicators (gross regional product, exports of goods, and the average monthly nominal wage) at the Ukraine's regional level. Using a methodology of regression and correlation analysis, authors identify a positive influence of FDI on all above-mentioned indicators. If foreign direct investment in the regions increased by 100 USD, gross regional product grew by an average of 200 USD. In case of FDI growth by 1%, exports of goods raised by 0.6%. If this investment rises by 1%, the average monthly nominal wage grew by 0.09%. The received results confirm the importance of further attraction of such investment, which can contribute significantly to the technological modernization of production facilities, creation of additional jobs, and economic growth of the country's regions.

Keywords: foreign direct investment, economic development, Ukraine

JEL Code: F21

1. Introduction

There are different publications with respect to the impact of FDI on economic development of countries. Rachdi et al. (2016) carry out cointegration analysis between FDI and selected indicators, namely: GDP growth, inflation, trade openness, and real effective exchange rate. Using panel data set for 68 emerging countries, a positive long-run relationship between economic growth, openness and FDI was discovered, while a negative long-run link between inflation, real effective exchange rate and FDI was identified.

Groh and Wich (2012), as well as Holienčinová and Dobák (2015), determine four key drivers which have an impact on FDI, namely: economic activity, legal and political system, the business environment, and infrastructure. Researchers rank emerging countries regarding their FDI attraction, determine strength and weakness analyses of FDI flows, and propose recommendations for the improvement of FDI activity.

The research results obtained by Vu and Noy (2009) confirm that FDI has a substantial positive effect on economic growth of analyzed OECD countries. However, it is stressed that this effect is different across the countries, and it is observed only in several economic sectors (Kubicová and Kádeková, 2011). In a crisis situation, some unfavorable tendencies in this respect can take place in the country's economy (Hambálková and Rovný, 2010).

Tintin (2013) explores the determinants of FDI inflows in Central and Eastern European Countries (CEEC). On the basis of the panel least squares estimation method with fixed effects, it is identified that the level of GDP, trade openness, EU membership, and institutions have the positive substantial impact on FDI inflows.

The problem of the growth and effective usage of foreign investment has been important for Ukraine as well. This topic is covered in various publications. For instance, Chychkalo-Kondratska and Buriak (2014) analyze tendencies of foreign direct investment and systematize factors which have a strong impact on its attraction into economy of Ukraine's regions, namely: natural-resources, labor, political-legal, economic, innovative, infrastructure, geographical, and business factors.

Kramar et al. (2015) underline that stable and well-defined FDI regimes can promote national well-being and sustainability. To improve the investment attractiveness of Ukrainian economy, the increase of investment market transparency, enhancement of protection of foreign investment, and simplification of business regulatory procedures are required. Cywiński and Harasym (2014) emphasize that the economic regime, institutional environment, and anti-corruption measures are very important in terms of attraction of FDI to Ukraine.

Bezrukova and Svichkar (2016) assess investment aspects of relations between Ukraine and the EU, considering regional and sectoral structures of FDI. The researchers confirm that FDI has a positive impact on Ukraine's economy. They support the creation of a free EU-Ukraine trade zone, which will promote more active investment from the EU countries and economic growth of the country.

Chekh et al. (2016) consider import substitution and FDI promotion in Ukraine. The efficiency of FDI is investigated applying the DEA-analysis method. It is concluded that there is a potential for the more effective use of FDI aimed at the reduction of import dependence.

The aim of our paper is to evaluate the effect of FDI on selected economic indicators, including gross regional product, exports of goods, and the average monthly nominal wage. During the preparation of the paper, data and publications of State Statistics Service of Ukraine on the above-mentioned indicators were used. To convert Ukrainian

hryvnias to US dollars, the data of National Bank of Ukraine on annual average official exchange rate of hryvnia towards this currency were employed.

2. Methodology and Data

In real situations, we often encounter the so-called free dependencies, when a certain value of one variable corresponds to different values of the other variable. Dependence of the variables is then reflected in such way that changes in the values of one variable are accompanied by changes in conditional distribution of the values of second variable. The free dependencies of real variables are called statistical dependencies.

If two variables are statistically dependent, it does not mean that there also exists some legitimate, causal relationship. Variables with no inherent relationship may in fact be statistically dependent. Statistical technique for analysing the dependencies between quantitative variables is called regression and correlation analysis. Two basic tasks must be solved as part of statistical analysis of quantitative variables:

1. regression task, which aims to characterize the relationship between the variables with appropriate functional relationship
2. correlation task, which aims to identify the characteristics informing about the quality of a functional relationship, i.e. the extent to which explanatory variables explain the variability of the variable that is being explained.

Regression analysis is used to analyse the relationship between values of numerical variable Y and the values of numerical variable X or larger set of numerical variables $X_1, X_2, \mathrm{K}, X_k$. Searching for such relationships aims to finding suitable functions for point and interval estimates of unknown values of variable Y, using the known values of variable X, respectively variables $X_1, X_2, \mathrm{K}, X_k$. Such estimates are called regression estimates, and functions are called regression functions. If we consider the regression function with a single explanatory variable, we are talking about simple regression analysis, which we also applied in our paper.

First, it is necessary to specify the variables in the regression function, i.e. select appropriate indicators for individual variables. Secondly, it is required to identify the regression function, i.e. choose the most appropriate functional relationship describing the dependency between analysed variables.

In this article, to detect dependencies between economic indicators, linear regression model had been used in its general form:

$$y = b_0 + b_1 x \tag{1}$$

and a power (Cobb-Douglas) production function, whose general form is:

$$y = b_0 x^{b_1} \tag{2}$$

Correlation analysis is a summary of the methods and procedures used to verify the explanatory ability of quantified regression models as a whole and its parts. Verification of explanatory ability of quantified regression models leads to calculation of numerical characteristics, which in concentrated form describe the quality of the calculated models. The basis for the calculation of such numerical characteristics is decomposition of the total sum of the squared differences of dependent variable y_j from the mean $\bar{y}$, which can be labelled (C), on *explained* sum of the squared differences of theoretical values of dependent variable y'_j from the mean $\bar{y}$ (V) and *unexplained* sum of the squared

differences of empirical and theoretical values (N), so called residual sum of squares. Obviously, the following relation is valid

$$C = V + N \tag{3}$$

where $\quad C = \sum_{j=1}^{n} (y_j - \bar{y})^2$ is the total sum of the squared differences $\tag{4}$

$\quad V = \sum_{j=1}^{n} (y'_j - \bar{y})^2$ is explained sum of the squared differences $\tag{5}$

$\quad N = \sum_{j=n}^{n} (y_j - y'_j)^2$ is unexplained (residual) sum of the squared differences $\tag{6}$

Explained sum of squares of the differences can be considered that part of the total sum of the squared differences that can be explained by the choice of the regression function, while the residual sum of squared differences is that part which cannot be explained by the regression model. How much of the variability of the dependent variable can be explained by the chosen regression function is represented by the ratio:

$$I^2 = \frac{C - N}{C} = 1 - \frac{N}{C} = 1 - \frac{\sum_{j=1}^{n} (y_j - y'_j)^2}{\sum_{j=1}^{n} (y_j - \bar{y})^2} \tag{7}$$

which is called coefficient of determination.

As the most suitable trend function is considered the one for which the coefficient of determination (correlation coefficient) is the highest.

Closeness of the actual values y_t and the adjusted values y'_t can be measured by the absolute errors. In this paper, we used the mean absolute percentage error MAPE:

$$MAPE = \frac{1}{n} \sum_{t=1}^{n} \frac{|y_t - y'_t|}{y_t} \tag{8}$$

The best model is considered to be the one for which the MAPE error value is the lowest (Obtulovič, 2010).

3. Results

There was a significant increase of the volume of foreign direct investment (FDI) per capita in 2010–2015: from 873.1 USD to 1068.0 USD, or by 22.3% (Table 1). However, in 2014–2015, this indicator decreased by 19.6%. This decline occurred as a result of the unfavorable and unstable economic situation in the country due to Russian annexation of Crimea and the conflict in Eastern Ukraine. The leading positions on the investment volume had the city of Kyiv (2010 – 7031.9 USD; 2015 – 8068.1 USD) and Dnipropetrovsk oblast (2010 – 2098.5 USD; 2015 – 2329.4 USD). The indicator had somewhat lower rate in Kyiv (2010 – 887.4 USD; 2015 – 1038.1 USD), Poltava (2010 – 301.0 USD; 2015 – 719.6 USD), Ivano-Frankivsk (2010 – 460.8 USD; 2015 – 671.1 USD), and Kharkiv (2010 – 754.6 USD; 2015 – 635.9 USD) oblasts. As for the largest increase of the volume of this investment, it was observed in Poltava (by 139.1%) and Cherkasy (by 138.7%)

oblasts. Its most substantial decline occurred on Volyn (by 18.9%), Kharkiv (by 15.7%), Rivne (by 15.0%), and Ternopil (by 14.6%) oblasts.

Table 1: Foreign direct investment per capita in 2010-2015, by oblast (at the beginning of years), USD

	2010	2011	2012	2013	2014	2015	2015 as % of 2010
Total	873.1	980.6	1105.6	1217.6	1327.8	1068.0	122.3
Autonomous Republic of Crimea	367.0	417.0	602.0	747.5	...	...	...
Vinnytsya	112.0	125.3	138.9	152.9	191.5	138.7	123,8
Volyn	321.6	211.4	281.5	367.0	328.8	260.9	81.1
Dnipropetrovsk	2098.5	2242.2	2468.6	2547.0	2749.3	2329.4	111.0
Donetsk	366.1	513.5	600.9	728.2	828.8	503.4	137.5
Zhytomyr	184.4	201.1	264.4	285.2	306.9	226.8	123.0
Zakarpattya	293.0	293.1	279.6	325.1	349.2	266.2	90.9
Zaporizhzhya	504.6	527.7	550.0	602.8	632.3	587.4	116.4
Ivano-Frankivsk	460.8	372.0	453.1	466.4	590.0	671.1	145.6
Kyiv	887.4	940.0	1022.7	1070.1	1157.4	1038.1	117.0
Kirovohrad	81.3	64.5	72.4	104.5	160.9	83.8	103.1
Luhansk	275.0	299.3	336.3	370.9	391.9	283.5	103.1
Lviv	473.2	496.1	549.7	649.3	674.9	545.6	115.3
Mykolayiv	136.5	139.5	129.1	208.2	241.7	196.4	143.9
Odesa	437.7	465.5	513.4	684.3	701.0	599.7	137.0
Poltava	301.0	371.0	476.2	644.0	732.3	719.6	239.1
Rivne	267.4	268.6	243.4	258.8	270.9	227.3	85.0
Sumy	207.1	308.8	313.3	337.4	372.1	233.8	112.9
Ternopil	61.1	55.2	57.4	59.4	64.3	52.2	85.4
Kharkiv	754.6	989.2	1029.7	797.1	782.3	635.9	84.3
Kherson	180.3	186.7	190.4	233.0	256.2	194.8	108.0
Khmelnytskiy	164.5	137.9	141.4	156.1	171.7	145.3	88.3
Cherkasy	171.6	224.9	223.6	695.2	704.3	409.6	238.7
Chernivtsi	68.6	68.7	68.7	71.1	88.6	75.8	110.5
Chernihiv	80.2	86.7	93.0	97.7	120.7	94.8	118.2
Kyiv (city)	7031.9	7936.2	9006.9	9783.0	10190.7	8068.1	114.7
Sevastopol (city)	419.9	405.7	437.4	409.9	...	...	...

Sources: authors' own composition based on the data of State Statistics Service of Ukraine (2014a, 2016b)

To carry out further analysis, the following indicators were calculated at the regional level in USD:
- gross regional product per capita;
- export of goods per capita;
- the average monthly nominal wage of the regular employee.

These indicators were chosen to assess the influence of foreign direct investment on various aspects of economic development of oblasts, including:
- regional economic development;
- foreign economic activity;
- the level of living of workers.

To determine links between foreign direct investment per capita and the above-mentioned indicators, groupings were made for 2010–2015 (Table 2). Foreign direct investment per capita is presented in the following ranges:

- 0–299.9 USD;
- 300.0–599.9 USD;
- 600.0–899.9 USD;
- 900.0 USD and more.

Table 2: Foreign direct investment per capita and its impact on selected economic indicators in 2010-2015, (at the beginning of years), USD

Foreign direct investment per capita	Gross regional product per capita	Export of goods per capita	The average monthly nominal wage of the regular employee
01.01.2010			
0–299.9	1621.4	428.3	201.0
300.0–599.9	2220.5	707.0	225.2
600.0–899.9	2759.3	540.2	243.3
900.0 and more	5700.3	2021.6	328.8
01.01.2011			
0–299.9	1870.9	505.1	231.9
300.0–599.9	2641.8	985.9	262.9
600.0–899.9	3136.4	640.7	274.4
900.0 and more	6624.1	2489.6	365.4
01.01.2012			
0–299.9	2215.0	544.1	260.8
300.0–599.9	3104.3	1307.6	303.2
600.0–899.9	3508.8	2124.9	336.2
900.0 and more	5779.1	2014.8	375.6
01.01.2013			
0–299.9	2461.3	544.3	302.1
300.0–599.9	2779.4	923.8	327.7
600.0–899.9	3701.8	1309.6	351.4
900.0 and more	7615.3	2932.5	454.8
01.01.2014			
0–299.9	2616.8	587.2	328.7
300.0–599.9	2694.0	809.6	342.2
600.0–899.9	3926.1	1325.9	380.3
900.0 and more	8162.3	2833.8	487.7
01.01.2015			
0–299.9	1973.2	639.6	238.9
300.0–599.9	2618.9	1164.1	272.7
600.0–899.9	3101.5	831.0	257.9
900.0 and more	6280.7	2596.6	350.7

Source: authors' own calculations based on the data of State Statistics Committee of Ukraine (2010a, 2010b) and State Statistics Service of Ukraine (2011, 2012, 2013, 2014a, 2014b, 2014c, 2015b, 2015c, 2015d, 2016a, 2016b)

The calculated results confirm that, in most cases, there was a clear positive impact of FDI on these indicators, i.e., the increase of FDI volume led to the growth of the indicators.

In the paper, we also focused on monitoring the impact of foreign investment (per capita) on selected economic indicators in the regions of Ukraine (Ternopil, Chernivtsi, Kirovohrad, Chernihiv, Vinnytsya, Khmelnytskiy, Kherson, Mykolayiv, Zhytomyr, Rivne, Sumy, Volyn, Zakarpattya, Luhansk, Cherkasy, Donetsk, Lviv, Zaporizhzhya, Odesa, Kharkiv, Ivano-Frankivsk, Kyiv and Poltava). We analyzed data from 2010 to 2015. The paper points out just 2015, because other years are very similar. As a dependent variable (y), gross regional product per capita (USD) was chosen, independent variable (x) is the first step in foreign direct investment per capita (USD).

For modeling dependence between the above mentioned indicators, we used linear regression model as follows: $y = 2.0003x + 1631.1$ (Figure 1). Selected regression model explains the variability of the gross regional product to about 57%, MAPE (mean absolute percentage error) = 0.17, P = 3.09, significant F = 3,09E-05. If foreign direct investment in the regions increased by 100 USD, gross regional product grew by an average of 200 USD. It is obvious that foreign direct investment per capita significantly affects gross product per capita in the regions of Ukraine.
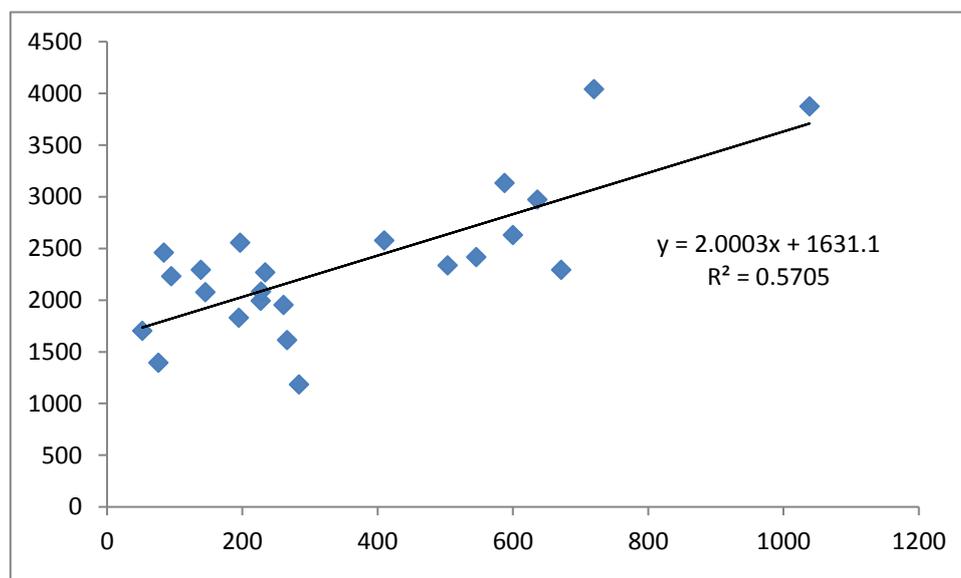
Figure 1: Impact of the foreign direct investment (independent variable) (USD) on gross regional product (dependent variable) (USD) in the regions of Ukraine

Source: authors' own calculations based on the data of State Statistics Service of Ukraine (2015a, 2015b, 2016a, 2016b)

This part of the paper is connected with the analysis of relationships between foreign direct investment (USD) as the independent variable x and export of the goods (USD) as the dependent variable y again in 2015. The results of the analysis are presented in Figure 2.

For modeling dependence between the above mentioned indicators, we chose a power-law regression model. The equation becomes: $y = 28.013x^{0.6185}$ (Figure 2). Selected regression model explains the variability of commodity exports to about 43%, MAPE = 0.07, significant F = 0.000967. In case of FDI growth by 1%, exports of goods raised by 0.6%. Hence, there is a positive correlation between FDI per capita (USD) and exports (USD) in the regions of Ukraine.
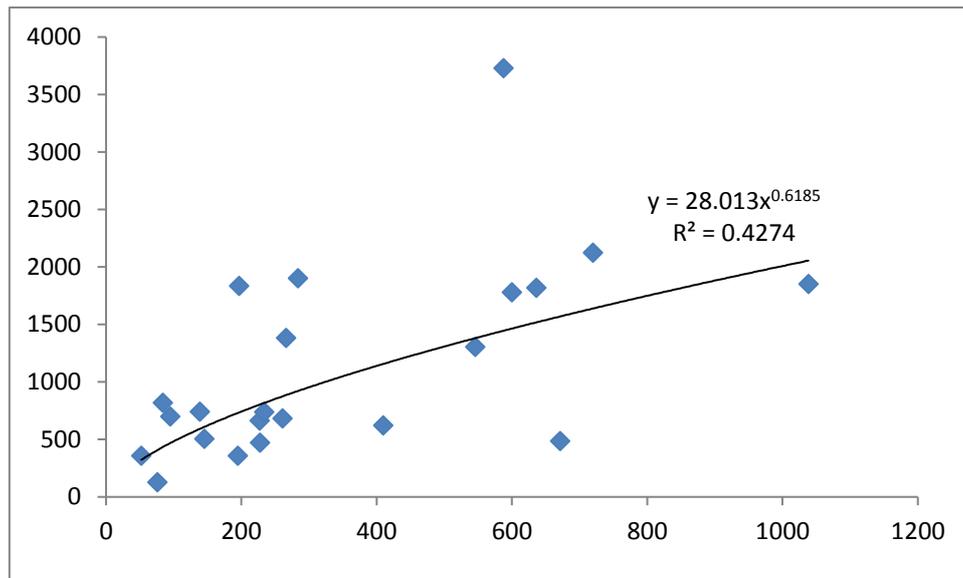
Figure 2: Impact of foreign direct investment (independent variable) (USD) on the export of goods (dependent variable) (USD) in the regions of Ukraine

Source: authors' own calculations based on the data of State Statistics Service of Ukraine (2015a, 2015b, 2016a, 2016b)
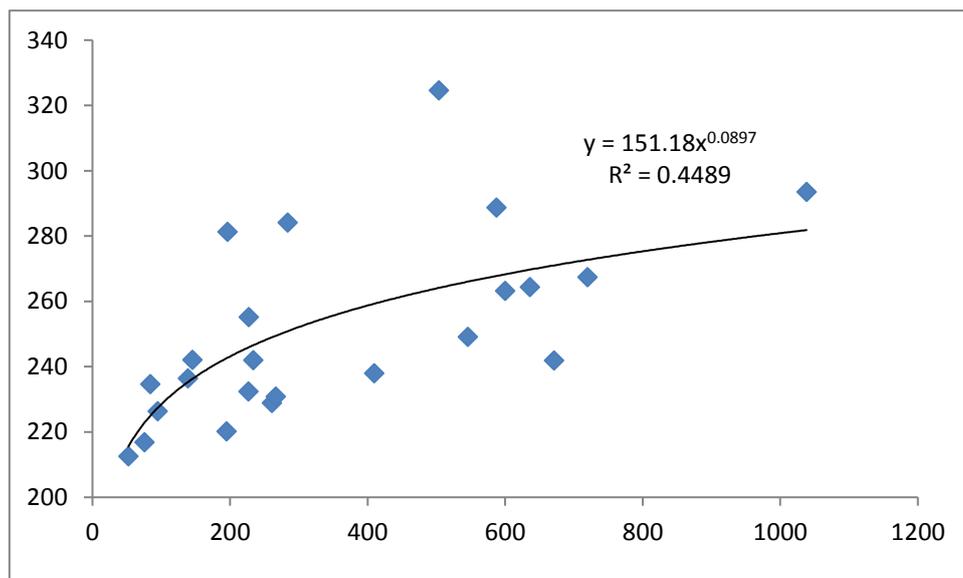
Figure 3: Effect of foreign direct investment (independent variable) (USD) on the average monthly nominal wage (dependent variable) (USD) in the regions of Ukraine

Source: authors' own calculations based on the data of State Statistics Service of Ukraine (2015a, 2015b, 2016a, 2016b)

In the next part of the paper, we focused on the analysis of dependence between foreign direct investment (USD) as the independent variable x and the average monthly nominal wage (USD) as the dependent variable y. The results of the analysis are shown in Figure 3.

To model the dependencies between these indicators, we chose a power-law regression model. In this case, the equation is the following: $y = 151.18x^{0.0897}$ (Figure 3). The selected regression model explains the variability of the average monthly nominal wage to about 45%, MAPE = 0.01, significant F = 0.00047. So, if this investment rises by

1%, the average monthly nominal wage grew by 0.09%. The results show a positive correlation between foreign direct investment (USD) per capita and the average monthly nominal wage (USD) in the regions of Ukraine.

4. Discussion and Conclusions

The experience of many countries shows that foreign direct investment could be an important factor to enhance efficiency and competitiveness of the national economy. Four economic indicators were selected for the analysis regarding Ukraine, namely: foreign direct investment as the independent variables and the gross regional product, exports of goods, and average monthly nominal wage as dependent variables. With respect to all above-mentioned dependent variables, FDI has a positive impact. That is why it is essential for Ukraine to create necessary conditions for the attraction of FDI, which, in turn, will significantly contribute to development of the country's economy.

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Selected Aspects to Determine of Sustainable Value in Enterprise Practice

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Abstract

The paper expands other aspects that have arisen as output in the final stage of solving the Czech Science Foundation (CSF) research project: "Measuring Corporate Sustainability in Selected Sectors" by two research teams of the Faculty of Business and Management (FBM), the Brno University of Technology (BUT) and the Faculty of Business and Economics (FBE), the Mendel University in Brno (Mendel) in the period from 2014 to 2016. It mainly concerns the practical modification of determining the sustainable value added (SVA) of the enterprise for the purposes of following the final process of determining the corporate sustainability performance (CPS). This is based on the original Figge-Hahn concept, but it also respects the new conditions chosen and constructed by a diverse collection of indicators (from four areas: economic, environmental, social and corporate governance from a selected sector – manufacturing). Due to differences in the nature of the indicators (given their quantitative and qualitative character) we have had to provide an appropriate implementation of the mathematical and statistical methods. In the end we refer to the web-portal which was created.

Keywords: corporate performance sustainability economic, environmental, social and corporate governance indicators, research, sustainable value modifications

JEL Code: C02, Q01

1. Introduction

In the passing of time, the concept of sustainability (sustainable development) had passed through various stages. Firstly, when it was defined in 1987 by Gro Harlem Brundtland in the Brundtland Report and titled Our Common Future, sustainable development was based on the relation between economic growth and ecology from the viewpoint of the macro-level development, i.e., relying on two key concepts: society needs and the environment, and technological limitations from the viewpoint of a long-term future compared with the present (UN WCED, 1987). Since the end of the last, cen-

tury, sustainable development has been supporting the balance of three pillars: environmental, social and economic; the so-called *Triple Bottom Line* (TBL) model, (Elkington, 1997). This concept has been largely accepted by the professional community and it has been discussed by many authors (e.g., Savitz and Weber, 2006; Willard, 2002; Holden, Linnerud and Banister, 2014). Later, it has increasingly been pointing towards the need to add to the triplet pillars, in the basic concept of sustainability, a fourth dimension: corporate governance (CG). Measuring environmental, social and governance (ESG) indicators together with monitoring economic indicators plays a key role in determining corporate performance sustainability (CPS).

The paper discusses selected aspects which were based on solving the Czech Science Foundation (CSF) research project: "*Measuring Corporate Sustainability in Selected Sectors*" by two research teams of the Faculty of Business and Management (FBM), the Brno University of Technology (BUT) and the Faculty of Business and Economics (FBE), the Mendel University in Brno (Mendelu) since 2014 to 2016. The main objective of this project is to monitor and analyze the current state of corporate performance sustainability (CPS) in selected sectors of the economy and to develop a new model of CPS measurement. Therefore, an essential starting point for us was to point out and to focus on the modified Figge-Hann concept of *Sustainable Value Added*.

The selected industrial sector and our project focus are manufacturing. The manufacturing industry takes part, to high (the highest) degree, in creating the Gross Domestic Product (GDP). This way it influences the level of the economy as a whole. Similarly, its impact is important in the sphere of satisfying human needs, thus affecting the standard of living. From the viewpoint of sustainable development, it plays a key role. This is one reason why it has merited such attention, and our project is focused in this direction.

The Ministry of Industry and Trade of the Czech Republic (MIT CR) published, in 2016, the 19th edition of the publication The Panorama of the Manufacturing Industry in the Czech Republic for the purposes of the professional public, in joint collaboration with the Czech Statistical Office (CZSO) and the Union of Industry and Transport (UIT) of the Czech Republic, (MPO ČR, 2016). The publication called the Interactive Browser of Economic Indicators of the Manufacturing Industry provides immediate comparison of individual sections and their economic indicators, (MPO ČR, Gratiasová, 2016).

Our project has monitored a set of relevant enterprises in selected sectors in the manufacturing industry, i.e. enterprises with over 250 employees with a legal form joint-stock company or limited company and according to the Classification of Economic Activities (CZ-NACE).

2. The Sustainable Value Added – Basic Approach

Enterprise value, *Economic Value Added* (EVA), *Market Value* (MV), etc. are frequently used values which are being currently measured in enterprises; for relevant definitions and more in (Sirbu, 2012; Ray, 2001; Neumaierová and Neumaier, 2002; Pavelková and Knápková, 2005; Kislingerová, 2005).

From the viewpoint of sustainability assessment, the Figge-Hahn (F-H) *Sustainability Value Added* (SVA) concept (Figge and Hahn, 2004, 2005) shows an effective model for measuring sustainability and consequently for determining the CPS. SVA represents the extra (added) value created as the result of operating not only with economic but also environmental and social resources, compared to a benchmark. This value is ex-

pressed in absolute monetary terms – this is a great advantage. Not only in general but also in practice, another interesting advanced view of authors Hahn et al. (which transcends the TBL principle) says "*that tensions in corporate sustainability occur between different levels, in change processes and within a temporal and spatial context*", (Hahn et al., 2014).

The fundamental SVA idea can be expressed in the following formula – according to (Figge and Hahn, 2004, 2005; Kuosmanen and Kuosmanen, 2009):

<u>Firstly</u>, for simplicity's sake, we suppose one economical *y* and one other (social or environmental) *x* indicator (the asterisk designation is intended for the benchmark, without the asterisk for the company), formula (1):

$$(\frac{y}{x} - \frac{y^*}{x^*}) \cdot x = y - \frac{y^*}{x^*} \cdot x = y - \frac{x}{x^*} \cdot y^* \tag{1}$$

These computational steps can be described in economical categories as follows:
step 1:

$(y..\text{value\_added})_{\text{company}}/(x..\text{impact\_added})_{\text{company}} = (\frac{y}{x}..\text{eco/(soc/envi)\_efficiency})_{\text{company}};$

$(y^*..\text{value\_added})_{\text{benchmark}}/(x^*..\text{impact\_added})_{\text{benchmark}} = (\frac{y^*}{x^*}..\text{eco/(soc/envi)\_efficiency}$

as opportunity_costs)$_{\text{benchmark}}$;
step 2:

$(\frac{y}{x}..\text{eco/(soc/envi)\_efficiency})_{\text{company}} - (\frac{y^*}{x^*}..\text{eco/(soc/envi)\_efficiency})_{\text{benchmark}} = \frac{y}{x} - \frac{y^*}{x^*}..$

value spread;
step 3:

$(\frac{y}{x} - \frac{y^*}{x^*})..$ value spread $\cdot (x..$ impact added$)_{\text{company}} = y - \frac{x}{x^*} \cdot y^*..$ result (value contribu-

tion),
where (briefly) "eco" = impact added related to economic indicator; "soc/envi" = impact added related to social or environmental indicator.

<u>Secondly</u>, generally, for the vector $(x_1,..,x_n)$ with *n* number of components (*n* number of impacts added related to *n* indicators – social or environmental), and one economic input indicator *y* for company, analogically, $(x_1^*,...,x_n^*)$ and y^* for benchmarking, we can write (sustainable value added of the company), formula (2):

$$SVA = \frac{1}{n} \sum_{i=1}^{n} (\frac{y}{x_i} - \frac{y^*}{x_i^*}) \cdot x_i = y - \frac{1}{n} \sum_{i=1}^{n} \frac{y^*}{x_i^*} \cdot x_i \tag{2}$$

As mentioned above, the essential theory-practice advantage of the F-G SVA concept is the fact that the result is expressed in monetary unit.

Although the vector $(x_1,..,x_n)$ represents indicators with various units, the value *y* represents indicator with monetary unit, then each of the addends in (2) also possesses a monetary unit. For example, let x_1 presents indicator which is expressed in [CZK · year^{-1}], *y* is expressed in [CZK] then for the units in the corresponding addend in

(2) is true: $\left[\left(\frac{CZK}{\frac{CZK}{year}}-\frac{CZK}{\frac{CZK}{year}}\right)\cdot\frac{CZK}{year}=CZK\right]=\left[CZK-\left(\frac{CZK}{\frac{CZK}{year}}\right)\cdot\frac{CZK}{year}=CZK\right]$, CZK = Czech crown.

3. Materials and Methods

This phase of our research was based on several main stages:

(A) *The set of the ESG indicators*: A necessary starting point for our investigation was to determine the appropriate set of key performance indicators (KPIs) which are reasonable considered. In this step, firstly, we have established the results of our previous project, and secondly, we gradually adapt this set of KPIs for additional research needs with the aim to reduce the number of these indicators, more in tabs.1, 2, 3.

Remark 1, to the *Character* column: Reported indicators are different in nature, i.e. for some of indicators: (a) their higher numerical value is better (an up arrow); (b) their lower numerical value is better (a down arrow); (c) the best is the middle value (a horizontal arrow); (d) dichotomous response, as No/Yes (0/1). The indicator nature (charakcter) is determined by the logical interpretation of its source definition.

Remark 2, to the source of indicators bellow: The set of appropriate indicators – key performance indicators (KPIs) — from the ESG and economic areas (for large companies in selected manufacturing sector): In the start we used the outputs of the previous project "Construction of Methods for Assessment of Multifactor Complex Company Performance in Selected Sectors" (with Reg. No P403/11/2085) solved in 2011–2013 by the same research teams) for identifying the basic set of KPIs in all the four areas Economic, environmental, social, corporate governance. We considered various resources as: Czech Statistical office (CZSO), Global Reporting Initiative platform (GRI), International Federation of Accountants (IFAC), Organization for Economic Cooperation and Development (OECD), EUROSTAT, Corporate Social Responsibility (CSR), Society of Investment Professionals in Germany (DVFA), United Nations Conference on Trade and Development (UNCTAD), ISO 14 000, Eco-Management and Audit Scheme(EMAS), AMADEUS, CENIA, Ministries of the: Environment, Industry and Trade, Agriculture in Czech Republic, Eurostat, websites of companies, annual reports, self-assessment, etc.also the international literature resources describing the specific individual areas (Mondelaers, K., 2010; 2011; ADVANCE-project, 2008) and further. The basic set of indicators has been reduced (about more than 70%) using advanced mathematical and statistical methods and tests (correlations analysis, factor analysis, Kaiser-Meyer-Olkin statistics, Barlett´s sphericity test, method of principal components, Venn diagram, etc.), more in the outcomes: the previous project Reg. No P403/11/2085 and (Kocmanová, Hřebíček, et. al., 2013; Chvátalová and Šimberová, 2012).

Table 1: Current modification of environmental indicators set [Source: Own work, project support materials]

	List of selected environmental indicator	Unit	Character
1	**EN1 – Total emissions to air (emissions** SO_2, NO_x a CO, VOC, NH_3)[1] [1]or total amount of air pollutants	[tons $\cdot$ year^{-1}]	↘
2	**EN2 – Total greenhouse gas emissions** (CO_2, CH_4, N_2O, HFCs, PFCs a SF_6)[1] [1]or total amount of greenhouse gas emis-	[tons $\cdot$ year^{-1}]	↘

sions

3	**EN3 – Total consumption of renewable energy** [1]	$[\text{tons} \cdot \text{year}^{-1}]$	↘
	[1]or total amount of energy consumption		
4	**EN4 – Total annual consumption of water**[1]	$[\text{m}^3 \cdot \text{year}^{-1}]$	↘
	[1]or total water withdrawal		
5	**EN5 – Total annual production of waste**	$[\text{tons} \cdot \text{year}^{-1}]$	↘
6	**EN6 – Total annual production of hazardous waste**	$[\text{tons} \cdot \text{year}^{-1}]$	↘

Table 2: Current modification of social indicators set [Source: Own work, project support materials]

	List of selected social indicator	Unit	Character
1	**SO1 – Community**	$[\text{CZK} \cdot \text{year}^{-1}]$	↗
2	**SO2 – Contributions to municipalities**	$[\text{CZK} \cdot \text{year}^{-1}]$	↗
3	**HR2 – Equal opportunity**	$[\text{number} \cdot \text{year}^{-1}]$	→ ↘
4	**LA1 – Employee turnover**	$[\text{number} \cdot \text{year}^{-1}]$	
5	**LA2 – Education, training expenditures**	$[\text{CZK} \cdot \text{year}^{-1}]$	↗
6	**LA3 – Personnel costs**	$[\text{CZK} \cdot \text{year}^{-1}]$	↗

Table 3: Current modification of corporate governance indicators set [Source: Own work, project support materials]

	List of selected corporate governance indicator	Unit	Character	
1	**CG1 – Information about company**	[yes or no]	0/1	
2	**CG2 – Corporate Governance effectiveness Collective report**	[yes or no]	0/1	
3	**CG3 – Present a specific action report**	[yes or no]	0/1	
4	**CG4 – Ethical conduct**	[yes or no]	0/1	

(B) *The economic indicator implementation*: The economic added value (EVA) was chosen – it captures the economic situation in the enterprise well enough.

The calculation of this indicator can be approached in two elementary ways. We have opted for the option closer to practice. Taking the EVA indicator with regard to the company's economic profit, we are dealing with business costs that also include alternative costs (especially equity costs, which are being valorized to a certain degree). The F-H SVA concept is also built upon the idea of alternative costs. In order to calculate the EVA indicator, we have acceded to the methodology of the Czech Ministry of Industry and Trade, formula (3):

$$EVA = (ROE - r_e) \cdot E \tag{3}$$

where *ROE* is the returns of equity (profit after tax/equity); r_e is the return of entity (the alternative cost of the company's equity); *E* is the equity. The EVA calculation is very complicated, especially vis á vis establishing the r_e parameter. It is best to support the

EVA computing by utilizing advanced software, or rather in combination with advanced mathematical methods (soft computing – e.g., neural network, and similar).

(C) *The modification SVA*: For designing the modified SVA concept we had to respect specific facts:

comprehensive sustainability assessment – the corporate sustainability assessment and the SVA measuring integrates economic, environmental, social and corporate governance areas which are presented both financial and non-financial indicators, can have quantitative or qualitative nature;

suitability – for set of indicators it is necessary to reflect the variability of spectrums and goals of operation of different enterprises in the individual subsectors of manufacturing with regard to the potential correction of the set of indicators in the case of individual enterprise (different available sustainability frameworks are used and specific sets of indicators are chosen for analysed sector);

simplicity and applicability – indicators are expressed by mathematical available means, i.e. as the solvable models, (Hřebíček et al., 2016);

various character – indicators can have a different character (for some indicators higher their numerical value is better, for other indicators their lower numerical value is better) and indicators can bear a different numerical cardinality;

weight implementation – in order to improve our proposed approach, we suppose: different indicators don't have an equal impact on the SVA value of company; due to it each indicator should have a specific weight in the SVA calculation; this weight differs according to the localization, size, sub/sector of the company, and other factors;

the benchmark value and the weight of each indicator calculation can be done in different ways, for example using the *Data Envelopment Analysis* (DEA) model – by applying this model, the most efficient company can be determined which is then taken as a benchmark company (Kasem et al., 2015), it is important a sensitive and rational choice of benchmarking; to determine the benchmark value the indicators values can be transformed into a relative form and process can be converted to a calculation using percent; to determine the weights of individual indicators can be applied multi-criteria methods (e.g., scoring method, the Fuller method), or expert assessment.

After applying the mentioned modifications above, we obtain follow formula (4):

$$SVA = EVA - \frac{1}{m+n+l}\left(\sum_{i=1}^{m} w_{e_i}\frac{EVA^*}{e_i^*}e_i + \sum_{j=1}^{n} w_{s_j}\frac{EVA^*}{s_j^*}s_j + \sum_{k=1}^{l} w_{g_i}\frac{EVA^*}{g_k^*}g_k\right) (4)$$

where *SVA* is sustainable value added, *EVA* is economic value added (company); EVA^* is economic value added (benchmark); (e_i, s_j, g_k) is the vector of amounts of (environmental, social, corporate governance) indicators – company; (e_i^*, s_j^*, g_k^*) is the vector of amounts of (environmental, social, corporate governance) indicators – benchmark; $(w_{e_i}, w_{s_j}, w_{g_i})$ is the vector of weights of (environmental, social, corporate governance) indicators, all for *i* = 1, .. ,*m* and *j* = 1, .. ,*n* and *k* = 1, .. ,*l* (*m*, *n*, *l* ϵ **N**) are numbers of environment, social, corporate governance input indicators (amounts).

4. Discussion and Conclusions

It was said to obtain all values for the set of filtered indicators from information of selected enterprises is very difficult. Therefore, we must consider methods respecting the

missing data (to ignore or impute these data with support the statistical methods, for instance – median or with support mathematical methods as interpolation) for the purpose of this paper is not necessary to rewrite the known formula in general. For reasons of the statistical credibility we must also consider outliers (we again used the well-known standard statistical methods, which we do not present it by reason of the scale of this paper). An important advantage of the F-H SVA concept (the aforementioned) is the fact that the construction SVA in a sense "suppresses" the diversity of units of partial indicators, final calculations are processed by way of financial units (in our case, Czech crown) and it operates with the ratio of amounts of the respective indicators. In the process of the SVA modification we intend to respect fact that our set of filtered indicators assumes values in a large numerical range. Therefore (due to a numerical "homogenization" and normalization of values) it offers the possibility of introducing some mathematical procedures, for example, to convert values using by an appropriate function (for instance modified arctangent), eventually converting to percentages, etc.

For the SVA modification we introduced the weights to individual indicators. We use both expert assessments and multi-criteria decision methods. Also we have intensively discussed the choice of suitable values for benchmarking (it offers to take sectoral values, respectively the best enterprises values or DEA). As an input economic indicator, we considered the advanced EVA indicator. It adequately reflects the company's economic situation. For individual companies the EVA indicator is calculated using sub indicators included in annual reports of companies, and therefore EVA is achievable indicator. To obtain data from corporate governance and economic areas is much easier (because they are mostly mandatory reported) than from social area and environment.

The F-H SVA concept is very useful from many views, in particularly due to the diversity of units of input indicators. The result is expressed in financial units.

All these aspects include: problems of data collection of economic, environment, social and governance areas including linked open data; application of qualitative and quantitative methods to different character of appropriate indicators; quality of data and methods of their cleaning; computational aspects (appropriate software processing for computations, visualizations and finalization results).

The main objective of the project was to the CPS measurement in selected sectors. A pilot study was performed, for example, in the sample of breweries and biogas plants in the Czech Republic. At the end of the project solution was created a web-portal WEBRIS, as an open source software, which processes the selected key performance indicators including the EVA, DEA, SVA and benchmark calculations and generates output in the form of a radar chart which is arranged for managerial decision. Modular architecture enables easy interactivity and modifications for the administrator or company user. (Faldík et al., 2016). This software is transparent to company management and its and his decision making. Briefly, Fig. 1 depicts an example of output radar chart: the comparison of the SVA efficiency evaluation of five randomly selected farms with biogas plant A, B, C, D, E in the Moravian regions of the Czech Republic. The graph also shows the calculated threshold.
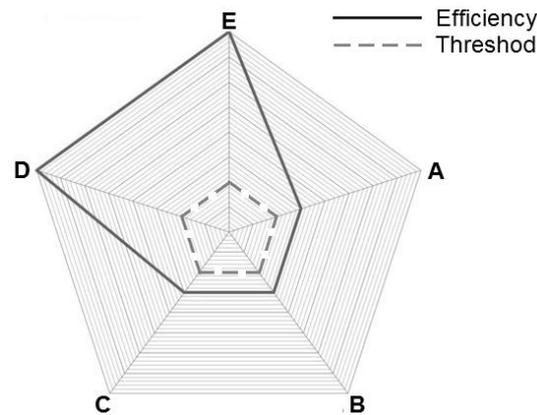
Figure 1: Radar chart – the efficiency evaluation of five studied biogas plants [Source: Own work, Hřebíček et al., 2016]

Acknowledgements

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Credit Behaviour of Clients in Slovakia and the Czech Republic

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Abstract

Recent global financial crisis has caused that financial risk measurement – especially the measurement of the credit risk – remains a significant priority in current banking. This paper discusses the problem of estimating the transition probability of client credit behaviour when aggregate proportional data are known. The paper examines the dynamics of credit risk through rating migrations and shows linkages between rating migration and prevailing macroeconomic conditions expressed in GDP growth. Markov Chain methodology is considered as an appropriate method for transition matrices estimation. This paper compares transition probabilities for different economic conditions in Slovakia and the Czech Republic. Transition probability matrices estimated in this paper provide a basis for comparing bank sector. We have separate the economy into two states, when GDP growth was above/below average and we have computed the conditioned transition matrices on these states. We show that the period with a GDP above the average were more stable in both countries. Our findings may have implications for credit risk managers in financial institutions. Moreover our results give a useful framework for stress testing of the credit portfolios.

Keywords: transition matrix, probability, risk, Markov Chains, rating, migration

JEL Code: C13, C61, F62

1. Introduction

During the global financial crisis and economic recessions, banks are exposed to credit risk arising from the diversity of financial instruments such as loans, interbank transactions, trade financing, foreign exchange transactions and various derivative financial instruments. Based on the Basel agreements, banks can implement its internal rating system (IRB), which enables to estimate the risk exposure that is designed to provide a realistic estimate of capital requirements for the regulator (usually from the central

bank). However, this approach is applied on financial institutions which meet the minimum conditions for the application of the IRB system, and they have approval from their national regulators. In addition, banks are obligated to calculate an annual one-year Value at Risk (VaR confidence level of 99.9%) for losses due to credit quality migration of sensitive products in the trading book. For this reason, it is essential to estimate probabilities of the qualitative migration credit facilities and potential failures in today's volatile economic environment for financial institutions.

Debtor's credit risk behaviour can show various behavioural patterns over various macroeconomic phases and business cycle states. This paper contributes to the empirical investigation of credit risk behaviour of the clients in Slovakia and in Czech Republic. The main aim of this paper is to give the answers to two hypotheses. The first hypothesis is: "Do economic conditions have an impact on the stationary transition probabilities in the Slovak and Czech Republic?" The second hypothesis is: "Is there a relation between credit migration and GDP growth?" Our paper explores the dynamics of credit risk by means of qualitative ratings and points to a relation between ratings migration and GDP growth. We have used Markov chains methodology applied to the aggregated proportional data to estimate transition probability matrices. Transition probability matrices that are estimated in this paper provide a basis for comparing credit quality of the bank sector in Slovakia and Czech Republic.

The paper is organized as follows: Section 2 discusses the used methodology to estimate transition probability matrices of rating migrations. Section 3 describes the application of the presented methodology to ratio loans using data from Slovakia and the Czech Republic. Section 4 summarizes our findings.

2. Methodology and Data

Credit migration or transition probability matrix characterizes the past changes in credit quality of debtor. Transition probability matrix is essential input into many risk management applications, including portfolio risk assessment, modelling the term structure of credit risk premium, etc. Estimation of probabilities in transition matrix is relatively simple when individual transitions are observed over time. Cohort method or duration approach to estimate transition matrix was presented in (Schuermann, Jafry, 2003). (Grunnwald, 2014), (Gavalas, Syriopoulos, 2014) presented continuous-time maximum likelihood (CTML) framework. In this paper we cannot use these methods, because we have imperfectly observed credit quality transitions. We have available information only for aggregate proportion given by percentage of total observations in a rating category at a given time. If the time series of observations are sufficiently long, it is possible to estimate a transition probability matrix from aggregate data using quadratic programming methods (Jones, 2005). Only a few authors studied this problem, for example (Macrae, Chase, 1977), (Lee et al., 1970), (Bangia, 2000). The stability of the transition probability estimation was solved by (Anderson, 1957) and (Nickell, 2000). Many problems remain still open, especially regarding properties of the estimates. In this paper, we have used regression approach to estimate the transition probability matrix as was described in (Kalbfleisch, Lawless, 1984), (Jones, 2005).

The method uses the distribution of loans in the credit rating for selected rating categories for each defined period. Instead of observing changes in the credit rating, we have available proportional data of loans with credit quality j at time t and credit quality

i at time $(t-1)$. Then the stochastic relationship between the actual and the estimated occurrence of $y_j(t)$ can be defined as (Jones, 2005):

$$y_j(t) = \sum_i y_i(t-1)p_{ij} + u_j(t) \quad \text{or} \quad y = Xp + u, \quad j=1,2,\ldots, R\text{-}1, \tag{1}$$

where vector *y* characterizes portions of observations at the time for selected rating, *p* is a vector of the estimated transition probabilities, *R* is a number of rating categories:

$$p = [p_1 p_2 \mathrm{K} \ p_{R-1}]^T =$$
$$[p_{11}, p_{21}, \mathrm{K}, p_{R1} \quad p_{12}, p_{22}, \mathrm{K}, p_{R2} \quad \mathrm{K} \quad p_{1,R-1}, p_{2,R-1}, \mathrm{K} \ p_{R,R-1}]^T \tag{2}$$

u is an error vector:

$$u = [u_1 u_2 \mathrm{K} \ u_{R-1}]^T =$$
$$[u_1(1), u_1(2), \mathrm{K}, u_1(T) \quad u_2(1), u_2(2), \mathrm{K}, u_2(T) \quad \mathrm{K} \quad u_{R-1}(1), u_{R-1}(2), \mathrm{K}, u_{R-1}(T)]^T \tag{3}$$

and *X* is the following matrix:

$$X_j = \begin{bmatrix} y_1(0) & y_2(0) & \Lambda & y_R(0) \\ y_1(1) & y_2(1) & \Lambda & y_R(1) \\ \mathrm{M} & \mathrm{M} & \mathrm{O} & \mathrm{M} \\ y_1(T-1) & y_2(T-1) & \Lambda & y_R(T-1) \end{bmatrix}. \tag{4}$$

Now we minimize the sum of squared errors in equation (1) using OLS, subject to linear constraints (Jones, 2005):

$$minimize \ u^T u = (y - Xp)^T (y - Xp), \tag{5}$$

subject to $\sum_{j=1}^{R-1} p_{ij} \leq 1$ and $\sum_{j=1}^{R-1} p_{Rj} = 0$, with $p_{ij} \geq 0$.

The last row of the transition matrix is solved using:

$$p_{iR} = 1 - \sum_{j=1}^{R-1} \hat{p}_{ij}.$$

A rating transition probabilities matrix (2) is the first-order, time-homogeneous Markov model, which is based on the assumptions that the probability of migrating from one rating class to another depends on the current rating only and the probability of changing from one rating class at time *t* to another class at time *t+i* does not depend on *t*.

We have applied this method on the nonperforming quarterly data obtained from the publicly available sources: data portal of the National Bank of Slovakia and data portal of the National Bank of Czech Republic. It was important to obtain data with long history, in which all changes are captured in the sense that one-time fluctuations in the sample do not cause errors in the calculations. We have prepared our own program in Wolfram Mathematica (Jackuliak, 2016).

3. Results

3.1. Application to the Slovak Republic data

The Slovak financial sector was significantly affected by the political system in the country. After transition from the planned economy to the market-oriented economy, the entire financial sector had had major difficulties due to low capital adequacy, lack of long-term financial resources, the existence of so-called bad loans and prevailing state ownership in the largest banks. The mentioned problems were subsequently solved by

buyout of the Slovak financial institutions by foreign shareholders. Foreign shareholders provided sufficient capital to declining Slovak banks, and consequently Slovak banks could stay on the market. The actual formation of the modern Slovak banking system began after 1992, when standard banking laws were adopted – Law on Banks and the Central Bank Act 1992 and the Law on the National Bank of Slovakia (NBS) no.566 / 1992. NBS started storing statistical information on the credit classifications in addition to monetary policy.

After joining the Eurozone in 2009, the Slovak Republic adopted the requirements for classification defined by the European Central Bank. NBS provides a qualitative classification of loans as standard loans and non-performing loans. Standard loans are classified as loans that are without problems i.e. the delay in payments shall not exceed 90 days. According to Basel II, the counterparty is considered as default when a debtor is unable to pay off the debt amount within 90 days after the maturity date.

Due to frequent changes in classification of loans and non-comparability of individual categories simultaneously, we have used quarterly data from NBS data portal for period from 2009 to 2015, divided into the following ratings

– A – performing loans (loans problem free, respectively loans past due less than 90 days)

– B – non-performing loans (loans overdue more than 90 days)

 – FX – defaulted loans (net written-off loans, net of proceeds from previously written off receivables from clients).
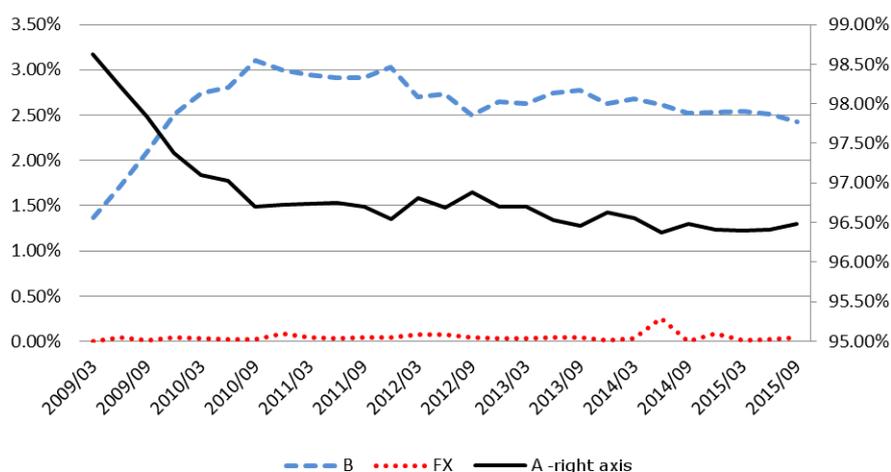
Figure 1: Slovakia loan categories proportions
Source: Own processing based on data: http://www.nbs.sk/sk/statisticke-udaje/menova-a-bankova-statistika/statisticke-udaje-penaznych-financnych-institucii/uvery, data period 2009–2015

Slovakia loan Figure 1 shows time series of loan ratios in each rating category for Slovakia. The period from 2009 to 2015 was under influence of financial crisis caused by bubbles in the real estate market in the USA in 2007. Since 2009, we can see a significant decline in quality loans in Slovakia from more than 98% to around 96%. The proportion of problem-free loans over the next years did not change much, and the volatility was only average. Loans in category A in 2009 moved in an opposite direction to the direction of movement of loans overdue more than 90 days, characterized as non-performing loans. The share of this group of loans initially grew from less than 1.5% to more than 3%, and then the trend was decreasing. In the case of defaulted loans, we can see higher volatility in 2014.

The mean of performing loans was 97.3%, non-performing loans past due 90 days or more had an average value 2.6%. Defaulted loans average value was 0.05%. Comparing the median to the mean, we can see the most varied categories were categories of defaulted loans. This fact shows the major change at time proportion in the sample data. A coefficient of variation describes the variability of each category. It clearly has the highest values in the case of the defaulted loans.

Table 1: Slovakia. Descriptive statistics of the loan categories

Slovak Republic	Performing Loans	Non-performing Loans	Defaulted Loans
Mean	41,676,099	1,121,619	20,695
Standard Error	710,296	1,191,486	17,219
Median	41,296,135	1,191,486	17,219
Coefficient of variation	9%	16%	104%
Standard deviation	3,690,806	179,856	21,589
Minimum	36,391,608	537,236	713
Maximum	49,768,329	1,253,563	117,232

Source: Own processing based on data: http://www.nbs.sk/sk/statisticke-udaje/menova-a-bankova-statistika/statisticke-udaje-penaznych-financnych-institucii/uvery, data period 2009–2015

Using the data described above, we have applied the OLS method of estimation to these observations. Using sample data for period from 2009 to 2015, we have derived the quarterly transition probability matrix (Table 2).

Table 2: Slovakia. Estimated Quarterly Transition Matrix

		to rating		
		A	B	FX
from rating		0.991	0.009	0.000
		0.307	0.681	0.012
	X	0.000	0.000	1.000

Source: Own processing based on data: http://www.nbs.sk/sk/statisticke-udaje/menova-a-bankova-statistika/statisticke-udaje-penaznych-financnych-institucii/uvery, data period 2009–2015

Non-performing loans and loans classified as defaulted were fully or at least partially payed in over 30% of cases. The remaining 68% of non-performing loans in the next quarter stayed in the same rating category. 1.2% of non-performing loans were written off during the next term. Performing loans stayed in its qualitative rating during the next period in more than 99% cases, and only 0.9% of loans migrated to worse rating B as given by the calculated transition matrix.

Now we explain changes in the behaviour of loans ratios categories due to changes in the underlying economic conditions. We examine the behaviour of real GDP growth, shown in the dashed pink line in Figure 2. We can see the highest volatility of real GDP mainly in year 2009. The Slovak economy influenced by crisis in 2009 showed negative GDP increase compared to the previous quarter. Beginning from 2010, the year on year quarterly comparisons moved GDP growth back into positive values. GDP growth in the Slovak economy reflects the development of performing loans, where in 2009 we can

see the highest drop in the quality rating of A. Therefore, we decide to analyse our sample conditioned on the economic cycle. We have created two periods. The first one is a period with low GDP growth (defined as GDP growth below the average trend rate) and the second is a period with high growth (defined as GDP growth above the average trend rate).

We have estimated transition probability matrices for both periods. Results are presented in Table 3. We verify the assumption that the transition probability is stationary, using two sample Fisher test of variances. We find we can reject this assumption, see Table 4.
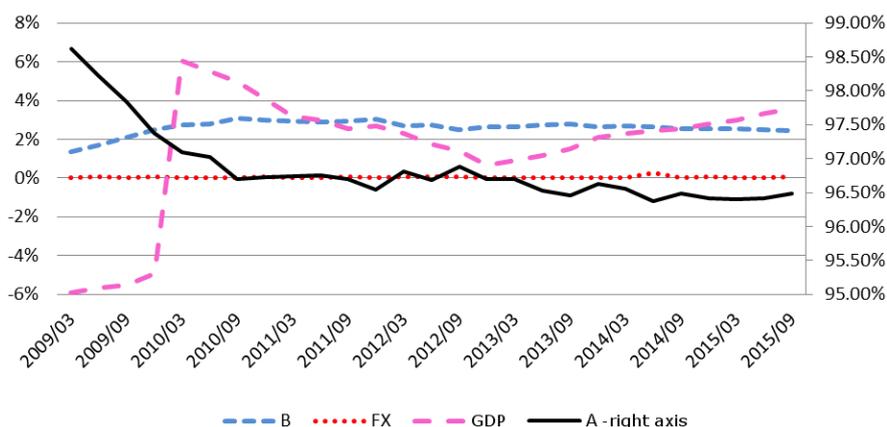
Figure 2: Slovakia loan categories proportions and real GDP
Source: Own processing based on data: http://www.nbs.sk/sk/statisticke-udaje/menova-a-bankova-statistika/statisticke-udaje-penaznych-financnych-institucii/uvery, data period 2009–2015

Table 3: Slovakia. Estimated Quarterly Transition Matrix, GDP Growth Low/High as Average Growth

		Quarters with GDP Growth Above Average				Quarters with GDP Growth Below Average		
		to rating				to rating		
		A	B	FX		A	B	FX
from rating	A	0.996	0.004	0.000	from rating	0.992	0.008	0.000
	B	0.118	0.862	0.020		0.236	0.722	0.043
	FX	0.000	0.000	1.000		0.000	0.000	1.000

Source: Own processing based on data: http://www.nbs.sk/sk/statisticke-udaje/menova-a-bankova-statistika/statisticke-udaje-penaznych-financnych-institucii/uvery, data period 2009–2015

Table 4: Slovakia. Two sample F-test of Variances, Quarters with GDP growth Above/Below Average

	rating A	rating B	rating FX
	Quarterly with Above Average Growth vs Quarterly with Below Average Growth		
F	14.83	4.99	0.09
P(F<=f) (1)	0.00	0.00	0.00

F krit			
(1)	2.55	2.55	0.31

Source: Own processing based on data: http://www.nbs.sk/sk/statisticke-udaje/menova-a-bankova-statistika/statisticke-udaje-penaznych-financnych-institucii/uvery, data period 2009–2015

The estimated transition matrices reflect the diversity of the data confirmed by Fisher test. Our results reject the temporal constancy transition probabilities during different economic cycles. During period with GDP growth below the average, transition probabilities show the highest volatility of the GDP. We can also see higher probability of the transition from rating B to rating FX – defaulted loans.

3.2. Application to the Czech Republic data

The Czech Republic shared a combined financial sector with the Slovak Republic till 1993 and therefore the progress of the financial sector was very closely related and similar to the progress in Slovakia. After the split of Czechoslovakia, the Czech financial sector solved the same challenges as we mentioned in the previous section. Banking was closely linked to the government from the beginning, banks did not have sufficient capital and lending conditions had non-market character. After taking over the Czech banks by foreign shareholders and providing sufficient capital, the Czech National Bank (CNB) started to create a classification of loans. We have obtained the data from the CNB, publicly available data in ARAD. We have obtained proportional quarterly data of the qualitative classifications of total loans in the Czech Republic since 2008 divided into the same rating categories as in Slovakia.

Figure 3 shows time series of loan ratios in each rating category in the Czech Republic. We can see a very similar trend to the trend in the Slovak Republic. Economic conditions in the Czech and Slovak Republic are closely linked to economic development and growth in the European Union, and therefore during crisis, which affects their main customers, the crisis is fully reflected in the financial sector and the country. Since 2008, we can see a significant fall in "performing loans" (rating – A on the graph) from 97% to 92.5% in 2015. This decrease is even more significant than it was in the category of performing loans in Slovakia. "Nonperforming loans" (rating B on the graph) grew in the opposite direction from 2008 to 2010, where we see an increase by more than 3%. This growing trend levelled off after 2010 and a given category of assets fluctuated slightly over 5 percent. Similarly, during this period "defaulted loans" had higher percentages and were more volatile.

Descriptive statistics for the data from the Czech National Bank for years 2008 to 2015 are presented in the Table 5. The mean of performing loans (rating A) was 95%, non-performing loans past due 90 days or more (rating B) had an average value of 5%. Defaulted loans (rating FX) average value was 0.075%. Comparing the median to the mean, the most varied categories were categories of defaulted loans, rating FX. This means that the share of values of rating FX in time changed significantly. The variability in individual ratings is characterized by the coefficient of variation. The highest coefficient of variation is clearly for FX rating. The coefficient of variation accounted for this rating is 107%, which means the share of the time could vary by more than 100%. Margin is the biggest in percentage terms for category FX.
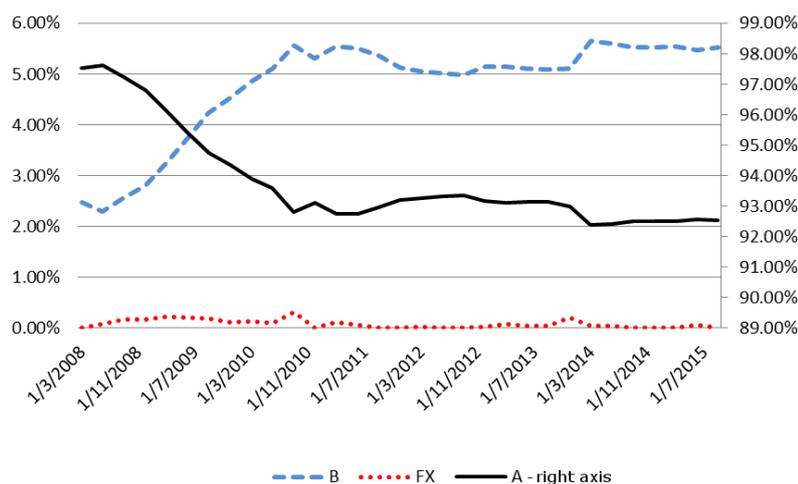
Figure 3: Czech loan categories proportions
Source: Own processing based on data: http://www.cnb.cz/docs/ARADY/HTML/index.htm, data period 2008–2015

Using the Czech data, we have applied the OLS method of estimation to a sample period from 2008 to 2015. The derived quarterly transition probability matrix is presented in Table 6. We can see the highest volatility between rating B (performing loans) and A (nonperforming loans). The probability of transition from rating B to rating A was 11.8%. The transition probability from rating B to rating FX during the next one quarter was 0.2%. Loans classified as performing (A) stayed in this rating with probability more than 99%. Only 0.7% performing loans migrated to rating B and with a probability of 0.01% loans defaulted.

Table 5: Czech Republic. Descriptive statistics of the loan categories

Czech Republic	Performing Loans	Non-performing Loans	Defaulted Loans
Mean	2,642,890	136,561	2,087
Standard Error	43,481	6,842	402
Median	2,644,753	146,480	1,432
Coefficient of variation	9%	28%	107%
Standard deviation	242,092	38,097	2,239
Minimum	2,175,464	55,182	0
Maximum	3,091,264	184,476	8,217

Source: Own processing based on data: http://www.cnb.cz/docs/ARADY/HTML/index.htm, data period 2008–2015

Table 6: Czech Republic. Estimated Quarterly Transition Matrix

		to rating		
		A	B	FX
from rating		0.992	0.007	0.001
		0.118	0.880	0.002
	X	0.000	0.000	1.000
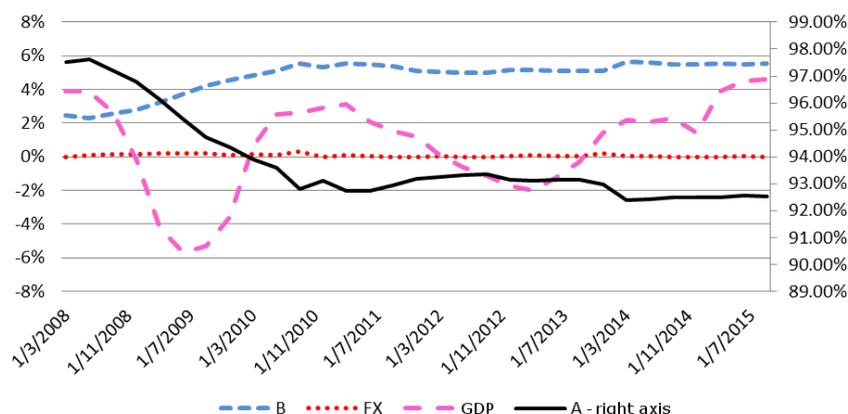
Figure 4: Czech loan categories proportions and real GDP
Source: Own processing based on data: http://www.cnb.cz/docs/ARADY/HTML/index.htm, data period 2008–2015

Table 7 presents the estimated quarterly transition probability matrices for a period with above/below average growth GDP. We verify the assumption that the transition probability is stationary, using two sample Fisher's test of variances. We find we cannot reject this assumption, see Table 8. Loans ratios for the quarter with above and below average growth GDP in the Czech Republic have similar character of the progress. This result can be caused by more volatile GDP, which means even a slight increase in the share of category A in the period 2012–2013 declined afterwards.

Table 7: Czech Republic. Estimated Quarterly Transition Matrix, GDP Growth Low/High as Average Growth

Quarters with GDP growth above average					Quarters with GDP growth below average			
	to rating					to rating		
		A	B	FX			A	B	FX
From rating		0.980	0.019	0.001	from rating		0.984	0.014	0.001
		0.311	0.679	0.010			0.259	0.711	0.030
	X	0.000	0.000	1.000			0.000	0.000	1.000

Source: Own processing based on data: http://www.cnb.cz/docs/ARADY/HTML/index.htm, data period 2008–2015

Differences between matrices in Table 7 are the most relevant for rating B (nonperforming loans). In the case of quarters for GDP above the average, volatility rating is greater than during the period with GDP below the average. For transition probability matrix with GDP below the average the volatility is higher for transition from rating B to rating FX. The estimated transition matrix shows that during worse economic performance of the country the probability of default of non-performing loans was higher than when the economy fared better on average. Proportional credit data of the Czech Republic, like the Slovak Republic data show a positive correlation between the growth of defaulted loans and poorer economic results of the country.

Table 8: Czech Republic. Two sample F-test of Variances, Quarters with GDP growth above/below average

		rating A	rating B	rating FX
		Quarters with GDP growth above average vs quarters with GDP growth below average		
(1)	F	2.08	2.14	1.19
	P(F<=f)	0.10	0.09	0.39
	F krit (1)	2.58	2.58	2.58

Source: Own processing based on data: http://www.cnb.cz/docs/ARADY/HTML/index.htm, data period 2008–2015

4. Discussion and Conclusions

The dynamics of credit portfolios during the analysed period was significantly affected by economic turbulences in Europe. Transition probability matrix for Slovakia and the Czech Republic have been estimated for a relatively short period of time due to changes in data stored by the National Banks and inconsistencies in the distributions of loans ratios over time. The resulting transition probability matrices in both countries show an increasing volatility in credit rating B. Consistent data for Slovakia and the Czech Republic were available only for short period after the outbreak of the financial crisis. The estimated probability of migration is therefore typical for crisis periods.

Our estimated matrices show a higher probability of migration from its original state, and they usually overestimate the probability of credit risk. For credit data of the Czech Republic and Slovakia, we have tested the impact of the credit to GDP dynamics. The average real GDP in Slovakia for the analysed period was 1.5% and 0.8% in the Czech Republic. Impact on GDP dynamics of credit behaviour was reflected in the same manner in both countries. The periods with GDP above the average were more stable and more likely to improve the assessment.

We can conclude that economic cycles affect the stationarity of probabilities of credit migration in the selected countries, and so our hypothesis about stationarity was confirmed. We have also confirmed the second hypothesis stating that there are some relations between the credit and GDP migration in Slovakia and the Czech Republic.

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The influence of tax policies on sustainable development in Poland and the Czech Republic

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Abstract

Since the 1980s, many governments have adopted neo-liberal economic policies more and more. The main aims of such policies have to boost the economy and to increase both the total amount of money collected through the public tax intake and to lower marginal tax rates. The supporters of this trend argued that markets always behaved in a rational and effective manner. But instead of reducing poverty and promoting the development of good social welfare, these policies have partly caused an increase in social inequality, (that made by power during 1990s and 2000s.) The goal of this article is to show how tax policies have affected sustainable development, especially concerning socioeconomic aspects in both Poland and the Czech Republic.

Keywords: neo-liberal policy, taxation, sustainable development

JEL Code: E13, E62, H21, H3

1. Introduction

After World War II several Western countries estabilished welfare state models for their populations. They were estabilished as a reaction to the hardships of the Great Depression and the horrors of the war. These models ran successfully for many decades but started to flounder in the 1970s when several economies started to struggle and this model was seen as being too expensive. At this time, a new more neo-liberal approach was introduced as being a more realistic way forward.

During the 1970s, the concept of the welfare state came under pressure and there was an increasing convergence of views that tax systems needed to be modified. The perception of what makes a 'good tax system' shifted from one that explicitly introduces distortions into the functioning of capitalist market to one that minimizes such distortions. It was based on the belief in the efficiency of markets. But the 1990s and 2000s showed

that the markets cannot work efficiently. The crisis of 2008 was the best example for this. At the same time, the idea of a sustainable socioeconomic model was becoming more popular. In the first section of this article, the author describes the neo-liberal approach to taxation and the main result of this policy. Section two discusses sustainable development as a main idea in the European Union which appears to be similar to a continuation of the welfare states. Section three describes the main changes that have taken place in the Czech Republic and Poland since these countries became members of the EU. Focus was put on the main indicators of sustainable development especially on socioeconomic aspects. The goal of this article is to show that taxation policy, can support sustainable development. This article makes use of references to literature, reports and statistics.

2. Taxation in Neo-liberal policy

From the 1980s onwards in the neo-liberal era, there has been a general effort by policy-makers globally to reduce progressive tax schemes and marginal tax rates. The standard arguments concerning this revolved around promoting economic growth and investment and reducing disincentives to work. The effects of these policies can be clearly seen. In 2012, the world's 100 richest people became $241 billion richer. They are now worth $1.9 trillon: just a little less than the entire output of the United Kingdom. This is not the result of chance. The rise in the fortunes of the super – rich is the direct result of policies. Here are a few:

- the reduction of tax rates and tax enforcement;
- governments' refusal to recoup a decent share of revenues from minerals and land;
- the privatisation of public assets and the creation of a toll-both economy;
- wage liberalisation and the destruction of collective bargaining.

The policies that made the global monarchs so rich are the policies which are squeezing everyone else. This is not what the theory predicted. Fridrich Hayek, Milton Friedman and their disciples – in business schools, the IMF, the World Bank, the OECD and just about every modern government – argued that the less governments tax the rich, defend workers and redistribute wealth, the more prosperous everyone will be. Any attempt to reduce inequality would damage the efficiency of the market. The economists have conducted a 30-year global experiment: tax systems generally needed to be modified to achieve greater 'neutrality' of taxation (Tanzi, 1987). This was part of a broader shift in the economic paradigm, based on the perception that stagflation (i.e. high unemployment combined with high inflation) experienced by developed and some developing countries in the 1970s was partly due to the distorting effects of state intervention. As a result, monetary policy began to give priority to fighting inflation at the expense of efforts to check rising unemployment. It was believed that the unemployment problem could be solved by introducing greater flexibility in 'hiring and firing' conditions and in wage determination, and by shifting the distribution of income in favour of profit-making. The perception of what makes a 'good tax system' shifted from one that explicitly introduces distortions into the functioning of capitalist market economies to one that minimizes such distortions (Steinmo, 2003). It was based on a revival of the belief in the efficiency of markets. According to this point of view, the tax burden and government expenditure should be kept to a minimum, and the distribution of the tax burden and allocation of public expenditure should be determined primarily by efficiency criteria (McLure, 1984; Musgrave, 1990).

Distributional considerations should only come into play to avoid extreme income inequality, which should be reduced mainly through expenditures (e.g. Engel, Galetovic and Raddatz, 1990). High taxation of corporate profits and high marginal income tax rates for those at the top of the income scale were seen as slowing down economic activity, but also as being ineffective in redistributing income and wealth (Bird and Zolt, 2005).

In developed countries, tax reforms typically included:

- scaling back the progressive tax rates on personal income, patriculary marginal rates at the top end of the income scale;
- reducing the number of income tax brackets;
- cutting back corporate tax rates;
- broadening the income tax base by eliminating loopholes and exemptions;
- increasing rates of indirect taxes – in particular VAT and social security contributions (Sandford, 1993: 10-20).

These changes in the tax structure which aimed at making the tax system more 'neutral', favoured some interests over others. The elimination of loopholes and exemptions in most cases reduced certain privileges of taxpayers in the higher income groups. At the same time, cuts in income and capital taxation, together with increases in consumption taxes, led to a redistribution of the tax burden which fell more heavily on lower income groups. The overall effect of these changes in the tax structure made taxation more regressive (Steinmo, 2003: 223).

This lower taxation of high-income groups and profits was expected to lead to greater investment. As globalization advanced in the 1990s, it was also argued that reducing the tax burden, especially on profits, was necessary because high corporate taxes had an adverse impact on the international competitiveness of companies.

However, these tax reforms did not result in higher overall efficiency and faster growth (Piketty, Seaz and Stantcheva, 2011). In fact, reduced top marginal tax rates encouraged a greater distribution of corporate profits among shareholders – who are mainly to be found in the top income groups – rather than the reinvestment of such profits. In addition, the neo-liberal policy favoured the rise of financial bubbles which ended in several crises. Following these crises, governments were forced to look for additional money and this additional money was raised through taxation.

Table 1 shows the main economic changes, especially in the European Union, during last years.

First, when we look at GDP the worst situation was in 2009 when the main impact of the last financial crisis took place. Of course, the situation looked quite different in China, where the annual growth in GDP was consistently over 7% during this period. As we can see the more complicated situation is in the Euro Area. The reason for that is the differential economic situation in states composing this area and the accumulating problems in the banking sector and then in public finance policies.

Then, let's look at average PIT rates. Before the beginning of the crisis, the rate level was high, and then it dropped slightly. When the situation became worse and the states had bigger financial problems, the PIT rates grew again, especially in the Euro area. A better situation was with CIT because governments lowered the rate to stimulate capital expenditures. But the GDP indicator showed that money that was left in investors hands not been used in this way. The same could be said about effective average tax rates in the non-financial sector.

Table 1: Main indicators of economy in 2007–2015

GDP (%)	2007	2008	2009	2010	2011	2012	2013	2014	2015
EU 28	3	0.4	−4.4	2.1	1.7	−0.5	0.2	1.5	2.2
Euro area (EA – 19)	3	0.4	−4.5	2.1	1.5	−0.9	−0.3	1.1	2
China (including Hong Kong)	14.2	9.6	9.2	10.6	9.5	7.7	7.7	7.3	:
Japan	2.2	−1	−5.5	4.7	−0.5	1.7	1.4	0	0.5
USA	1.8	−0.3	−2.8	2.5	1.6	2.3	2.2	2.4	:
PIT simple averages (%)									
EU 28	39.7	38.4	38	38.5	38.4	38.7	39.4	39.5	39.3
Euro area (EA – 19)	39.4	39.1	38.8	39.7	40.6	41.1	42.3	42.3	42.1
CIT simply averages (%)									
EU 28	24.4	23.8	23.8	23.2	23	22.9	23.2	22.9	22.8
Euro area (EA – 19)	25.7	25.1	25.3	24.5	24.4	24.3	25	24.8	24.6
Vat simple averages (%)									
EU 28	19.6	19.5	19.9	20.5	20.8	21.1	21.5	21.5	21.6
EU 19	18.9	18.8	19.2	19.7	19.9	20.1	20.6	20.7	20.8
Effective average tax rates, non-financial sector (%)									
EU 28	22.1	21.3	21.6	21	20.8	20.8	21.1	21.1	
EA 19	23.4	22.5	22.9	22.1	21.8	22	22.8	22.8	

Source: Own study on base of Report „Taxation trends in the European Union" Eurostat 2015 edition

It is interesting to focus on VAT. Althought the current rates of this duty are still increasing, the level of VAT in the Euro Area is lower than in all non-Euro members of the EU. That means that the states which are not in the Euro Area have higher rates of this tax. Perhaps, that's why they did not have such big fiscal problems as took place in the Euro Area.

In summary, tax reforms in many developed economies at the end of the last century, mainly benefited from the highest income households, except when the decline of top marginal rates was counterbalanced by increases in other taxes with progressive incidence. But despite the reduction in the progressive nature of the tax systems and lower corporate taxes, growth remained slow.

3. Sustainable development in the EU, in place of the welfare state

Sustainable development has its roots in the idea of the welfare state and this was a concept of government in which the state or a well-estabilished network of social institutions, would play a key role in the protection and promotion of the economic and social wellbeing of citizens. It is based on the principles of equality of opportunity, equitable distribution of wealth and public responsibility for those unable to avail themselves of the minimal provisions for a good life. The model of the welfare state also usually includes public provisions of basic education, health services and housing. The next aspect was an antipoverty program and the system of personal taxation.

Welfare economics was an answer to the situation after the Second World War. This idea was a clear sense of rebuilding better social conditions. The concept of sustainable development is an idea, which was created on an international level and is a response to neo-liberal policies, which often lead to social inequality, problems with the environment and almost a collapse in public finances.

Sustainable development became a fundamental and overarching objective of the European Union, enshrined in the Treaty on European Union in Article 3. Measuring progress towards sustainable development is an integral part of the EU's Sustainable Development Strategy (EU SDS), and it is Eurostat's task to produce a monitoring report every two years based on the EU's set of sustainable development indicators (SDIs).

The first steps of Eurostat towards measuring sustainable development (SD) go back to the 1990s. Following the United Nations (UN) Conference on Environment and Development held in Rio de Janeiro in 1992, Eurostat started working closely with the UN Commission on Sustainable Development (UNCSD) on global indicators of sustainable development.

A first EU SDI set was proposed following the adoption of the first EU SDS in 2001 and was endorsed by the Commision in 2005. The set was slightly revised after the review of the first EU SDS that led to an adoption of a renewed strategy in 2006.

The EU SDI set is organised in a theme-oriented framework, which provides a clear and easily communicable structure relevant for political decision making. The framework is based on current priority policy issues, but can be adjusted to possible changes in these priorities and objectives which may emerge over time.

The SDI framework covers ten thematic areas belonging to the economic, the social, the environmental, the global and the institutional dimensions i.e.: socioeconomic development, sustainable consumption and production, social inclusion, demographic changes, public health, climate change and energy, sustainable transport, natural resoues, global partnership and good governance.

The main body of the current EU SDS, essentially unchanged since 2006, is built around seven key challenges, with corresponding operational objectives and targets as well as associated actions and measures. The most recent changes to the indicator set followed the adoption of the Europe 2020 Strategy and its eight headline indicators, which have been integrated into the SDI framework in the themes: socioeconomic development, social inclusion and climate change and energy.

Addressing the development needs of the poorest populations has been on the global political agenda since the Millennium Development Goals (MDGs) were agreed by UN Member States. They address some of the most pressing issues faced by developing countries at the time. The eight goals aimed aim to eradicate extreme poverty and enhance education, health, gender equality, environmental sustainability and global partnership.

The Europe 2020 strategy, adopted by the European Council on 17 June 2010, is the EU ten year strategy for growth and jobs. It puts forward three mutually reinforcing priorities to make Europe a smarter, more sustainable and more inclusive place in which to live:

- the transition to smart growth through the development of an economy based on knowledge, research and innovation;
- the promotion of more resource efficient, greener and competitive markets leading to greater sustainable growth;
- the fostering of job creation and poverty reduction through the priority of growth policies (Sustainable development in European Union; 2015).

The relationship between the EU Sustainable Development Strategy and the Lisbon Strategy sets the overall framework, within which short – and medium-term strategies should operate, by providing a long – term perspective and clear and coherent guidance to all policy areas. Now EU SDS recognises the role of economic development in facilitating the transition to a more sustainable society, especially in socioeconomic aspects. The idea of sustainable development suggests markets are not able to work efficiently without a pointed strategy, that should be compiled by governments and harmonized on an international level. Next chapter presents how the changes in tax policy influence on sustainable development in two states that belong to both Visergard Group and European Union: the Czech Republic and Poland.

4. Sustainable development in socioeconomic aspects in Poland and the Czech Republic

The model of SD presents a complex system with flows among three pillars. First, the economy influences the environment but the environment affects the economy, too. The environment influences society, while society reacts by demographic changes, forming consumer styles and education. On the other side, by creating the levels of wages, welfare and employment, the economy first influences the standard of living. For sustainable development to be an operating instrument in economic policy, it should have a solid base – indicators that will reflect the changes over years. In this section, the focus will be put on the socioeconomic aspects of SD and the main indicators to compare the settings of Poland and the Czech Republic in the European Union (EU).

The GDP during presented years was better in the EU and EA. Countries in Middle Europe felt the crisis less severely than in Western Europe. In Poland in particular GDP was high and never was below zero (Table 2).

Table 2: Main indicators in Poland and the Czech Republic in 2007–2015

GDP (%)	2007	2008	2009	2010	2011	2012	2013	2014	2015
Czech Republic	5.5	2.7	−4.8	2.3	2	−0.8	−0.5	2.7	4.5
Poland	7	4.2	2.8	3.6	5	1.6	1.3	3.3	3.6
Top statutory PIT%									
Czech Republic	32	15	15	15	15	15	22	22	22
Poland	40	40	32	32	32	32	32	32	32
Top Statutory CIT (%)									
Czech Republic	24	21	20	19	19	19	19	19	19
Poland	19	19	19	19	19	19	19	19	19
VAT rates (%)									
Czech Republic standard/reduced	19; 5	19; 9	19; 9	20; 10	20; 10	20; 14	21; 15	21; 15	21; 10/15
Poland standard/reduced	22; 7(3)	22; 7(3)	22; 7(3)	22; 7(3)	23; 5/8	23; 5/8	23; 5/8	23; 5/8	23; 5/8
Effective average tax rates, non-financial sector (%)									
Czech Republic	21	18.4	17.5	16.7	16.7	16.7	16.7	16.7	
Poland	23.7	23.7	23.7	24.8	24.8	27.1	27.1	27.1	

Source: Own study on base of Report "Taxation trends in the European Union" Eurostat 2015 edition

The lowest value of GDP in the Czech Republic was in 2009 – −4,9%. There was the main hit of the financial crisis. After that GDP is up and down but the last two years

showed a the growing tendency. For both countries charactetistic are two years: 2009 and 2012–2013 when the economic situation was under the influence of the last financial crisis.

When we look at PIT rates – in the Czech Republic there is a flat rate whereas in Poland there is a progressive tax system. In Poland until 2008 there were three thresholds: 19%, 30% and 40%, but after the reforms there are now only two: 18% and 40%. The main goal of this reform was to leave money in people's pockets and in companies to increase investments and savings. Cutting the PIT rates accompanied the rise of VAT rates two years later. The reason was that after PIT reform the government did not have higher revenues as was supposed and as it was during 1980s in Western countries. In Poland the standard rate is higher than in the Czech Republic and than the average in the EU, too. The changes in PIT rates and VAT rates were after the drop of GPD. Interesting in that GPD never came back to the value it had been before 2008 despite changes in taxation.

Table 3 shows the level of debt and deficit since Poland and the Czech Republic have become members of the European Union. The level of debt was always bigger in the Euro Area than in the European Union. The highest values were during the last three years which were a result of government help for financial institutions. Both the Czech Republic and Poland's debt was almost 50% lower. But in the Czech Republic we can observe that debt has grown from 28,5% in 2004 **to** 44,9% in 2013 to 40,3% in 2015. In Poland debt has grown also but by not so much as in the Czech Republic.

Table 3: General gros debt and deficit in Czech Republic and Poland

General government gross debt (% GDP)											
	2004	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
EU (28)	60.9	60.1	57.5	60.7	72.8	78.4	81.1	83.8	85.7	86,7	85
EA 19	68.4	67.4	65	68.6	78.4	83.8	86.1	89.5	91.3	92	90,4
Czech Republic	28.5	27.9	27.8	28.7	34.1	38.2	39.8	44.5	44.9	42,2	40,3
Poland	45	46.9	44.2	46.3	49.4	53.1	54.1	53.7	55.7	50,2	51,1
General government deficit/surplus (% GDP)											
EU (28)	−2.9	−1.6	−0.9	−2.4	−6.6	−6.4	−4.6	−4.3	−3.3	−3	−2,4
EA 19	−3	−1.5	−0.6	−2.2	−6.3	−6.2	−4.2	−3.6	−3	−2,6	−2,1
Czech Republic	−2.7	−2.3	−0.7	−2.1	−5.5	−4.4	−2.7	−3.9	−1.2	−1,9	−0,6
Poland	−5	−3.6	−1.9	−3.6	−7.3	−7.3	−4.8	−3.7	−4.1	−3,4	−2,6

Source: own study on:
base:http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tec00127&plugin=1, last update: 16.01.2017

When we look at deficit, we can see that the worst was in 2009. Before this year in the Czech Republic the deficit was below 3%. In 2013, the deficit was below 3% again but the price was a higher level of debt. In Poland the situation was worse because until 2015 the deficit was over 3%, which means the reforms to keep a balance in public finance were not efficient enough. Even the reforms in taxation and good GPD did not make the economic situation better as well as was supposed. Until 2015 Poland was under European Commision control because of a high deficit.

The main indicator of socioeconomic sustainable development in the EU is GDP per capita (Table 4). In the EU and in the EA real GDP per capita declined in 2009 but since then it has been growing. In the Czech Republic and Poland the level of real GDP per capita is lower but in Poland the numbers are much lower than in the Czech Rebublic. The characteristic thing is that in the Czech Republic GDP per capita was growing to 2009 and then

it dropped a little but since 2010 it has been growing again. In Poland this trend since 2004 has been growing from year to year but is still low. It could be seen a little strange because the GPD in the Czech Republic was fluctuating more than in Poland but the real GDP per capita was better. The author thinks that the reason for that could be the effectiveness of using government strategy to support the economy.

Table 4: Real GDP per capita (euro per capita)

geo/time	2004	2006	2008	2009	2010	2011	2012	2013	2014	2015
EU (28 countries)	24,400	25,500	26,200	25,000	25,500	25,800	25,600	25,600	26,000	26,500
Euro area (19 countries)	27,600	28,700	29,400	28,000	28,500	28,900	28,500	28,400	28,700	29,200
Czech Republic	12,800	14,400	15,400	14,600	14,900	15,200	15,100	15,000	15,400	16,000
Poland	7,300	8,000	8,900	9,200	9,400	9,900	10,000	10,200	10,500	10,900

Source: own study on base:
http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tsdec100&plugin=1, last update: 16.01.2017.

Savings are the next aspect that reflects sustainable development and taxation policy. When we look at the EU we can see that the level of savings was highest in 2009 and after that it has been systematically falling (Table 5). The same situation can be observed in the EA. Here the level of savings rate is higher than in all the EU but it did not achieve the level of 2004. Despite the growing GDP per capita, the savings rate is dropping and that means that people have been spending more money for consumption than for savings. On the other hand, it could confirm that the financial markets still have problems and attention is being put on improving conditions in this sector. When we look at the Czech Republic the highest rate was in 2009 and after that could be seen a little drop to 2013 and after that the rate has been growing and even is higher than in the EU. In Poland the situation is not good. The level of savings rate is very low and it has been steadly falling since 2010. That could be proof that people don't have tmoney to save because the earnings are to low or the taxation, mainly indirect, is still too high.

Table 5: Household saving rate (%)

geo/time	2004	2006	2008	2009	2010	2011	2012	2013	2014	2015
EU (28 countries)	11.94	10.95	10.83	12.91	11.98	11.28	10.9	10.84	10.32	10.08
Euro area (19 countries)	14.16	13.02	13.17	14.51	13.16	12.8	12.32	12.5	12.52	12.33
Czech Republic	9.92	12.58	11.36	13.34	12.52	11.19	11.14	10.86	11.77	11.81
Poland	6.61	5.35	3.42	5.53	4.95	1.52	1.49	2.54	1.94	1.77

Source: own study on base:
http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tsdec240&plugin=1; last update 16.01.2017.

The rate of unemployment is another very interesting indicator. In the EU the best situation was in 2008 and after that the rate of unemployment was growing until 2015 (Table 6). The same situation was in the EA but here the rate was higher than in the EU. In the Czech Republic the lowest rate was in 2008, too. The worst situation was in 2010 when the rate was at the level 7,3%. During the next few years the rate was falling and

reached 5,1%. This decline had the effect of creating new job places and investments. In Poland in 2004 the unemployment rate in 2004 was over 19%. After 2006 there was a big decrease in this indicator. This was partly caused by some EU states opening their job markets and people finding work in Western Europe. This decline in the unemployment rate was not caused by investment or by the creation of new jobs but mainly was the effect of earnings emigration.

Table 6: Total unemployment rate (%)

geo/time	2004	2006	2008	2009	2010	2011	2012	2013	2014	2015
EU (28 countries)	9.3	8.2	7	9	9.6	9.7	10.5	10.9	10.2	9.4
Euro area (19)	9.3	8.4	7.6	9.6	10.2	10.2	11.4	12	11.6	10.9
Czech Republic	8.3	7.1	4.4	6.7	7.3	6.7	7	7	6.1	5.1
Poland	19.1	13.9	7.1	8.1	9.7	9.7	10.1	10.3	9	7.5

Source: Own study on base:
http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tsdec450&plugin=1;
last update 16.01.2017

The confirmation in the previous indicator is the number of people who are at risk of being in poverty. In the EU almost one quarter of people live in poverty (Table 7). When we look at the Czech Republic in 2005 that figure was 19,6% but in Poland it was over 45,3%. Since then the percentage of social exclusion in the Czech Republic has fallen over 5p.p. to 14%. In Poland the number of people who live in poverty has decreased by over a half in ten years. The reason for this situation is the earnings emigration and the transfer of moneyback home to Polish families.

Table 7: People at risk of poverty or social exlusion (% and 1,000 persons)

geo/time	2005	2006	2008	2009	2010	2011	2012	2013	2014	2015
EU (28 countries)	:	:	:	:	23.7	24.3	24.7	24.6	24.4	23.7
Euro area (19 countries)	22	22.1	21.7	21.6	22	22.9	23.3	23.1	23.5	23
Czech Republic	19.6	18	15.3	14	14.4	15.3	15.4	14.6	14.8	14
Poland	45.3	39.5	30.5	27.8	27.8	27.2	26.7	25.8	24.7	23.4

Source: own study on base:
http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tsdec450&plugin=1;
last update 16.01.2017.

Finally, one can look at the real adjusted gross disposable income of householders (Table 8). In the EU and EA this disposable income is slowly growing. Even in the EA the situation is better than in all members of the EU. In the Czech Republic it can be seen that since 2004 disposable income has increased from year to year. In Poland every year disposable income has been consistently lower than in the Czech Republic.

To sum up, after reviewing the main indicators that characterize sustainable development, we can see that the situation in the Czech Republic is better than in Poland. Athough Poland is a bigger country with a positive GDP during recent years, the economic situation is still below expectations and its full potential. It is clear that fiscal policy creates the economic climate. Hopefully, This short review has shown that the taxation changes in Poland were not reflected in the indicators that measure sustainable development.

Table 8: Real adjusted gross disposable income of households per capita (in PPS)

geo/time	2004	2006	2008	2009	2010	2011	2012	2013	2014	2015
EU (28 countries)	17,198	18,577	19,555	19,234	19,665	19,972	20,337	20,385	20,781	21,629
Euro area (19)	18,650	20,129	21,227	20,692	21,356	21,674	21,907	21,988	22,431	23,248
Czech Republic	11,947	13,263	13,496	13,849	14,191	14,748	14,924	15,370	16,086	:
Poland	8,620	9,344	10,781	11,321	12,252	12,791	13,610	13,793	14,273	14,909

Source: own Study on base: http://ec.europa.eu/eurostat/tgm/table; last update 16.01.2017.

5. Summary

With the decline of the Welfare States the neo-liberal policy became more popular in developed countries and taxation became more regressive. The neo-liberals claimed that the result of these tax changes would be greater economic efficiency and an increase in investment, with benefits for all. The opposite occurred. The greater inequality became, the less stable the economy and the lower its rates of growth. At the same time more attention was being put on sustainable development and its socioeconomic aspects. When we look at the Czech Republic and Poland we can see that the former managed financial problems during recent years better than Poland and even than the EU. The flat taxation of PIT, lower CIT, a lower deficit, a low unemployment rate and high savings rate and disposable income of householders showed that in the Czech Republic properly prepared taxation policies did, in the long term, work well together with sustainable development. In Poland despite positive GDP indicator and taxation reforms the economic situation is worse then in the Czech Republic. This shows that nowadays the situation is different than in the 1970s and 1980s and now we should think not about liberal or non-liberal tax policies but we should consider effective taxation – on the national/state level that should be harmonized with European union/world trends. Such taxation schemes will support sustainable development.

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Family enterprise – New Rules of the Czech Civil Code in Legal and Economic Context

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Abstract

The family-run business model is in the Czech Republic not used in the scope, as it is the case of other EU Member States. Until recently one of the reasons was also the absence of a legislative framework that would give to the family business or its organization a comprehensive and systematic rules and a stable order. This has – from a part – changed since January 1st, 2014 with the entry into force of the new Czech Civil Code, Act No. 89/2012 Coll. The present paper aims at pointing out the ways, forms and the diversity of family business from business in general according to the legislation in the Civil Code introducing in its Sections 700–707 the institute of family enterprise. In the context of economic-legal analysis undertaken some aspects related to the family enterprise are highlighted, in particular the sharing of profit gains, employment of family members in the operation of the family enterprise and the continuing of operation of the family business after the death of the family member being in the legal position of the entrepreneur..

Keywords: family enterprise, business, ownership, gains from performance of family enterprise, family ties

JEL Code: K15

1. Introduction

Family business can be considered a very important part of national economies. Family businesses are significantly involved in the formation of the national GDP. Koiranen (2007) characterizes the family businesses as "the backbone of the European economy". By far we can´t say that the family business fits only within the category of small and medium business. Among family businesses we find those that fall into the category of large enterprises, that is, undertakings that employ more than 500 employees.

In the Czech Republic, the family-run business model in not employed to such extent as it is the case on other EU-Member countries, in particular in the countries of the

former "EU-15". Countries like Spain, Austria, Italy, Germany, Switzerland, Norway or the United Kingdom are the typical ones of the European Union showing a high level of family business. As to the Czech business environment, however, we may say that his form of business stays often underestimated. The cause is partly the historical development of the discipline of business, which begun to flourish relatively recently – much later than in the former quoted. Among other reasons belonged – until recently – also the absence of a legislative framework that would give to the family business or its organization a comprehensive and systematic rules and a stable order. This changed from a part since 1st January 2014 by the entry into force of the new Czech Civil Code. Nevertheless, the family-run business represents by now Present only around 30% of all business entities in the Czech Republic, among them such important world-wide known firms as Koh-i-noor, Petrof, ZON or RAVAK. (Plhoňová, 2013) However, it is worth noting that the share of family-run business on the Czech annual GDP amounts to 40% and it grows both in size and importance (http://www.rsmfamilyoffice.eu).

2. Aims and Methodology

The paper aims at analyzing of selected issues of the new legal regulation, focusing on significant aspects of the institute in the context of economics, commercial law and family law, as well as to highlight the potential weaknesses in the regulation itself. The research was made on the basis of use of general theoretical scientific methods. The use of analytic method is accompanied by the historical method when comparing the rules contained in the former Commercial Code. Comparative method is employed also in the highlighting of the origin of the new institute and its relatively recent formation.

Paper starts with characteristics of the features of family enterprise. After that it defines the family members who are legally entitled to be involved in the operation of a family enterprise. Leading role belongs logically to the owner of the family enterprise and thus the subsequent part characterizes its specific position among the family members including the ownership of the enterprise. After a brief characteristic of the formation of a family enterprise, the following part focuses on claims that belong to family members involved in the operation of the enterprise. Explanations on the transfer of participation in family enterprise are followed by the regulation of possibilities for termination of participation by family member and – finally highlights the advantages and prospects for this type of business in the future.

3. Results

3.1. Family enterprise – a new legal institute

The regulation of a family enterprise has no tradition in the Czech law. In recent years the family-run business entities, where the family members work under the guidance of one family member, without being regulated by mutual contractual relationships, gained on importance. Typical examples are facilities in founded and run in the agriculture, gastronomy or accommodation sectors. Before 2014, the specific features of the relations between the family members who were personally involved in the operation of business enterprises of family type have not been taken into account by the rules of *ius privatorum.*

The new Czech Civil Code ("CivC" thereinafter), law No. 89/ 2012 Coll. brings new rules for an entity called as family enterprise, in the provisions of Section 700–707 CivC. The regulation of the family enterprise has no tradition in the Czech law. We may find its roots in the Italian *Codice civile* (Art. 230bis) – notwithstanding the fact that Czech civil law roots tends to incline traditionally rather to Austrian´s ABGB or German´s BGB. According to the explanation given by Explanatory Memorandum to the CivC, the rules are aimed at filling the gap in regulation where the family members are in fact working for a family enterprise without their rights and obligations would be governed by a special contract closed to that purpose. And to aim was the Italian regulation more suitable as it is of recent date (introduced by the 1975 revision of the Code) and quite complex (see more Piccolo, 2008).

The provision of Section 700 CivC specifies: "The family enterprise is a kind of commercial enterprise in which spouses and persons within a defined family relationship work together with at least one of the spouses and which is in the ownership of one of these persons. Those members who permanently work for the family or for family enterprise are viewed as family members involved in the operation of the family enterprise."

This legal definition respects the main features of the family business that are stressed by many authors as part of the definition of family business in general, i.e.:
– degree of ownership,
– intention to the succession, and
– involvement of the family members in the business (Vallone, 2013).

3.2. Family enterprise is no legal person

The establishing of family enterprise does not create a legal person, it is not recorded neither in the company or another public register. It is in essence s a contractual cooperation of natural persons within a family. As participating may be even persons that consistently work for the family. Family enterprise is thus not characterized by the subject of business, but by persons, who are involved in its operation. The institute of a family enterprise is intended first of all to offer to family members who work on the permanent basis for a family business and whose legal position is not ruled by a sort of family-bound contract certain protection and legal title to demand their legal rights.

We may imagine the family enterprise as a set of business assets serving to commercial purposes, in the operation of which are involved – through permanent labor participation – the members of the wider family without being partners of the company or being employed on the basis of a labor contract.

We may characterize the family enterprise as a special type of the commercial enterprise under Section 502 CivC. The advantage of the family enterprise is that its members regulate their mutual rights and obligations, profit shares, etc. by a contract. In the case of a family enterprise there are not – and shall not be – any rights and obligations arising by establishment of commercial company or cooperatives on the basis of articles of association or statutes, contract of silent partnership or labor contracts concluded between the members of the family. Members of the family enterprise are not partners, employees, but necessarily even not entrepreneurs. A family enterprise may operate in the way that only one member of the family enterprise shall own a trade license for running the family enterprise

3.3.   Membership in the family enterprise

Member of a family enterprise becomes everybody who is involved in its activities i.e. persons wo perform work for the family enterprise or who works on a permanent basis for the family any by that facilitates the operation of the enterprise or makes it possible.

Participation in the family enterprise is attached only to persons that are family members, cannot be transferred to anybody else. This rule has one exception, and that is the transfer of family member rights in the enterprise to another family member (for example, the son may transfer the participation to his sister). However, the latter is possible only in the event that all family member who are involved in the operation of the enterprise shall agree. Should only one member disagree then the participation can´t be transferred even if all other members agree. (Petlina, Koráb, 2015)

Participation in the family enterprise shall always cease to exist in the case of the sale of the enterprise. When selling the family enterprise the family members shall always possess the pre-emption right. Similarly, in the case when family enterprise becomes subject to heritage, member participating in the operation have the right of priority to inherit it.

Participation in the family enterprise shall cease for a family member also in the case he/she terminates to perform the work for the family or the family enterprise, for example if a daughter who has worked as an accountant in the family enterprise ceases to work and moves abroad. Similarly, the latter may cease to exist in the case that instead of the previous work as a member of the family enterprise a person continues to perform the work on the basis of a contract of employment or, for example, begins to work for family as independent entrepreneur with a trade license for accounting.

3.4.   Entitlement to a share in the profit created

Family members who are in fact involved in the operation of the family enterprise itself, are entitled to "their share" in profits generated (also to a share in property acquired from the profit as well as in increments to the enterprise), this extent that corresponds to the amount and type of work done by them. We should be aware that individual members of the family may have different opinions on "the importance and the benefits" of the work done by them for the family enterprise.

Here it should be noted, in accordance with the Explanatory Memorandum regarding the standard of living of family members, that "even a child that does not participate in the operation of the family enterprise (e.g. for health reasons, duration of studies etc.) can't be served worse than his/her sibling, who works for the family enterprise."

Only a fully legally capable person may waiver his/her share in the profit (or even a part thereof), this in the due form personal declaration. This declaration must be done as public deed, e.g. declaration pronounced before and recorded by the notary public. It must always be evident that the declaration was manifested freely by the person and without any coercion by somebody other.

Since the family enterprise is intended for subsistence of the family, all family members who are involved in the running of the enterprise, are entitled to decide on:
  – utilization of the profits (and how to deal with increments),
  – matters outside the usual operation
  – changes to the basic principles of the enterprise operation or its suspension.

Decisions shall be taken by the majority of votes of the family members. To this issue the Explanatory Memorandum to CivC notices that the decision-making on the above matters is entrusted to the entire "family community, or to all members of the family

involved in the operation of the family enterprise without regard to ownership or co-ownership."

Therefore, even if the family enterprise shall be, for example, in the joint property of the spouses, it will be not be – in a situation where in its operation are involved their daughter with her husband, the husband and wife's brother and/or grandparents – in the sole discretion of the spouses only to suspend the operation of the enterprise, even though they have it in their joint property. The decision shall belong to all parties involved by majority of votes – exactly because the enterprise represents a source of subsistence for all of them and the family as a whole.

Should a person who is incapacitated be among the family members, then:
- in the case of minors it shall be for the vote represented by his/her legal representative,
- in other events such person shall be represented than by the guardian.

In order to maintain the family enterprise in the hands of family members who are actively engaged in the business, the family member who was involved in the operation of the family enterprise, may take the advantage of:
- pre-emptive right when assigning the family enterprise (co-ownership share thereof) and/or property which, according to its nature and previous determination, served permanently for of the operation of the family enterprise,
- priority rights when dividing the succession by the Court – according to the Explanatory Memorandum to CivC, especially situations where a division of the succession shall occur according to the last will of the deceased by the decision of a third person.
- The participation in the operation of family enterprise terminates as follows:
- by a disposal of the enterprise , or
- member ceases to perform work for the family (even situations when a person who takes care for the family house where the whole family lives stops his activities due to illness, age etc.) or
- the legal grounds for the person's involvement in the operation of the family enterprise changes (e.g. the person enters into an employment relationship by closing the labor contract).

Upon termination of participation in the family enterprise, the family member shall be entitled to settlement of his/her share in the profits. If economically justifiable, the settlement can be arranged in instalments under the Section 706 CivC –in case this is agreed upon or decided by the Court. (Odehnalová, 2011) However, if there is no reasonable cause for the breaking down in instalments, the Court will not approve the instalment payment and/or shall decide on the invalidity of instalment arrangement

3.5. Advantages and disadvantages of the family enterprise

There are several advantages and/or disadvantages brought by situation, when the mutual rights and obligations of the members of the family enterprise are not covered by a contract arrangement.

As disadvantage may be seen, for instance, that a family enterprise member may leave the enterprise at any time what may in the case of unexpected exit of the family member who participated on its operation in a significant way, cause considerable operational difficulties for the enterprise. As another disadvantage may be regarded the fact that family members who are involved in the operation of the family enterprise, are not eligible for regular monthly wages (reward), or to another protection normally belonging to employees under labor legislation.(Hanzelková, Mihalisko, Koráb, 2008)

Further on, the current legislation rules on some aspects of the family enterprise insufficiently – this regards e.g. deciding on matters related to the enterprise, on conditions for the payment of the profit shares from the operation of the enterprise, but also on possible liability of family members for the debts incurred during the operation of the enterprise. This may – on the other side – be seen also as an advantage as the family members bear under such terms practically no liability for the running of family enterprise (the liability bears always the family member who owns the family enterprise, but who has not stronger voting rights than the other members of the family).

On the other hand, as an advantage of the enterprise may be without any doubt seen a lower administrative burden based on the high level of informal relationships among family members involved in the operation of the family enterprise.(Koráb, Kalouda, Salgueiro, Sanchez-Apelaniz, 1998) The relationships between family members in their participation on the operation of family enterprises are governed, in the absence of an explicit agreement, by usages and practices established between them as far as they do not contravene the rules of the CivC on the family enterprise. As an advantage we may also classify the preferential right of family members involved in the operation of the family enterprise in the case when the enterprise is divided, in the procedure of dividing the enterprise by a Court and also the pre-emption right that have family members involved in the operation of the enterprise in the case of disposal (sale) with the enterprise. (Odehnalová, 2011)

3.6. Gap in the CivC legislation – dependent work within the family enterprise

No apparent rules on the procedure can be found in the legislation on family enterprise for situation when the participation of a family member in the operation of the family enterprise has already fulfilled characteristics of dependent work within the meaning of the Labor Code, i.e., it constitutes labor performed in person with a controlling link between him and another family member (usually a family member who owns the family enterprise) .

From one point of view we can say that no provision of the CivC ruling on family enterprise contains a clear exception from the obligation to perform work exclusively in dependent employment relationship under Section 3 of the Labor Code. At the same time, there is also no reason for depriving the family members actually performing dependent work for the family enterprise of the protection granted to employees by the labor legislation, in particular as regards working hours, working conditions, remuneration, etc.

On the other side, the purpose of the rules on family enterprise is to accept the reality that, in the case of the ownership of the enterprise by one of the family members, other family members are to some extent involved in its operation without establishing any formal legal relationships among them, and the latter participate jointly, as a family, also in the benefits resulting for the family from such a business establishment. We may also argue that by participating in the operation of the family enterprise all characteristics of dependent work can´t even be fulfilled, especially the existence of controlling link. This is due to the fact that participation in the operation of the family enterprise is of purely voluntary nature and, at the same time, there exists no controlling link between family members, (i.e. it is not compulsory to one member of the family to carry out the instructions of another member).

Both aforesaid conclusions may, however, lead to somehow absurd consequences. The application of the first conclusion would mean that in each case where a continuous

and systematic work of a family member takes place when contributing to the operation of the family enterprise (for example son and daughter help twice a week with cleaning of the family pension) and they will be given instructions by another member of the family (which is in practice common), there should be an employment relationship concluded. Such a conclusion would, however, be absurd from the practical point of view and the legal regulation of family enterprise would become essentially inapplicable.

The application of the second of the above conclusions would, on the contrary, allow to create situations where abuses of the work of family members take place while depriving them of the protection otherwise provided to employees. For example, in a situation where family members work on cultivation of agricultural land, and ordinary employees in a commercial enterprise would be limited by maximum length 12 hours per shift (and established mandatory breaks) according to the Labor Code, the work of family members involved in the operation of family enterprise could work, for instance, even 16 hours per day with no break, without thereby breaking the legal rules. (Janků, Marek, 2016) This can be hardly held for acceptable as well.

In deciding whether or not family members should enter into an employment relationship, we therefore recommend to consider their role in the activities of the family enterprise. In the case that the actual position of a family member will close to the employee´s position, i.e. he/she will really perform systematic work in a subordinate position under the instructions of another person, we recommend rather the conclusion of the labor contract. On the contrary, if the character of the work will be closer to collective cooperation of family members in the operation of the business enterprise, the legal relationship can be left in the mode of family enterprise without any contractual arrangements.

What may be crucial for the solution of the problems also the view of regional Labor Inspectorates. Indeed, there is no clear position taken by these institutions yet, although it can be assumed that the appropriate assistance of a family member in the framework of the operation of the family enterprise will not be evaluated as illegal work, especially if the family enterprise will be owned by a member of the family as a natural person-entrepreneur. On the contrary, in the case where a family enterprise would be owned by a family member through a legal entity, and the status of family member would be in the position of the employee, the potential problems with the Labor Inspectorate can be considered for likely (especially in the control stage). We have to wait when a statement on this issue will be expressed by the courts, which may be, however, a question of several years. This uncertainty can therefore also be regarded as a disadvantage of family enterprise.

3.7. Gap in the CivC legislation – forms of continuity in operation of the family enterprise after the entrepreneur´s death

The issue of continuity of the activities of family enterprise operated by a natural person after its death is also not explicitly ruled by CivC provisions on the family enterprise. Here we may, however, apply the regulatory framework of the Trade License Act, No. 455/1991 Coll. as amended thereafter. Within the meaning of its Section 13, within the persons entitled to continue in running the family enterprise under statutory conditions until the end of proceedings on succession fall the estate administrator, executor of the will, if entrusted with the adminnistration of the estate, heirs at law, if there is no last will, legatees, and the surviving spouse or partner, even if he/she is not the heir, if co-owner of the assets used to operate the business, the surviving spouse or partner, if the trade license is not continued by the heirs or a trustee, if the enterprise was inserted by the

will into a trust fund (Testamentary Trust Fund). The option to continue under the trade license depends on the notification thereof to the Trade Office within limits set by the law. Trade License Act also governs the procedure for the continuation of the trade license until the end of the succession proceedings, or even continuing to run the trade license after the succession. It is therefore clear that statutory rules contain provisions the purpose of which is to prevent the functioning of family enterprise owned by the deceased family member during the time for which the property rights to the deceased entrepreneur´s enterprise are not clarified.

4. Discussion and Conclusions

4.1.   Gap in the CivC legislation – dependent work within the family enterprise

No apparent rules on the procedure can be found in the legislation on family enterprise for situation when the participation of a family member in the operation of the family enterprise has already fulfilled characteristics of dependent work within the meaning of the Labor Code, i.e., it constitutes labor performed in person with a controlling link between him and another family member (usually a family member who owns the family enterprise) .

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4.3. Recommendations

Family-run businesses and their economic contribution are not sufficiently well publicized, although they represent the driving force of national economies. Their position is quite complicated, but ,as for the Czech Republic, we may assume that it will be strengthened in the years to come provided that they can deal with the competitive pressure and a necessary intergenerational transmission. The application of the effective legal rules on family enterprises for the involvement of family members into the operation of the enterprise can be very may be evaluated as very useful due to their informal character, respecting, at the same time, the family-centered nature of such an operation. However, we must realize the potential consequences following such arrangements and to take sufficient measures face them. At the same time, we must also consider whether under concrete circumstances, a different contractual arrangement would be more suitable, for example in the form of employment relationship or a business company running under articles of association. Reasons therefore may be so the rights and obligations of the parties as well as the tax reasons.

Unfortunately, in the context of the CivC legislation on the family enterprise the amendments and modification of other legislation outside the CivC was not made that would address the questions related with this issue. In particular, this includes questions of the obligations of the persons involved in the operation of the family enterprise in relation to the mandatory payments on health and social insurance and the active employment policy, the legal regime of the claims of such persons in case of proven insolvency of the owner of the family enterprise.

The legal regulation of the family enterprise brings several new legal questions and many uncertainties, which will be dealt only in the following years by the practical development searching for answers. At the same time it is necessary to be aware of the partial nature of the institute for family enterprise in the context of the family-run business, as defined in the introduction of this contribution. The Institute of family enterprise is not applicable in particular to the form of so-called family business company, in which members of the family are involved in the business in the form of ownership of monetary and in-kind contributions to the registered capital of the company and at least one of the members of the family is a member of the statutory body or statutory body of the family trading company.

The way to increased support for the family-run business in the context of the Czech legislation and economy, therefore, must necessarily be started with the general definition of the family business, preferably in the context of an emerging European legislation.

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Licence Agreements in the Context of the New Civil Code

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Abstract

Under the license agreement, the licensor provides the license in the agreed scope, and the licensee undertakes to pay agreed royalties or is entitled to use the license free of charge. Corporations administering on a long-term basis license agreements, concluded and/or renewed continuously before and after January 1, 2014, when the new Czech Civil Code entered into force, must face on a daily basis, simultaneous application of two different regulation, as the agreements concluded previous to the above date are still governed by the former Commercial Code, Act. No. 513/1991 Coll. The aim of the present paper is to compare the fundamental provisions of both regulations, at present simultaneously applicable, in terms of the practical impact and consequences of this specificity on the entrepreneurs and/or other entities administering license contracts. Subsequently it formulates recommendations aimed at mitigation of the difficulties that may result from this concurrent application by the subjects administering the license agreements.

Keywords: civil law, Commercial Code, Civil Code, licensing agreement, licensor, licensee, royalty

JEL Code: K 11

1. Introduction

Licensing of patents and providing of other intellectual property rights may facilitate access by researchers to third-party technologies and facilitate practical application with a view toward commercialization or public use. Patent licensing may also facilitate movement of new technologies from the research phase to the commercialization phase as small and medium enterprises out-license inventions to more highly capitalized enterprises. Patent licensing may provide a means for enterprises to overcome obstacles to incremental innovation. Patent licensing may, last but not least, facilitate joint research and development, accelerating technology development and spreading risk. In order to achieve all these goals, a proper legal basis for the procedure of licencing must provide

for legal guaranties and protection of the rights of the provider/ licensor. Czech legislation, headed by the new Civil Code, Act. No 89/2012 Coll. (thereinafter "CivC"), rules on the above issues in a general way, replacing the former rules therefore contained in the Commercial Code, Act No 513/91 Coll, (thereinafter "ComC") after the date of CivC entry into force. The Code came into effect on January 1, 2014.

However, the legal relations – subject-matter of the regulation by the CivC – that were established before the date of its entry into force as well as the rights and obligations following from them including rights and obligations following the breach of contracts, shall be governed by the previously effective legislation, i.e. the ComC, further on.

The above provision has practical impacts on a considerable number of legal relations and contract that regulate them. Among the latter we find license agreements as arrangements governing the industrial property. These represent a type of legal arrangements which are generally not concluded as short-term contracts, but as long-term ones. In other words, that all license agreements concluded before 31 December 2013 shall be governed by previous legislation – ComC, even if it should be for a relatively long time. Only license agreements concluded after 1. 1.2014 shall be governed by the new Civil Code as the legislation replacing to this extent the ComC.

For corporations managing the license contracts, concluded and/or renewed continuously before and after the crucial date quoted above, the simultaneous application of two different regulations can therefore be a practical problem, which they must face on a daily basis.

2. Aims and Methodology

The aim of the present paper is to compare the crucial provisions in both regulations, thus simultaneously applicable, in terms of the practical impact and consequences of this specificity on the entrepreneurs and/or other entities administering license contracts.. In this context we will, first of all, examine the previous regulation contained in the ComC (which corresponds with the legislation still in force in the Slovak Republic); thereafter we shall approach the recent rules brought by the CivC 2012. (the paper builds on Marek, 2008 and Pospíšil, 2014). Subsequently we shall formulate some recommendations aimed at mitigation of the difficulties that may face subjects administering the licence agreements as subject of their business due to this concurrent application.

The Explanatory Memorandum to the Civil Code (thereinafter "Explanatory Memorandum") states in this context that the rights and obligations of the licence agreements in the earlier law was not regulated in a uniform way. The rules on licensing of objects of industrial property were contained in the ComC (in Sections 508 et seq.), whereas the provisions on the licensing of objects protected by copyright law were included in the Copyright Act (Sections 46 et seq.). Both statutes are *leges speciali* in relation to the CivC.

According to the Explanatory Memorandum, this was felt as a weakness, which was suitable for remedy, so that both special regulations shall be integrated into one single institute, while respecting the special features of licensing of items protected by the copyright. The new legal rules "follow mainly the aim of systematic legal arrangement... it takes over the legislation from both special statutes, without making substantial changes in it." The rights and obligations from licence agreements pass to the legal successor of the person to whom the licence was granted. The licence agreement can exclude such a transfer of rights and obligations to the successor.

The Explanatory Memorandum then continues by noting that a person who acquired sublicense may also grant further sublicenses only if this was explicitly agreed between him and the provider of the sublicense.

The research submitted in the present study by the authors was accomplished on the basis of use of the analytical, comparative and inductive methods.

3. Results

3.1. Regulation by the Commercial Code (Act .No. 513/1991 Coll)

Implementation of research and development activities contributes significantly to the increase of level of the production of goods. Generally, however, it is not necessary to develop what was already discovered before. A considerable part of the production development is based on the use of the results of activities of other subjects, e.g. good market position of labels, trademarks or other intellectual rights. These results can be provided for further use by their authors on the basis of contractual relations. Mainly to this purpose is designed the conclusion of licence agreements. (Marek, 2008)

By the licence agreement to the subjects of industrial property:

- The provider grants to the licensee the exercise – to the agreed extend and on the agreed territory – the rights to the industrial property (thereinafter "rights")
- The licensee undertakes to provide the agreed royalties or other material assets to the license provider.

The agreement must be in writing. This follows from the rules containing the basic provisions on the licence agreement to the objects of industrial property (Section 508 of the ComC).

With regard to the mandatory provision of Section 263 para. 2 ComC, the basic provisions of Section 508 of the ComC shall be of mandatory nature as well.

Licence agreement to the objects of industrial property as contractual type represents the so-called relative trade, which can be applied in situations meeting the conditions laid down in Section 261 paras. 1 and 2 ComC. Even in this case it was also possible, according to the provisions of Section 262 ComC, agree that certain relationships that does not fall under the scope of Section 261 ComC, shall be nevertheless governed by the ComC as well.

3.1.1. Importance of the basic provisions

Basic provision defines the substantial parts of the agreement, which are – next to the specification of the Contracting Parties (licensor and licensee) – as follows

- specification of the rights whose exercise is granted, including the definition of their extent and territory of use;
- determination of the amount of royalty or other form of consideration.

It should be noted on this place that the application of the agreement was possible only for "industrial property rights". However broad the application of the agreement may be, it is defined just by this specification of the agreement (other intellectual property rights, as for instance know how, could not be included).

Under the rules of ComC, it was possible to use the agreement only for objects of industrial property, i.e. essentially for rights protected by patents for inventions, utility

models, industrial designs, trademarks, topographies of semiconductor products, new varieties of plants and breeds of animals.

Provision of a licence was excluded (due to the special nature connected only to the relevant territory) in the case of designations of origin and geographical indications.

In the Commentary to ComC by Švarc (Švarc,1996) we find following opinion to this issue: "The licensor under Sections 508 to 515 can be just the owner and/or the applicant for exclusive rights to some of these intangible assets. The provisions of Sections 508 to 515 do not apply to the sub-licencing contract." This opinion is fully in accordance with the rule contained in Section 511 paras. 1 and 2 ComC. However, the text of the provisions was of facultative character. By agreement of the parties it could be either excluded or otherwise modified. Therefore we believe that in those cases when the Contracting Parties agreed on these divergent arrangements the concluding of a sub-licensing contract was possible and was not contrary to the basic provisions on this contractual type.

The licensor is under Section 511 ComC continues – even after granting the licence to others – to be entitled to exercising rights that are the subject of the agreement, as well as to grant further licenses to third persons. The licensee is not entitled to leave the exercise of the right to other people.

Due to the facultative character of the above rule it is, however, possible to negotiate different arrangements. They are, for instance, possibilities to leave to the licensor the right of use but to prohibit its provision to other licensee, etc.

According to the ComC, the licence shall be granted as non-exclusive, however, it is also possible to arrange the latter as an exclusive licence.

According to the commercial law the licence agreement regulated by the ComC was not permitted to rule on rights other than to the objects of industrial property. Agreements granting rights to other objects than to objects of industrial property could be concluded as so called innominate contracts under Section 269 para. 2 ComC. In such a situation, these innominate contracts were not covered by other provisions of the ComC governing the licence agreement, unless the parties have explicitly agreed.

Following argumentation was provided to the support of this legislation: "There are many types of licence agreements with a very different content. It is therefore not easy (neither appropriate) to provide for a single regime by the law, that would suit for all types of licences on all kinds of intangible assets. Joint rules on licence agreement in broad terms would be too general. Limitation of Sections 508 to 515 ComC only to licences to the objects of industrial property follows their common features, e.g. Their protection on the basis of a decision by public authorities (e.g. registration), which the other intangible assets do not possess." (Švarc, 1996)

The authors of the present paper proposed already ten years ago to consider amendment to the ComC modifying the licence agreement so that it would include broader scope of relationships (with the exception of the copyright licence agreements under the Copyright Act), including the licence agreement to know-how, covering, for example, technological processes and/or material composition of the ingredients that are not protected by industrial rights. (Marek, 2008).

Legal rules on the licence agreement contained in eight sections of the ComC are of such a general nature (except for the basic provision) so that it complied with universal use. Special regulation concerning rights to be recorded in public register was contained in a mandatory provisions of Section 509 para. 1 of the ComC.

After the enactment of ComC majority of the authors thought that for future general use of the licence agreement no modifications of the provisions of Section 509 to 515 ComC shall be necessary. The changes were required only as regards the provisions of

Section 508, para. 1. The conclusion of the agreement entitled only to the exercise of the right, not to its assignment. Should the parties intend to arrange for assignment of the rights, the form of an innominate contract was necessary.

Contract on the assignment of rights could be concluded only if not forbidden by special legislation. The prohibition of assignment of rights was ruled, for instance, under the provisions on so-called collective trademarks. As for collective trademarks, the prohibition of awarding a licence was provided as well. This is provided for by the Trademark Act, Act. No. 441/2003 Coll. As amended. This legislative restriction that remains in force after the abolishing of ComC must be respect, *de lege ferenda*, however, its modification may be considered.

3.1.2. Record in the Register of Rights

ComC rules: "If provided for by a special statutory provision, a registration in the appropriate register of these rights is required for their exercise in accordance with a contract." This mandatory rule applies under the Czech law, for example, in the case of trade marks.

Trademark licence agreement becomes effective towards third parties upon the registration in the trade mark register administered by the Industrial Property Office.(Štenglová, Plíva, Tomsa, 2009)

It is necessary to bear in mind that, as regards industrial property and its protection, the principle of territoriality applies. Exercise of the right is, therefore, in accordance with this principle and as such must be ensured in all countries where the registration as condition is laid down by the law of the enrolment.

The ComC provision quoted above is mandatory (see Sections 509 (1) and 263 ComC). This is the only provisions of this kind – beside the basic provision – as regards the legal regulation of the licence agreement. All other provisions therein that concern this agreement are of facultative character and contractual arrangements agreed between the parties take precedence over the statutory rules.

In many individual cases the facultative character of these provisions is used. However, in our opinion, it is not enough simply to make divergent agreement of statutory provisions, but it is appropriate to rule by the way of contract a number of questions that are not mentioned in the ComC at all. Among others, the agreement should – depending on the nature of the relationship – provide for technical support by the licensor, training of relevant personnel of licensee, details on documentation to be passed with the licensee and on the content of the relevant transfer protocol, payment terms etc. Because the subject of the transaction are the industrial property rights, special legislation that applies to the subject-matter covered shall be studied a well.

When concluding the licence agreement the licensor must take due regard to the anti-competition legislation. Agreement on the transfer of rights or the granting of licences for inventions, industrial designs, trademarks, topographies of semiconductor products, utility models and protected plant varieties or animal breeds or parts may be invalid if the licensee is limited by its provisions in course of trade by restrictions that go beyond the subject matter and the scope of legal protection of industrial property (in detail Boháček.

However, the effects of nullity shall not rely, in particular, to limitations of licensee's rights that are justified by the interest of the licensor's rights on proper use of the rights – subject matter of the protection. Further on, it will not cover the obligations of the licensee to exchange experiences or to provide a licence to the patents with the view to improve or to use the rights – subject matter of the protection, provided it corresponds to the mutual obligations of the licensor and licensee. Finally, it doesn´t cover the obligations

of the licensee in respect to the competition on markets outside the scope of the Act on the Competition Protection.

The relevant provisions of the Act on the Competition Protection shall apply, *mutatis mutandis,* to the transfer rights or granting exercise of rights regarding a subject-matter that cannot be classified part of the industrial property.

Should the duration of the rights granted by the licence agreement depend on its performance, the licensee is obliged to the performance. For example, in the case of trade marks the exercise of the right is required the maintenance of the latter. Any trademark that would not be used for five years – provided the owner of the trade mark has no proper explanation therefor – would be deleted from the register. Thus, for the use of trade marks mandatory rules provided by a special legislation shall apply.

It is, however, necessary to bear in mind that the above stated will not apply, should the relevant rules have their origin in other than Czech legislation and/or should they follow applicable international conventions

3.1.3. Maintenance of rights, documentation

Relevant ComC rules imposed to the licensor the obligation to maintain the rights for the duration of the agreement if required by the nature of these rights. The latter relies, in particular, to the payment of royalties and/or securing of agenda related thereto such as the renewal of entries in registers, etc. As this may regard also other territory than the one of the Czech Republic, again, our preceding notice on the importance of the definition of the contractual territory and on the potential effect of foreign legislation or international conventions is of relevance thereto.

According to ComC, the provider/licensor shall, without undue delay after the conclusion of the agreement, provide the purchaser/licensee with complete documentation and information necessary for the exercise of rights under the agreement. Unless not otherwise agreed between the provider and the purchaser, the performance of this statutory obligation shall be very often one of the prerequisites of successful exercise of the right.

Statutory obligation of the licensee is to keep in secrecy from third persons any information and documents provided, unless it follows from the agreement or from the character of the supporting documentation and information provided that the provider is not interested in keeping them in secrecy. For third persons are not considered persons who participate in the operation of the entrepreneur´s business entrepreneur and were instructed in a due way by the entrepreneur to keep them in secrecy.

After the termination of the agreement the purchaser/licensee is obliged to return the documents provided and continue to keep as confidential information provided to him before it becomes generally known. The latter is ruled by section 513 ComC and extends thereby the rules provided by Sections 17 to 20 ComC on the trade secret and/or Section 271 on confidential information provided during negotiations on conclusion of the agreement.

If the purchaser/licensee is restricted in the exercise of the rights by other persons or if it finds out that the rights are infringed by other persons, he shall, without undue delay, report this to the provider/licensor. For the breach of this obligation he shall be, unless otherwise agreed by the agreement, liable for damages as for breach of any contractual or statutory obligations. The non-provision of reports could be also specified by the agreement as a substantial breach of the agreement with the corresponding legal consequences arising.

The provider/licensor was obliged, without undue delay, to take all necessary legal measures in order to protect the exercise of the rights of the purchaser/licensee. In doing

so he was entitled to require necessary assistance from the purchaser/licensee. Due to the fact that "the exercise of rights" is regarded as essential provision of the agreement, any potential breach of this obligation was to be held for a substantial breach of the agreement – this even without an explicit contractual provision to this end. The purchaser/licensee was dependent on the activities undertaken by of the licensor.(see also Pelikánová, 2004)

The agreement could be concluded both for a definite or an indefinite period of time. ComC provided that if the agreement was not concluded for a definite period, it can be terminated. Again, this was a facultative rule and it was therefore possible to agree on a termination period in agreements concluded for definite period of time. The termination itself – unless provided otherwise by the agreement itself – was effective after a period of one year from the end of the calendar month in which the notice was delivered to the other contractual party.

Due to the fact the entire ComC legislation was of facultative character, it was possible to prepare licence agreement "tailored" to specific needs. I doing this, however, it was necessary to take due regard to special additional domestic legislation, in many cases also to special legislation of other jurisdiction as well as to relevant international conventions.

3.2.   Regulation by the Civil Code (Act .No. 89/2012 Coll.)

Rules contained the CivC are not too extensive. This is no change in comparison to the former ComC rules. Under the heading "Licence" we find general arrangements contained in Sections 2358-2370. Following these provisions we find specific provisions on licence to items protected by the Copyright Act as well as special provisions for publishing licence agreement. These provisions, however, will not be part of our discourse hereto.

At first, we must note that many comments that were made above in relation to ComC rules, apply also as regards the new CivC rules. Thus, when dealing with identical problems in this part of the paper, our observations thereto will be not repeated once again. The latter applies, in particular, to the examples of the use of contractual freedom and references to special statutory regulations.

CivC rules are principally of facultative character. Relevant rule of Section 1 (1) CivC states on this issue: "Unless explicitly prohibited by the present Code, persons can agree on rights and obligations by way of derogation from the statutory provisions; prohibited are agreements that break good morals, public order or rights relating to the status of persons, including rights relating to the personality".

3.2.1. Basic provisions, exclusive and non-exclusive licence, record in the public list

Of mandatory character are, however, basic provisions for this contract type under Section 2358 CivC that rule on the essential terms of the agreement. According to the latter, through the licence agreement grants the provider/licensor permission (licence) to the purchaser/licensee to exercise the intellectual property rights to a limited or unlimited extent and the licensee undertakes, if not agreed otherwise, to pay a royalty to the provider.

Thus, the essential elements of the contract are as follows:
• specification of the relevant intellectual property rights;
• granting of authorisation by the provider to the purchaser to the exercise of the rights (to the specified limited or unlimited extent);

- purchaser´s obligation to pay royalty (if not agreed otherwise, e.g. in the case of cross-licences when the licensee as the provider grants – instead of remuneration – permission to exercise other rights).

No derogation is possible also as regards rule in para. 2 of the basic provision that specifies that the contract must be in writing if,

- an exclusive licence shall be granted or
- licence shall be registered in the appropriate public list.

Derogating agreements are hereby excluded with the regard to the provisions of Section 559 CivC ruling that everyone has the right to choose any form of legal transaction if not limited as to selection of this form by mutual agreement or by the statute. (Tichý in Švestka, Dvořák, Fiala e.s., 2014)

For the definition of the mandatory and/or facultative provisions, it is then necessary to examine the provisions of Section 2360 para. 1 (a). 2 CivC. The paragraph 1 specifies that if an exclusive licence is agreed, the provider has no right to grant the same licence to a third party for the duration of the exclusive licence. If not explicitly agreed otherwise, the provider/licensor shall refrain from exercising of rights licensed by an exclusive licence to the purchaser/licensee. Here we shall understand the first sentence of paragraph 1 not as a facultative definition, while the second sentence allows for explicit agreement on a derogating arrangement.

The provision of Section 2360 para. 2 CivC specifies that should a licensor grant for the duration of an exclusive licence rights in the form of licence to a third person without a written consent of the former, such licence does not arise. However, if a non-exclusive licences was granted before the subsequent granting of an exclusive licence, the former remains in force. According to our opinion, however, the wording of the first sentence of para. 2 does not allow for any derogative arrangements for the duration of the exclusive licensee unless the licensee gives its consent in writing. Under the second sentence of para. 2 there will be an exclusive licence granted, but a previously issued licence – if non-exclusive – shall be maintained.

Further on, we regard as mandatory rule also the provision of Section 2358 para. 3 CivC, which forms part of the basic provisions. It rules, that for a licence to the intellectual property recorded in a public list the agreement shall be effective against third parties upon the record entered to this list. Hence, a standard solution is chosen and any failure of entering the record is effective in relation to third parties, whereas the parties to the agreement are obliged by its provisions.

As regards the use of trademark, according to the case law (KS HK 19 Co 875/2006) the license agreement is not the only way how to arrange for its use. As eligible stands also an innominate contract, this even for agreement on the use without payment of royalties
(Regional Court Hradec Kralove, https://is.cuni.cz/webapps/zzp/download/12017259).

From the comparison of ComC and CivC rules we can draw the conclusion that while the ComC required always the written for licence agreement to industrial property items, The CivC provides for it only in specified cases.

CivC in does not define the contractual territory where it is possible to exercise the licence. Nevertheless, contractual provision on this issue is appropriate. Otherwise we would have obviously refer in the interpretation to the territory, on which the right is under protection, or even to other facts.

3.2.2. Use of licence, maintenance of rights

After the conclusion of licence agreement, the purchaser/licensee is not obliged to make use of the licence, unless the duration of the rights depends on its performance (Section 2359 (1) CivC). According to the content of the second part of the sentence of this paragraph, the parties to the agreement are principally not entitled to agree otherwise, this in spite of other legislation, which specifies for a mandatory performance of the rights (e.g. trademarks).

The provision of Section 2359 para. 2 provides for the maintenance of the right for the duration of the licence agreement, if required by its nature. This is, for example, the case of renewal of registrations in relevant registers (when imposed by further legislation).

According to the facultative provision of Section 2361 CivC, should a non-exclusive licence be agreed upon, the provider/licensor is entitled to exercise the rights to which he provided the non-exclusive licence and he can provide further licences to third persons. On this issue, however, different contractual arrangements may be agreed upon, e.g. providing that the performance of the right by the provider/licensor may continue, but further licences can be granted no longer. Should the provider/licensor be entitled to grant additional licences, it is in the interest of the purchaser/licensee, to provide for such alternative explicitly in the agreement.

Should then the purchaser/licensee itself be entitled to grant sub-licences to the rights licensed to him to a third party in whole or in part, he may do so only if explicitly provided for in the agreement (Section 2363 CivC). In such a case sublicenses may be granted.

In addition to the issue of sublicenses the CivC rules in Section 2364 for potential assignment of the licence to a third party. This assignment possible, in whole or in part, only with the consent of the provider/licensor. Written form is prescribed for the consent. Other form, obviously, can´t be agreed.

In Section 2365 the CivC rules for licences in relation to the transfer of the enterprise (previously under ComC "transfer of an undertaking") or a part thereof. If an enterprise or a part thereof, that constitutes a separate plant, were transferred, the consent of the licensor is required only if it has been separately agreed upon.

Because from individual licence agreements may not follow clearly whether we have to do with exclusive or non-exclusive licence, the CivC attempts to solve the problem by ruling that unless an exclusive licence is specifically agreed upon, it is assumed to be the case of non-exclusive licence.

4. Discussion and conclusions

Crucial part of any licence agreement constitute rules on the royalties to be paid by the licensee. The new CivC brought an essential change in rules on determining the amount of royalties. Probably the most important change – in comparison with the former regulation by that regulated only licence to industrial property items – is that the CivC provides rules on royalties for the entire field of intellectual property rights.

As regards the ways how to determine the amount of royalty for the license, we have seen that the previous ComC legislation was very poor and stipulated only that the purchaser/licensee is committed to provide certain remuneration or other property assets. The CivC has brought a more detailed rules on the specification of royalty and its amount.

In Section 2366 CivC stipulates that in order to be valid, the license agreement shall include provision on the amount of royalty or at least on the way to its determination. However, the license agreement shall be valid even if it follows from the will manifested by the parties that they wish to conclude a license agreement without specifying the amount of royalties (in this case the purchaser is obliged to pay the provider the standard remuneration, i.e. royalties normal at the time of conclusion of the agreement under similar terms and conditions and for this specific rights), or if the parties agree in the license agreement that the license shall be provided free of charge. Therefore, it follows from this fact that the license agreement may be – unlike e.g. the lease contract or sales contracts – a royalty-free agreement.

Further on, the CivC provides expressly in Section 2366 para. 2 that, should the amount of royalties depend on revenues from the use of the licence, the purchaser/licensee must allow access to accounting records for the determination of the actual amount of the royalties. The purchaser/licensee is also required to submit a statement of royalties agreed in that way in the agreed time periods (at least once a year, unless stated otherwise).

The royalties can be arranged in various ways. It may be a fixed lump sum, monthly fees, calculated according to the volume of production of the licensed goods, depending on the yield, etc. Royalties may also have a non-pecuniary form, the agreement shall then have the nature of the so-called barter contract.

When concluding the license agreement it is – in addition to the amount of the royalties – also important to agree on the terms of payment, as appropriate, consequences of non-payment of royalties properly and in-time. For the successful conclusion of the agreement we may recommend that the technology, or documents to the technology, should be transferred upon payment of the first instalment for a license (or advance payment). Another option of royalties (or consideration) is the conclusion of the cross-license agreement, according to which the Parties shall grant licenses to each other.

Next to the question of remuneration there are other issues that are subject of ongoing discussion. Licence agreements are often concluded for a definite period. In our opinion, even in such cases it can be contractually agreed how to terminate the contractual relationship during such definite period. Here, of course, the general modes of termination applicable to contracts for indefinite period shall be employed, i.e. the withdrawal, termination by mutual agreement, etc.

For agreements concluded for indefinite period the rule on the termination clause shall apply pursuant to Section 2370 CivC. If the license agreement is concluded for an indefinite period, the termination shall take effect after a period of one year from the end of the calendar month in which the notice of termination has been received by the other side. Such a statutory notice period may seem to be quite long. However, it is justified by the arrangements that have to be taken in most cases, which, as a rule, will not have a short-term character.

For cases of a premature termination of the agreement the payment of royalties as well as other questions may be agreed that concern the further use (or avoidance of further use) of the experience and/or know-how acquired. It is also possible to agree on arrangements substantively correspond in terms of content to a non-competition clause. In the end our discourse we can confirm that the new legislation is based on (and fundamentally corresponds to) a slightly modified version of the former ComC rules. One of major changes constitutes the possibility of concluding the license agreement as free-of charge. Even though the parties must keep in mind that in addition to the above men-

tioned CivC rules a number of implementing regulations must always be taken into account as specific rules governing the intellectual property rights, nevertheless the advantage of a wide contractual freedom and discretion of the parties still exists and may be used to their mutual benefit…

Acknowledgements

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Access to knowledge for the development of a regional innovation system: a case of Lithuanian regions

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Abstract

Regional innovation system can act efficiently just having enough capacity to absorb needed knowledge and use it for innovative activities, starting from the access to knowledge. This paper deals with the role of knowledge access in the development of a regional innovation system by giving theoretical insights and empirical evidences from Lithuanian regions. Paper presents results of quantitative and qualitative research (scientific methods such as statistical data analysis, SAW method, semi-structured interviews, systematization and interpretation were used). It was revealed, that the biggest challenges for the knowledge access in Lithuanian RISes are: low capacity of enterprises and small concentration of institutions, creating intellectual property, in regions; lack of knowledge and resources for the protection of intellectual property; struggling understanding of the meaning of innovativeness and the low culture of innovations.

Keywords: access to knowledge, regional innovation system, regional absorptive capacity

JEL Code: O31, R11

1. Introduction

Knowledge becomes the most important source in processes of diagnostics and transformation of global phenomenon. "Knowledge is the center of the creation and maintenance of innovation, which plays a critical role in predicting the long-term survival of firms and in sustaining a region's economic development" (Lau, Lo, 2015, p. 99). Regional innovation system (hereinafter – RIS) can be viable just by fulfilling its functions and being open for external knowledge flows. Absorptive capacity requires some prior knowledge; therefore, the existing knowledge stock of a region can be an important factor that moderates the flows between RIS actors (Fritsch, Kublina, 2016, p. 7). Those flows are necessary for all participants in a RIS in order to gain benefit from it and to use

it for future development. Access to knowledge is taken as an integral part of regional absorptive capacity, but at the same time it has the specific in the knowledge absorption process and needs a separate research. Even specifics of particular RIS (of Lithuania) can make the influence on results of knowledge access.

The aim of this research is to reveal the role of knowledge access in the development of a regional innovation system by giving theoretical insights and empirical evidences from Lithuanian regions. The scientific problem can be defined by **three problematic questions**: What is the role of access to knowledge in the knowledge absorption process of a RIS and its development? What is the situation of knowledge access in Lithuanian RISs? What kind of challenges Lithuanian RISes meet due to knowledge access? Those questions directly reflect **research tasks**. Quantitative and qualitative methodological **approaches and scientific methods** were used to prepare this paper. All quantitative and qualitative research data were gained by the author of this paper (Juknevičienė, 2015), but this paper presents the particular logical section of knowledge access in the whole knowledge absorption process; therefore, systematization and interpretation as methods were used to expose specifics.

2. The role of access to knowledge in the process of knowledge absorption in a RIS

Information and knowledge is the integral part of all products as well as social structures and relations between persons and groups. It is vitally important for the development of regional innovation systems. Developed regions (countries), as the main source of knowledge and new technologies (95 percent of all new global knowledge is created by 1/5 population), concern about the intellectual property protection on various levels, while developing regions more focuses on educating citizens, still falling behind the existing knowledge base (Tilly, 2007; Vathitphund, 2010). In developing the knowledge resources and trying to gain the competitive advantage, the access to knowledge is vital important.

Various authors analyzed the phenomenon of access to knowledge (hereinafter – A2K). In the conception of innovation management, A2K gained two meanings: access and understanding. And this concept was related with the broader level than just with the organizational one. Shaver (2009), Rizk & Shaver (2009) declares A2K as the need of democratic participation, global integration and economical justice, including both the right of people to get the access to products as consumers and the right to participate as producers. Harjevschi (2010) believes that A2K has the impact on the functioning of open and democratic societies, on economic development and innovations, on the culture and creativeness. It was founded that various authors (Koh, 2000; Daghfous, 2004; Balkin, 2006; Shaver, 2009; Rizk & Shaver, 2009) considered A2K as: a form of effective policy of information and knowledge producing; a new knowledge generator, depending on previous investments in R&D, previous knowledge, the intensity of new contacts' development and mutual assistance, the speed of efforts and strategy; and the one of the essential factors motivating the cross-organizational cooperation.

Following the approach of absorptive capacity (initiated by Cohen & Levinthal (1990), developed by Zahra & George (2002) and Lane, Koka & Pathak (2006), later transformed by Mahroum, Huggins, Clayton, Pain & Taylor (2008), Mahroum & Alsaleh (2012)) A2K is considered as the primary capacity, needed for the knowledge absorption and development process, leading to the promotion and enhancement of innovative

activities. It is stated as the integral part of innovativeness, composed by the enabling, functioning and interaction of two capabilities of organizations as well as regional innovation systems: the absorptive capacity (capacity to access the external knowledge, capacity to anchor and capacity to diffuse knowledge) and the development capacity (capacity to create and capacity to exploit knowledge) (Mahroum et al., 2008; Mahroum & Poirson, 2008; Mahroum & Alsaleh, 2012; Juknevičienė, 2015). On the other hand, some authors argues that when the external knowledge is very easy to access, all actors in a RIS can become equal, their prior knowledge becomes insufficient, the leveraging of companies becomes meaningless; and therefore, avoiding of such situation requires special efforts of all actors in a RIS – to develop absorptive capacity through organizational learning processes of acquisition, assimilation, transformation and exploitation (Cohen and Levinthal, 1990; Escribano, Fosfuri & Tribo, 2009; Zahra and George, 2002; Lewin, Massini & Peeters, 2011; Germanos, 2015).

According to some researches (Mahroum et al., 2008; Mahroum & Poirson, 2008; Innovation Efficacy Index..., 2010) A2K of a particular region (especially having the lower scientific, economic and social potential) could be enhanced by: the higher concentration of institutions creating the intellectual property (universities, knowledge centers, etc.); strengthening the local culture (the level of trust, social cohesion); increasing the economic activity reflecting the strong collaboration (trade, foreign investments, integration to global value chains, leadership for units of global networked companies, etc.). Some authors emphasize the importance of human resources mobility as a stimulus for knowledge absorption, when elsewhere gained experience and information can stimulate the growth and contribute very positively to a changing and competitive environment in an innovation system (Pavlikova, Janssens & De Mazière, 2015).

In summary, A2K is the capacity (of a person or organization) to understand what kind of external knowledge is needed, to identify and get the access to the source of it, to download it and to understand how it can be used and combined with previous existing (personal or organizational) knowledge to get the expected benefit. It creates preconditions for further steps of knowledge absorption. This capacity is enabled in personal, organizational and even regional levels for the main purpose of learning and growing (in both quantitative as well as qualitative meaning). It must be maintained and developed continuously because of permanent change of global knowledge, changing situation in technologies and markets, and, of course, the aim to develop the RIS (enhancing possibilities of RIS actors).

3. Methodology and Data

This paper presents partial results of original research accomplished by the author (Juknevičienė, 2015).

Lithuania is the southernmost of Europe's Baltic States. In accordance with EU classification, Lithuania has 10 regions (NUTS III regions), the so called "counties", which were considered as RISs. Using *the method of criteria selection* (22 criteria) two Lithuanian regions were included to *the sample*: Kaunas region as successfully conducting innovative activities, and Šiauliai region as conducting them with inadequate success.

18 different quantitative indicators (A1–A18), showing the situation of A2K in RISes, were analysed (Juknevičienė, 2015). It was used *the method of statistical data analysis*. The time period of 2005–2012 (8 years) was selected for the analysis. All statistical data was acquired from Statistics Lithuania (a government institution that collects, ana-

lyzes, and publishes statistical data and reports on the country's economical, social, etc. activities and the environment) databases and information gained during the direct communication with the institution's staff. In order to determine the situation of A2K changes in RISs, *the multiple criteria SAW (Simple Additive Weighting) method* was used. For calculating using the SAW method, Sj (SAW method criteria) is the sum of the values of the weighted indicators (Ginevičius & Podvezko 2008a, 2008b; Kareivaitė, 2012):

$$S_j = \sum_{i\backslash=1}^{m} w_i \, r_{ij}$$

(1)

where: w_i is the weight of the i-th indicator and r_{ij} is the number of the measured values (the normalized value of the indicator).

"Classic" normalization is performed by using the SAW method:

$$r_{ij} = \frac{r_{ij}}{\sum_{j\backslash=1}^{n} r_{ij}}, \quad \text{when} \quad \sum_{j\backslash=1}^{n} r_{ij} = 1$$

(2)

According to the statistical data, a decision matrix, normalized matrix and normalized weighted matrix must be constructed (both basic and modified results of this method were calculated).

The method of *semi-structured interviews with experts* was used for the qualitative research. The identification and sampling of institutions and representing experts was based on the method of criteria selection in accordance with the adapted principles of the Triple Helix model (Etzkowitz & Leydesdorff, 2000; Etzkowitz, 2007; Balász & Leydesdorff, 2011) – it included 27 experts representing 26 Kaunas and Šiauliai regions' academia (regional), business (regional), government (national), and other (science, research and business support) organizations (regional as well as national) (respectively – 4, 4, 3 and 16 (including 6 of the national level)). It was used five composed guidelines of questionnaires, adapted to the specific of a particular group of experts. Interviews were accomplished in March–May of 2014. Answers were codified according to the requirement of confidentiality (E1–E27), analyzed and interpreted. This paper presents insights of experts made on the A2K issue.

4. Results

18 indicators, reflecting the A2K situation in Kaunas and Šiauliai RISes (Lithuania) were analyzed (see Figure 1) as statistical data as well as using the SAW method.

Firstly, it must be emphasized, that the capacity for A2K can be promoted by an appropriate amount of communication infrastructure. It enables knowledge flows and the ability to acquire knowledge at the right time.

Table 1: Data of A2K indicators of Kaunas and Šiauliai RISes, 2005–2012

Indicators	2005	2006	2007	2008	2009	2010	2011	2012
Kaunas RIS								
A1 – Households with Internet access in the region (thousands of units)	106.84	203.35	267.97	309.46	360.69	398.72	395.43	377.17
A2 – People using the Internet daily in the region, aged 16–74 yrs. (thousands of units)	91.30	127.88	171.75	183.66	228.75	242.36	229.42	232.69

Indicators	2005	2006	2007	2008	2009	2010	2011	2012
A3 – Number of enterprises using e-networks for purchases and orders in the region (units)				3149	3837	4344	3123	2850
A4 – Number of enterprises using e-networks for sales in the region (units)				2581	2928	3232	2356	2888
A5 – Currently active subscribers to public mobile telephone connections in the region (thousands of units)	888.95	955.56	996.43	1015.22	1008.01	1009.09	1003.21	1008.59
A6 –Length of the local roads (km)	8834	8976	9095	9126	9253	9407	9426	9451
A7 – Number of planes that took off and landed in an international airport in the region (units)	4072	4865	6088	5696	6027	8753	9168	8553
A8 – Number of passengers that arrived and departed from an international airport in the region (thousands of units)	109.3	242.6	389.2	408.2	456.4	809.2	870.8	830
A9 – Number of service enterprises in the region (units)					3783	3698	4030	3811
A10 – Number of organizations engaged in educational activities in the region (units)					168	185	194	188
A11 – Number of organizations engaged in vocational, scientific, and technical activities (excluding R&D) in the region (units)					1200	1133	1268	1162
A12 – Number of organizations engaged in financial and insurance activities in the region (units)	297	296	327	353	368	367	360	325
A13 – Number of universities in the region (units)	7	7	7	7	6	6	5	5
A14 – Number of colleges in the region (units)	6	6	6	6	5	5	6	6
A15 – Industrial confidence indicator (percent)	–15	–1	–5	–2	–36	–19	–11	–16
A16 – Service sector business confidence indicator (percent)	25	42	33	30	–18	–3	16	20
A17 –The Regional Gross Domestic Product's share of National GDP (percent)	19.3	19.2	19.3	19.3	19.1	19.2	19.6	19.6
A18 – The Regional Industrial Value Added's share of Gross Value Added (percent)	26.5	25.7	25	24.7	24.4	26.9	29.2	29.5
Indicators	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Šiauliai RIS								
A1 – Households with Internet access in the region (thousands of units)	47.03	78.95	115.65	151.53	178.81	157.19	161.56	162.41
A2 – People using the Internet daily in the region, aged 16–74 yrs. (thousands of units)	36.33	49.24	61.62	70.34	84.10	81.56	82.87	94.47
A3 – Number of enterprises using e-networks for purchases and orders in the region (units)				1150	1384	1535	1119	1004
A4 – Number of enterprises using e-networks for sales in the region (units)				943	1056	1142	845	1018
A5 – Currently active subscribers to public mobile telephone connections in the region (thousands of units)	464.29	496.24	513.56	518.69	510.57	506.68	498.31	497.58
A6 –Length of the local roads (km)	7440	7570	7579	7681	7678	7686	7817	7797
A7 – Number of planes that took off and landed in an international airport in the region (units)	96	29	102	104	64	90	142	272
A8 – Number of passengers that arrived and departed from an international airport in the region (thousands of units)	0.4	0.6	0.9	1.1	1.3	0.7	0.9	1
A9 – Number of service enterprises in the region (units)					894	827	962	873
A10 – Number of organizations engaged in educational activities in the region (units)					48	48	47	51
A11 – Number of organizations engaged in vocational, scientific, and technical activities (excluding R&D) in the region (units)					295	266	326	281
A12 – Number of organizations engaged in financial and insurance activities in the region (units)	147	157	176	174	172	171	169	143
A13 – Number of universities in the region (units)	1	1	1	1	1	1	1	1

A14 – Number of colleges in the region (units)	3	3	3	3	2	2	2	2
A15 – Industrial confidence indicator (percent)	–15	–1	–5	–2	–36	–19	–11	–16
A16 – Service sector business confidence indicator (percent)	25	42	33	30	–18	–3	16	20
A17 –The Regional Gross Domestic Product's share of National GDP (percent)	7.7	7.6	7.4	7.4	7.2	7.4	7.5	7.6
A18 – The Regional Industrial Value Added's share of Gross Value Added (percent)	23.2	22.7	21.2	20.5	20.4	23.9	25.7	25.4

RIS's infrastructural (communication) environment can be described using particular knowledge access indicators (A1, A2, A5 and A8). A growing need for Internet access was observed in both regions. There is the high trend of the usage of ICT (internet and mobile connection) in the Kaunas RIS. The sharp jump of passengers using the services of Kaunas regional airports in 2010–2012 is explained by the increase in international emigration. The low usage of the Šiauliai international airport is explained by its military and industrial specialization.

Secondly, institutional environment is equally important for A2K process (A9, A10, A11, A12, A13, and A14). The number of science and study institutions (universities and colleges) in both regions remained stable: 5 universities and 6 colleges in Kaunas RIS and 1 university and 2 colleges in Šiauliai RIS (the lower concentration of such institutions in Šiauliai RIS). The number of service enterprises is 4.3 times higher in the Kaunas RIS (each year as of 2009). The number of nearly all types of decreased in both regions in 2012 – to 6.24 percent in the Kaunas RIS and 10.35 percent in the Šiauliai RIS. There are clear problems with social issues in RISes: industrial confidence indicator is negative (A15) and service sector business has the trust of less than 1/5 of population in 2012 (A16). Šiauliai RIS lags behind 2.4 times in the area of creation of regional GDP (A17).

Basic and modified indicator sums made it possible to assign a ranking for each year of the period analyzed, 2005–2012 (the higher value for Sj, the better the situation – 1 indicates the best situation and 8 the worst) (see Table 2, Figure 1).

It was observed that the worst (basic) state of A2K in both RISes occurred during 2005–2006 and 2008–2009. The year 2007–2008 was nearly the peak of knowledge access before the worldwide economic crisis. From 2009–2010, there was a recovery in both RISes. It can be noticed that the Kaunas RIS showed better results immediately after the crisis period, while the Šiauliai RIS took longer to get to the pre-crisis level of 2007–2008. It may was linked to the different potential of institutions situated in RISes and their ability to react quickly to changes of the market and environment. Higher concentration of institutions (producing intellectual property) enabled the Kaunas RIS to stabilize the A2K situation in 2010, while the Šiauliai RIS was trying to reach the level of 2008 even till 2012. Both (basic and modified) rankings confirmed the trend of growing A2K (only with different intensity) over last 3 years of the period analyzed.

Table 2: The results of the SAW Method for the A2K of Lithuanian RISs

Period	2005	2006	2007	2008	2009	2010	2011	2012
Kaunas region								
Sum of each year (basic)	0.10266	0.12170	0.12776	0.13076	0.10701	0.13128	0.14134	0.13749
Basic Sj	S1	S2	S3	S4	S5	S6	S7	S8
Rank	8	6	5	4	7	3	1	2
Sum of each year (modified)	0.10266	0.12170	0.12776	0.13776	0.14165	0.16221	0.16553	0.16150
Modified Sj	S1	S2	S3	S4	S5	S6	S7	S8
Rank	8	7	6	5	4	2	1	3

Period	2005	2006	2007	2008	2009	2010	2011	2012
Šiauliai region								
Sum of each year (basic)	0.10906	0.12073	0.13133	0.13779	0.10993	0.11588	0.13197	0.14332
Basic Sj	S1	S2	S3	S4	S5	S6	S7	S8
Rank	8	5	4	2	7	6	3	1
Sum of each year (modified)	0.10906	0.12073	0.13133	0.14436	0.14528	0.14946	0.15873	0.16543
Modified Sj	S1	S2	S3	S4	S5	S6	S7	S8
Rank	8	7	6	5	4	3	2	1
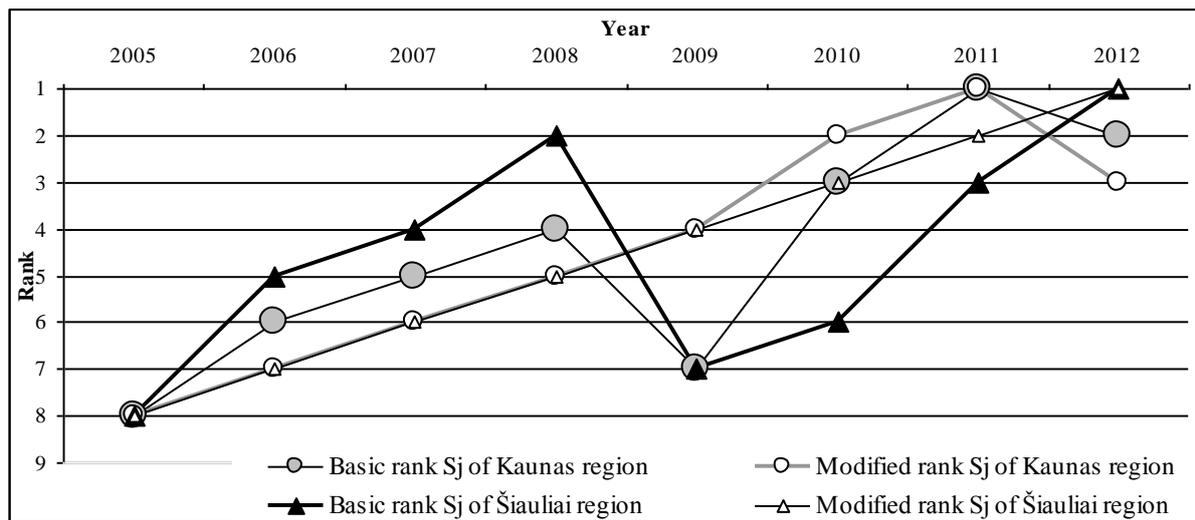
Figure 1: The ranks of A2K in Lithuanian RISes, obtained by SAW method

During the qualitative research (interviews with experts) some main results of A2K were gained. Experts claimed that nowadays to get the access to the knowledge is not very hard task: *For today the communication is not difficult. And it does not matter where you are (E3); There is more knowledge than it is needed. There is just a question, how to filter them out, to select" (E13)*. Experts emphasized two main sources of needed knowledge: interpersonal communication and international projects: *A lot of things depend on interpersonal human contacts (E1); The most reliable thing <…> is the direct communication with people from science (E6); We have international projects, where we really solve problems together with partners (E26)*. According to experts the geographical location looses its importance and everything now relies on the personal motivation: *Geography looses it meaning. <…> The only one difference is the speed of Internet (E218); Those, who are interested, are very active and they get the access to newest knowledge (E21)*. As main barriers for A2K in Lithuanian RISes experts identify mostly social issues, especially the lack of interest, competence and information retrieval ability: *In my opinion, the main barrier is the ignorance, i.e. in general about the possibility of obtaining such knowledge (E2); Few fingers are need to calculate companies, which wants access to scientific results (E1); It is a bad situation with the entrepreneurship. Majority of us are not able to create the business. In most cases we are just looking for a job (E9)*.

One of experts, representing business had some doubts if the business accessing the newest knowledge is able to absorb it: *I wonder how many such "the newest" is needed? <…> Maybe business does not need this newest knowledge, because we, our industry are still not mature for those newest things. <…> Maybe we would need more the technology transfer (E8)*.

Experts noted that innovations in Lithuanian RISes and business are mostly the results of external pressure: *Environment forces to change (E26)*. An it is highly connected to the lack of innovation culture: *Everything is watched with caution, new ideas hardly blaze the trail. Very strong traditions and conservatism (E4). Culture <...> still remains not so strong and stable (E22). There are no traditions to invest to science in Lithuania (E9).* Besides, the fear of a risk is quite popular in the society: *The risk is the main factor, which is holding back from innovations (E13)*; *Here still exists an approach <...> that innovations are the risky thing, requiring a lot of investments, which does not always repay (E2)*.

Experts mentioned that one of the most important issues dealing with A2K is the protection of intellectual property. Especially it is important in the context of cross-sectorial (science and business) partnership. It was revealed, that the major obstacle for the partnership and sharing the intellectual property is the human factor: there is a lack of professional consultants (*The knowledge, consultations are needed. <...> We are too small company to have good lawyers. <...> We not really have the experience" (E7)*); the lack of procedures' understanding (*The part of scientists does not clear understand the intellectual property. They know principles, but not always are aware with different nuances (E23)*); fears influenced by the culture (*It is very hard to talk about the protection. <...> We all are scared, all so closed (E22)*). Besides, the protection of intellectual property on the organizational level is complicated by the change of the staff: *Legislation is favorable for a person, but very unfavourable for the organization (E19)*.

In summary, there are some positive changes of A2K situation in Lithuanian RISes, but at the same time the development of a RIS is struggling due to some institutional challenges, especially the lack of companies, creating high level value added production in regions, offering possibilities for good specialists to realize their personal A2K capacity as well as to exploit all benefits of accessed external knowledge in innovative activities on organizational and regional levels.

5. Conclusions and Discussion

A2K is very important primary step for all activities, based on knowledge and focused on the development of a RIS. The composition of previous, existing and the new external knowledge can enable purposeful change of individuals, organizations and even regional innovation systems. Only having enough knowledge organization is able to evaluate the situation and make decisions on the future. At the same time it can act like a stimulus for companies to look for new ways of acting due to development of global and sectorial environment. Therefore, the A2K as a capacity contributes to solutions of various problems in processes of producing and managing; it strengthens innovative activities in organizations (as RIS actors) and stimulates the social and economic evolution of particular sector in a region.

A2K in a particular RIS can be strengthened by public and private investments to the connectivity – infrastructure and legal systems, helping for knowledge transferring process by using various means. Most affecting means are linked to financial decisions and actions (i.e. trade and investment) in a RIS.

The theoretical implications emphasize the importance for a RIS to become open, global and based on inter-organizational learning. In reality, A2K as an integral part of absorptive capacity in Lithuanian RISes functions very complicated. Only small part of business institutions have enough ability to use global sources (due to limited access to most recent patents, inventions, etc.), the business community is too little oriented to

inter-organizational learning (it prefers inter-personal communication and links). The lack of knowledge and resources for the protection of intellectual property leads to the avoidance of complicated procedures – often individual and institutions (as actors of a RIS) choose the openness of various ideas, what entails a loss of possible income.

A tendency towards growth and a return to pre-crisis levels can be identified for A2K in both Kaunas and Šiauliai RISes. The creation of favorable infrastructure for communication and institutions made a positive impact. However, the economic situation (the financial crisis, a decrease in the number of organizations, other residual affects) made the harm for both RISes (especially in the less sufficient Šiauliai region). It is possible that the positive change will remain for a longer period of time, due to the recovering economic situation in Lithuania's national innovation system and a changing innovation culture in society.

In general experts evaluate the situation of A2K in Lithuanian regions quite positive, they emphasize positive changes of the society's mindset (increasing acceptance of the importance of innovations in our lives, the changing attitudes towards cross-sectorial partnerships, and understanding of the need to change and/or to be original to survive in a market). But at the same time there still remains a lot of challenges to meet and a lot of boundaries to cross to reach the level of developed countries. Main directions for the required change are: the identification and implementation of the stable national strategy for the innovation policy, the growth of inter-organizational and cross-sectorial trust, the sustained education o the society.

This paper focuses on A2K in a RIS and it reveals peculiarities of small country's (Lithuanian) RISes. It provides the different approach (the quantitative and the qualitative) on the change of the situation of A2K in the context of regional development. It enables other researchers to repeat similar research in other RISes of similar countries, drawing some directions for future research. The quantitative research is based on original methodological approach; the qualitative research followed the tradition of uniqueness. It differs from previous publications because of presented more narrow logical section of a broader concept of absorptive capacity's development in a RIS.

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Private or Public Offerings of Convertible Bonds? A Dilemma of Hybrid Debt Issuers

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Abstract

Using a sample of 1,152 convertible debt issues carried out by non-financial American companies between 2004 and 2014, this paper examines the motives for issuing convertible bonds through private and public offerings, concentrating particularly on convertibles sold privately. Empirical analysis (by means of descriptive statistics, logistic regression and classification tree models) indicates that private convertibles are typically issued by nonprofitable, more leveraged firms with higher growth opportunities, which is similar to findings for straight debt. Companies with a poor financial performance decide to offer convertible bonds on the private market, perhaps in order to speed up raising capital from a small group of lenders able to carry out due-diligence process relatively fast. Second, using private convertible debt may help firms to undertake valuable projects and enable them to accelerate investment by alleviating the debt overhang problem which should result in improving their weak financial results.

Keywords: corporate finance, debt policy, private convertibles, public convertibles

JEL Code: G23, G30, G32

1. Introduction

Under perfect financial market conditions described by Modigliani and Miller (1958), capital structure does not influence the market value of a company and all net value investments are financed. However, market frictions make capital structure relevant and in order to pursue a new project, firms have to choose a proper source of finance. According to the pecking order theory of Myers and Majluf (1984), if financial needs of a company exceed its internal capacity, managers begin to use external financing – first debt, then equity. However, there is a group of entities for which using both sources of capital are not profitable. This may include undervalued firms with high information asymmetry (small, young companies, for instance). Such companies usually refrain from issuing common stock or straight debt to avoid the risk of raising insufficient equity or selling bonds with excessive coupon payments, afraid of facing an adverse selection problem which may lead to forgoing projects with positive NPV. Stein (1992) argues that using convertible debt

can prevent firms from underinvestment and enable them to raise equity capital "through the backdoor." In order to benefit from convertible debt financing, managers must decide to sell convertibles either in the public or private market.

The existing literature delves into a problem of a marketplace of hybrid debt issuance very rarely. Although Huang and Ramirez (2010) and Gomes and Philips (2012) deal with this question, their studies do not apply to convertibles financing directly but have been twined into a broader examination of debt and equity issues. Furthermore, their samples cover 1991–2004 or 1995–2003, thus there is an urgent need for their findings to be brought up to date. It seems then necessary to identify potential factors which may influence management decisions on selling convertibles publicly or privately. The motives for using private convertible bonds are particularly interesting in this context. We can make predictions about probable determinants on the issuance of such securities based mainly on previous research concerning straight debt financing. This shows that private corporate bonds are generally used by firms with significant information asymmetry (Chemmanur and Fulghieri, 1994; Gomes and Philips, 2012) and with a poor credit quality or a higher likelihood of distress (Fenn, 2000; Denis and Mihov, 2003; Huang and Ramirez, 2010; Arena, 2010). Companies are likely to make private placement in order to speed up raising capital (Fenn, 2000; Huang and Ramirez, 2010) or to reduce costs of producing information about their value and future earnings (Fama, 1985).

The intent of this paper is to find the determinants of choosing a proper marketplace for hybrid debt issues, especially the motives for selling convertibles in the private market. The study helps to answer a crucial question, namely why certain firms offer convertible bonds to a small group of lenders while others decide to sell these instruments publicly. Although this research concentrates only on issues carried out on the world's largest hybrid debt market – the United States – the goal of the paper is to initiate a discussion about private sales of convertible bonds without regard for specificity of particular market. We can presume that despite favorable regulations facilitating the issues of securities privately (such as Rule 144A in the U.S.), the reasons for borrowing capital from private sources might be similar across different countries.

Looking at the research outcomes for straight debt (i.a. Fenn, 2000; Denis and Mihov, 2003; Arena, 2010), we can hypothesize that first, the issuers of private convertibles are companies close to financial distress which decide to use hybrid debt in order to avoid issuance of undervalued common stock or high-yield corporate bonds. This approach is close to the "backdoor equity hypothesis" of Stein (1992). Secondly, it is also possible that private convertibles are used by more leveraged firms with higher growth opportunities which are more exposed to agency conflicts. Mayers (1998) develops a model whereby convertible bonds are a perfect tool to finance multi-stage investment projects, while Green (1984) and Lyanders and Zhdanov (2014) show that convertible debt can eliminate shareholders-bondholders conflict on asset substitution and debt overhang problems described by Jensen and Meckling (1986) and Myers (1977). Importantly, Yosha (1995) and Krishnaswami et al. (1999) find that companies with valuable investment options are more eager to issue private debt. Therefore, the abovementioned predictions lead to the following testable hypothesis: firms that issue private convertible bonds are less profitable, more leveraged and have higher growth opportunities than companies which issue convertibles through public offerings.

Using a sample of 1,152 convertible debt issues carried out by non-financial American companies between 2004 and 2014, the initial suppositions about financial performance of private convertibles issuers have been confirmed. Similar to the findings for

straight debt, the study shows that companies which borrow convertible capital from private sources are close to financial distress but have higher investment opportunities.

The remainder of this article is organized as follows: Section 2 provides a brief literature review on the motives for using convertible debt in the context of public and private offerings. Section 3 describes the sample description and methodology. Section 4 sets forth the empirical results. Section 5 contains concluding comments.

2. Literature Review

According to Myers and Majluf (1984) and Myers (1984), information asymmetry determines a choice of capital sources which relies on reducing information costs associated with the issuance of certain securities (debt or equity). Debt financing is significant for undervalued firms with high information asymmetry. It can help them to avoid underinvestment caused by the issuance of common stock at an excessively low price which may result in forgoing valuable investment projects. However, using straight debt by firms in poor financial performance increases a likelihood of missing interest payments and poses potential difficulties with redeeming face value of debt at maturity. Stein (1992) argues that using convertibles may solve this problem, as it allows firms to avoid issuing undervalued common stock or high-yield corporate bonds and enables them to raise equity capital at a later time under more favorable conditions without a necessity of repaying nominal value of debt, provided that bondholders exercise their conversion option. Brennan and Schwartz (1988) suggest that due to the hybrid nature of convertibles, two companies in different financial situations can issue hybrid debt with a similar coupon, mitigating an adverse selection problem when management and investors cannot agree on the risk of the issuer.

Note that high costs of revealing information about real risk and future earnings are typical for young and small corporations. In the models developed by Brennan and Schwartz (1988) and Stein (1992), the investors can learn about financial quality of a firm only after the issuance of securities offered on a public market. However, costs of producing information can be reduced by raising capital from a private market, since this information needs to be spread among a limited number of private lenders (Fama, 1985)[1]. These lenders are often big institutional investors (like banks or investment funds) which are capable of carrying out due diligence within a short time. This may be absolutely crucial for issuers in poor financial performance which have to assemble funds immediately in order to avoid costly bankruptcy. Hence, there is much evidence that junk bond issuers and companies with a greater probability of bankruptcy borrow from private sources (Fenn, 2000; Denis and Mihov, 2003; Huang and Ramirez, 2010)[2].

According to the lender specialization hypothesis, Chemmanur and Fulghieri (1994) assume that the decision of where to place debt securities is dependent on how difficult it is for the borrowers to negotiate with private investors to avoid inefficient liquidation in the case of default. A need to arrange certain principles with a small group of lenders seems to be crucial for firms with low credit quality. However, Blackwell and Kidwell (1988) and Arena (2010) argue that raising capital through private debt offerings can also be profitable for high credit quality firms which are too small to bear high flotation costs.

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[1]Perhaps for that reason Gomes and Philips (2012) document that 73% issues of equity and convertibles placed in the private markets are done by small firms.

[2]Huang and Ramirez (2010) find that 69% of convertibles issued under 144A Rule have speculative grade rating.

Jensen and Meckling (1976) assert that shareholders are eager to undertake riskier projects as they have an upside potential for future cash flows generated by new investment and the risk of company default is on the side of bondholders. According to Green (1984), the asset substitution problem can be eliminated by using convertible debt. Giving bondholders the right to participate in potential gains from the project may reduce the incentives of equity holders to engage in risky investment options[3].

Myers (1977) argues that highly leveraged companies are likely to forgo profitable projects which can result in a loss of their value, because they accept only investments with net present value that exceeds the nominal value of debt. Otherwise bondholders would capture most revenues generated by a new project; this is the so-called debt overhang problem. Lyanders and Zhdanov (2014) show that convertible debt financing can eliminate debt overhang and accelerate investment process of a company.

Underinvestment can also be caused by relatively higher debt coupons which should compensate bondholders for their difficulties in monitoring the firm's activities (Leland and Pyle, 1977). Myers (1977) suggests that issuers can reduce costs of underinvestment if they settle a closer relation with private lenders who are able to control company's operations much more effectively than dispersed public investors, thereby limiting moral hazard of shareholders and managers. This is why Krishnaswami et al. (1999) provides evidence that raising debt from private sources is most popular among companies with higher future growth opportunities. What is more, Yosha (1995) and Dhaliwal et al. (2004) argue that firms with high quality projects use private debt in order to avoid two costs: that of information disclosure if it is decided to issue public debt, and of revealing the information about a valuable projects to rival companies. Mayers (1998) develops a model whereby the issuance of convertible bonds solves a problem of future financing. He says that hybrid debt can help a company to decrease leverage and to raise additional capital at a lower cost when the investment option turns out to be "in-the-money," and it can eliminate the overinvestment problem (Jensen, 1986) when the investment option is not valuable.

3. Methodology and Data

This study examines the private and public issues of straight, callable and putable convertible bonds carried out between 2004 and 2014 by manufacturing and service companies from the United States. In order to extend conclusions from this research to the private market of convertibles in general, the issues of convertibles with a put/call option were excluded from the sample since an overwhelming majority of them are used only by the American companies (Kaźmierczak, 2016). The initial data for the analysis was taken from the Bloomberg Database. The final sample comprises 1,152 issues of convertibles, of which 529 were sold through private offerings and 623 through public offerings.

In order to verify the main hypothesis, eight proxies for financial performance of the issuers have been analysed. All necessary data was taken from the most recent financial reports from the preceding year of convertibles issuance. Selected indicators describe a firm's size ("Total assets"); leverage ("Debt/Assets", "Long term borrowings/Assets"); interest coverage ("EBITDA/Interest"); profitability ("Operating margin", "Net margin", "ROE"); and growth opportunities ("Tobin's q Ratio").

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[3] You can find the empirical evidence of Green's (1984) model in Dorion et al. (2014).

The empirical analysis is divided into two parts. In the first step, descriptive statistics (mean, median, standard deviation) and non-parametrical statistical significance Mann-Whitney U test are used. In the second step, logistic regression and classification tree models are employed to indicate the set of factors which may determine the issuance of private convertibles.

4. Results

The analysis of proxies for financial performance of the issuers generally confirms the initial suppositions regarding worse financial performance of companies that borrow funds from private sources (table 1). These results indicate that private and public issuers of convertible debt statistically differ from each other. The issuers of private debt are more than twice smaller than as the companies which sell debt through public offerings in terms of total assets ($330 million to $810 million)[4]. Although the leverage for both groups of firms is quite similarly fairly high (between 54–58%; differences statistically non-significant), the issuers of private convertibles have a lower level of long terms borrowings (12% to 26% for the public issuers). An utterly low interest coverage ratio for private issuers might be very surprising in this context (EBITDA/Interest = 0.2 compared to 2.8 for public issuers), but this is a probable consequence of their negative profitability already at an operational level. It should be noted that the issuers of public debt generate losses as well, but with a relatively smaller influence on their profitability (OM = −2% for private issuers and 1.7% for public issuers; NM = −10.5% and −3.4%; ROE = −2.3% and 1.3%). As for growth opportunities, it seems that both type of issuers are actively engaged in carrying out new investments at the moment of convertibles issuance, but Tobin's q is a higher for firms which borrow capital from private sources (2.2 to 1.8 for public issuers).

Table 1: Proxies for financial performance of public and private issuers of convertible debt

Variable	Issue Type	n	Mean	Median	Standard Deviation	p-value
Total Assets	Public	620	3137.029	809.776	10525.673	<0.0001***
	Private	523	1750.710	330.419	5240.377	
LTB/Assets	Public	623	0.318	0.258	0.400	<0.0001***
	Private	529	0.274	0.119	0.497	
Debt/Assets	Public	623	0.889	0.579	3.915	0.740
	Private	526	1.674	0.542	4.554	
EBITDA/Interest	Public	547	−26.252	2.833	678.232	<0.0001***
	Private	426	−9.991	0.198	490.199	
OM	Public	608	−6.571	0.017	62.207	<0.0001***
	Private	492	−6.491	−0.047	43.972	
NM	Public	608	−7.633	−0.034	77.760	0.001**
	Private	492	−6.514	−0.105	39.310	
ROE	Public	621	0.098	0.013	2.693	0.283
	Private	529	0.291	−0.023	5.118	
Q Ratio	Public	519	3.418	1.746	9.841	<0.0001***
	Private	442	14.617	2.212	39.841	

p-value – the probability of the Mann-Whitney U test;

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[4] Due to strong divergences from a normal distribution, expected values of all analyzed indicators are closer to their median rather than their mean values.

** significant at the 0.05 level;
*** significant at the 0.01 level.

Source: own elaboration.

In the second part of research, logistic regression models have been used in order to identify factors which may determine the decision of selling convertibles through private offerings (table 2)[5]. It turns out that under *ceteris paribus* assumption, if Debt/Assets and LTB/Assets rise by 1 percentage point, issuers are respectively 32% more likely and 45.5% less likely to issue private convertibles. A raise of Q Ratio by 1 increases a chance of selling convertibles privately by 3%. Such results indicate that a likelihood of issuing private convertibles is higher for more leveraged firms (in relation to their total assets) but with a lower level of long term borrowings and with higher investment opportunities.

Table 2: Logistic regression model for issues of private convertibles

Variable	B	S(B)	Wald Statistic	p–value	exp(B)
LTB/Assets	−0.607	0.242	6.324	0.012**	0.545
Debt/Assets	0.277	0.128	4.692	0.030**	1.320
Q Ratio	0.030	0.014	4.413	0.036**	1.030
Constant	−0.380	0.071	28.724	<0.0001***	0.684
R^2_{Nag}			0.089		
n			1152		

B – the non-standardized regression coefficient; S(B) – coefficient B estimation error B; R^2_{Nag} – Nagelkerke R-square; ** significant at the 0.05 level; *** significant at the 0.01 level.

Source: own elaboration.

The identification of main determinants for a marketplace of hybrid debt sales was complemented by classification trees models (figure 1)[6]. Similar to previous findings, the first criteria which may influence a management decision to issue convertibles privately are growth opportunities. When a company seems to be very engaged in new investment at the moment of debt issuance (Q Ratio > 13.2), the probability that it issues private convertible debt is almost 90%. With relatively lower growth opportunities (Q Ratio ≤ 13.2) a second important factor is the degree of leverage. If a company is relatively more indebted (Debt/Assets > 37.4%), has lower interest coverage ratio (EBITDA/Interest ≤ 1.8), but fewer lower long term borrowings (LTB/Assets ≤ 18.1), almost seven in ten of such firms decide to sell convertibles in the private market. If long term borrowings are higher (> 18.2%), but firm has lower profitability (OM ≤ −2.6%), only about half of companies borrow capital from private sources.

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[5] Seven independent variables were used in the logistic regression model: (1) Debt/Assets, (2) LTB/Assets, (3) EBITDA/Interest, (4) OM, (5) NM, (6) ROE, and (7) Q Ratio. The estimated model has a relatively high discriminatory power. It correctly classifies 98.4% of public debt issues and 13.6% of private debt issues. It overall predicts 61.8% of issues.

[6] Seven independent variables were used in the classification tree model: (1) Debt/Assets, (2) LTB/Assets, (3) EBITDA/Interest, (4) OM, (5) NM, (6) ROE, and (7) Q Ratio. Due to a strong asymmetry of distribution and a relatively large sample (more than 1,000 elements), the tree was built by means of the CRT algorithm. The estimated model correctly classifies 88.4% of public debt issues and 34.2% of private debt issues. It overall predicts 63.5% of issues.
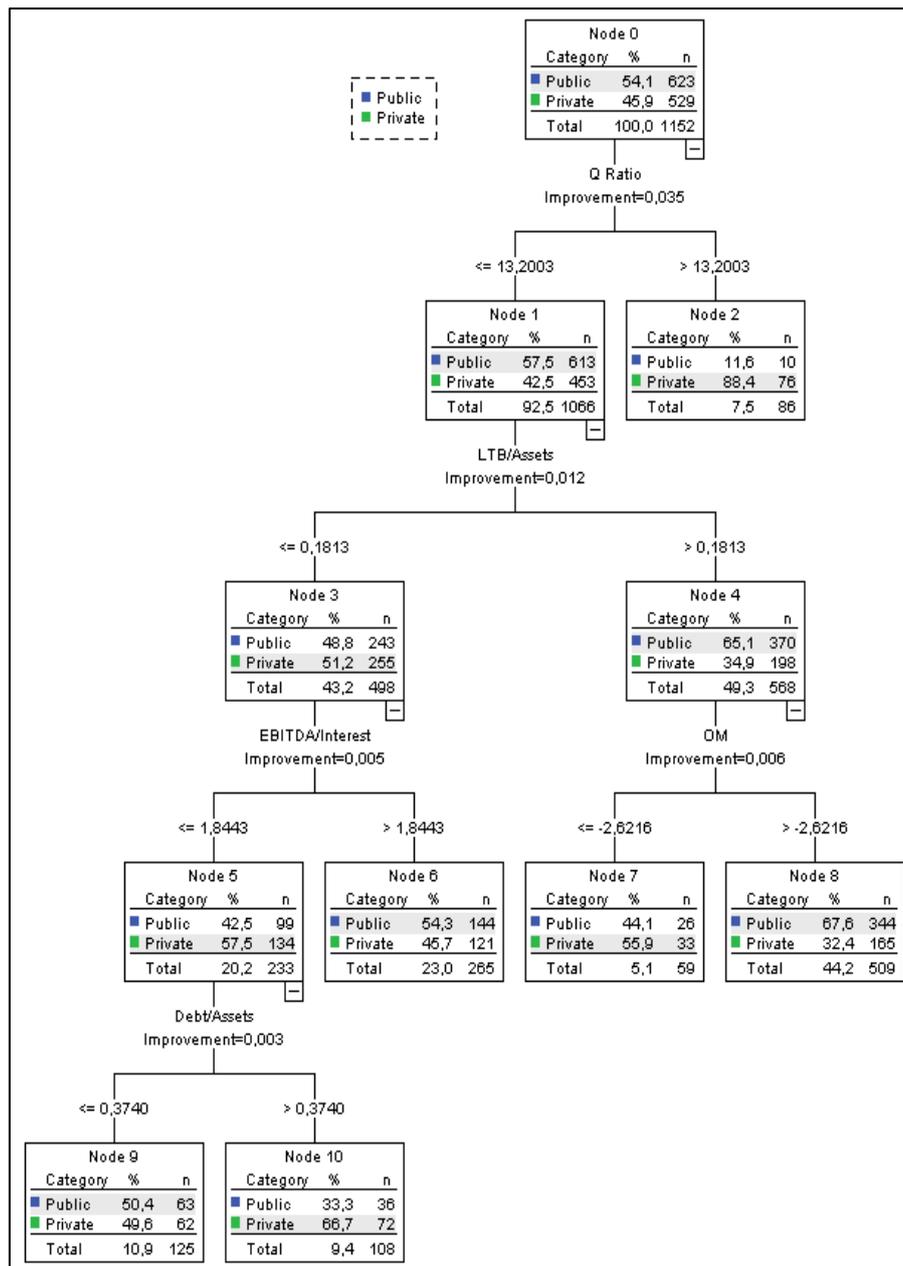
Figure 1: Classification tree for private and public issues of convertible debt

5. Discussion and Conclusions

In summary, the empirical examination of 1,152 issues of convertibles carried out between 2004 and 2014 by non-financial American companies show that private convertibles are issued more likely by less profitable, more leveraged firms with higher investment opportunities, confirming the initial predictions stated in the beginning of this paper. These results are close to findings for straight debt which indicate that private debt offerings are typical for firms with a low credit quality and a higher probability of bankruptcy (Fenn, 2000; Denis and Mihov, 2003; Arena, 2010). They are also close to the observations for convertibles done by Huang and Ramirez (2010) and Gomes and Philips (2012). However, this paper differs from the previous studies for two reasons. First, it

concentrates only on convertible debt financing and is not placed in the broader context of debt and equity issuances. Secondly, it covers a more actual sample (2004–2014) and thus brings the previous conclusions up to date.

The main findings of this paper are as follows. Private hybrid debt is commonly used by non-profitable companies which presumably face problems with assembling capital through the issuance of straight debt and common stock. Using convertibles allows them to raise debt which can be transformed into equity capital in the relatively short time, as per Stein (1992). A decision to sell convertible debt through private offerings may result from an urgent need to get funds relatively quickly, which can be achieved by cooperating with a small group of dedicated lenders as highlighted by Fenn (2000). Note that low long term borrowings for private issuers should simplify issuing debt instruments.

Second, similar to conclusions for straight debt (Krishnaswami et al., 1999), the study shows that private convertible bonds are issued by more leveraged companies (despite their relatively lower long term liabilities) with high growth opportunities. The idea behind using hybrid debt in this case is that convertibles may be perceived by firms as a perfect tool to finance their new investment options (Mayers, 1998) and to solve their debt overhang problem (Lyanders and Zhdanov, 2014). Carrying out new projects can accelerate firms' investments, improve their poor financial results and enable bondholders to convert debt into equity shortly after issuance of convertibles.

Thirdly, the research does not provide any evidence that selling convertibles on the private market is aimed at reducing costs of information asymmetry among small firms, as was presented by Gomes and Philips (2012). On the contrary, it was evidenced that private convertibles are used by medium to large companies presumably less exposed to adverse selection problems. Perhaps they decide to borrow funds from private sources in order to avoid high flotation costs associated with public issuances (Krishnaswami et al., 1999).

However, there are still a few questions which remain unanswered and several problems that need further examination. First of all, we should check whether, similar to Fenn (2000), firms do issue convertible bonds in the private market to save time to raise external capital or perhaps use private hybrid debt in order to have better negotiation opportunities on efficient liquidation of a company in the case of default, as suggested by Chemmanur and Fulghieri (1994) for straight debt. Apart from banks and other dedicated institutional investors, a role of hedge funds should by examined in this context, as these institutions are supposed to be one of the biggest players on the world convertible debt market (Choi et al., 2010). Furthermore, we should identify the motives for issuing private convertibles by companies with high growth opportunities. It is worth explaining whether they perceive private convertible debt as a tool to finance new investment options (Mayers, 1998) or perhaps they want to conceal from rival firms the information about their valuable investment option (Yosha, 1995). Lastly, it should be verified whether reasons for using private convertibles are similar across countries and whether the findings from this study are not only ascribed to the American firms.

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Economic possibilities of elderly people

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Abstract

Economic independence is a compulsory condition in order to make it possible for individuals' to control their life, to make the certain decisions and implement them. A very significant factor, securing individuals' economic independence is employment. Changes of economical conditions, significant demographical changes and their future tendencies have an impact on the elderly people employment. The research aim – to analyze the tendencies of elderly people economic possibilities. The following tasks were set in order to reach the aim of the research: 1) to identify the factors of economic possibilities; 2) to investigate the possibilities of the participation of the elderly people in the labour market. The article discusses factors determining economic possibilities of elderly people, describes the possibilities of elderly people participation in the labour market, analyzes employment trends, income of this age group. Economic possibilities for elderly people are enhanced by using implements which are related with elimination of the direct or indirect age barriers, creating the environment where a person could develop his capabilities without experiencing negative effects considering his age. Study results suggest that economic possibilities of elderly people depend on employment opportunities, income, education, gender, etc. During the coming years, there are likely to be considerable changes in the demographic profile of the EU's labour force. In the future proportion of the elderly people will remain in work longer, some people will work for economic reasons. The research methods are the survey and the analysis of the scientific literature, synthesis, comparison, summary, statistical data analysis, Min-Max indexes, and mean indexes.

Keywords: economic possibilities, an ageing population, employment.

JEL Code: J10, J14, R10.

1. Introduction

XXI century has fiercely entered our lives, setting new requirements. Europe has been undergoing demographic changes of an unprecedented scope, bringing the respective challenges with it. Reducing population and ageing population structure influence various areas of life of the society, reduce the possibilities for personal income growth and even economic growth.

The experience related to the possibilities and ways of arrangement of a person's life at an older age is not comprehensive enough. Changing family structure, increasing numbers of ageing workforce, elderly, senior people and reducing numbers of children, young people and adults of working age urge to look for solutions to these issues. It is therefore important to analyse and assess elderly people's situation on the labour market, their inclusion into social, economic, and cultural life.

The research aim – to analyze the tendencies of elderly people economic possibilities.

The following tasks were set in order to reach the aim of the research:
1. to identify the factors of economic possibilities;
2. to investigate the possibilities of the participation of the elderly people in the labour market.

The research methods are the survey and the analysis of the scientific literature, synthesis, comparison, summary, statistical data analysis, Min-Max indexes, and mean indexes.

2. The challenges of ageing society

Considerable demographic changes lead to decrease in the number of children, longer life expectancy, increase in the number of elderly population across the globe as well as the associated health, social and economic issues caused by this phenomenon (Šurkienė *et al.*, 2012). There is highlighted that "population ageing presents social, economic and cultural challenges to individuals, families, societies and the global community" (Ageing in the Twenty-First Century …, 2012). Where key aspects of population ageing are related to biological processes, medicine, achievements in science and education, and culture, this phenomenon could be referred to as positive. Ageing population could also be construed as the consequences of better life conditions and humans' comprehensive improvement (Garlauskaitė, Zabarauskaitė, 2015). On the positive side, population ageing has opened up new markets and brought us more experienced workers, a growing cadre of custodians of culture, and caregivers of grandchildren (Ageing in the Twenty-First Century …, 2012).

According to L. Gustainienė, V. Banevičienė (2014) increasingly longer life expectancy is a great achievement for humanity. Elderly population continues growing and its role is becoming more important both to the economy and to people communities. Growing numbers of elderly people changes not only an individual's life, but also relations between people. Elderly people are becoming a progressively influential group of society as a result of the increasing elderly population.

Nonetheless, if viewed from social and economic perspectives, population ageing is construed as negative changes in demographic factors. Demographic changes (lower birth and fertility rates, greater geographic mobility, higher levels of migration and increases in life expectancy, population ageing) are recognized as one of the most signifi-

cant challenges currently facing Europe. In recent decades, the structure and profile of the EU's population has changed considerably. The pace of change will quicker in the coming decades, and the EU's population grows progressively older. The proportion of older persons is growing at a faster rate than the general population.

Projections foresee a growing number and share of elderly persons (aged 65 and over), with a particularly rapid increase in the number of very old persons (aged 85 and over). These demographic developments are likely to have a considerable impact on a wide range of policy areas: most directly with respect to the different health and care requirements of the elderly, but also with respect to labour markets, social security and pension systems, economic fortunes, as well as government finances (People in the EU: who are ..., 2015).

Ageing is a process that covers various areas of life: physiological (medical), psychological, and many other areas. Consideration of ageing-related economic and social areas, however, requires viewing population ageing as a change of population age structure caused by increasing number of elderly people as compared to other age groups. Under the UN recommendations, the age of 60 is considered to be the threshold of old age, while the World Health Organisation considers the old age to start at of 65 (Garlauskaitė, Zabarauskaitė, 2015).

Main demographic indicator defining ageing trends is the share of elderly population in the society. According to F. Bettio *et al.* (2013) "older people are increasing in number; their state of health is changing while in comparison with earlier periods they have fewer children and social ties are looser".

On 1 January 2015, there were almost 96 million persons aged 65 and over in the EU-28. Figure 1 shows that they accounted for an 18.9% share of the EU-28 population.
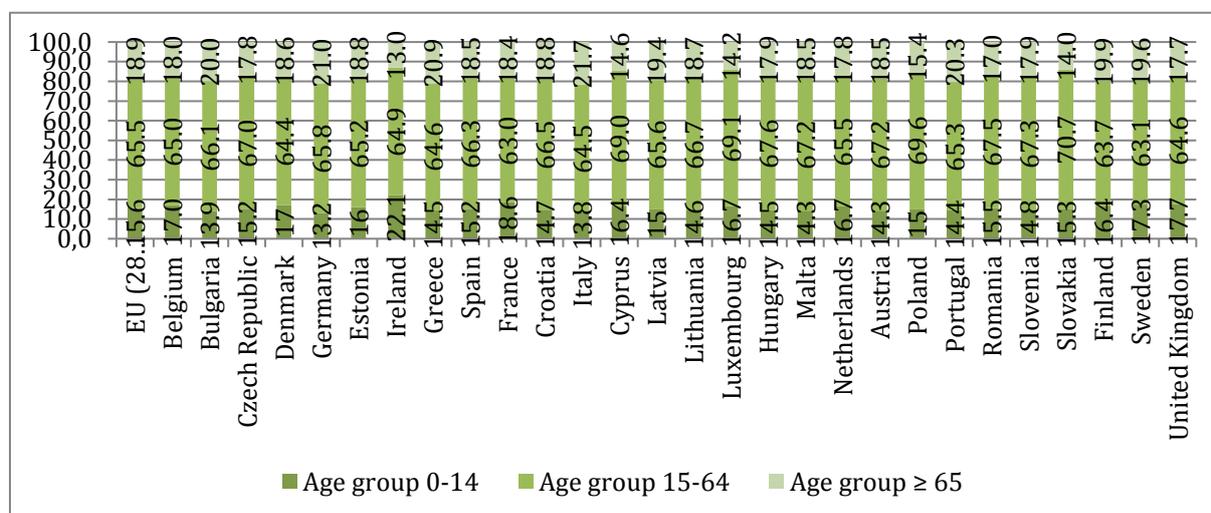
Figure 1: Resident population by age group, 2015 (Beginning of the year, compared to the total resident population, per cent)
Source: created by the author, based on EUROSTAT. 2016a. Population and social conditions.

The elderly accounted for a relatively high share – upwards of 20% – of the total population in Portugal, Greece, Germany and Italy (Figure 1). By contrast, less than 15% of the population in Cyprus, Luxembourg, Slovakia and Ireland was composed of people aged 65 and over. In Lithuania at the beginning of 2016, the resident population aged 65 and older amounted to 19%. In 2005–2015, the number of elderly persons increased by 3.3%. The number of elderly women was almost twice as high as that of elderly men (Demographic Yearbook, 2016).

The data of Eurostat (2016a) also prove that in 2015, almost 27 million people aged 80 or over were living in the European Union (7 million more than in 2005). An increase in both their absolute number and their share in total population is observed in nearly every EU Member State. The main reasons why the relative share of the elderly has risen are two: fertility rates have fallen and less young persons are born. There has also been an absolute increase in the number of elderly persons as a result of increased longevity (higher life expectancy). Life expectancy at birth has increased by about 10 years for both men and women.

The average life expectancy is expected to continue growing. This suggests that the old-age dependency ratio will increase in future as will. It should be noted that a fairly large share of elderly population signals potential additional challenges to the state. It is very important to provide greater opportunities for the elderly to continue working, volunteering, participating and contributing to society, with the dual purpose of increasing economic output and each individual's quality of life.

3. Methodology and Data

Assessment of elderly people's economic capacities first implies definition of the territorial units to be analysed. Under this research, main territorial units compared to each other according to the chosen indicators are the EU member countries. The second stage involves analysis of two main indicators reflecting elderly people's economic capacities: employment rate and income. The third stage involves assessment of situation of the territorial unit (EU Member State's) situation in comparison to territorial units (counties) characterised by worse or better situation. The value of the territorial unit having the lowest indicator is closer to 0, and the one having the highest indicator is closer to 1. Index values of the rest of the territorial units are located in the interval (0;1). For this purpose, Min-Max index is calculated using the following formula (Misiūnas, Svetikas, 2003):

$$I_{ij}(t) = \frac{x_{ij}(t) - \min_i(x_{ij})}{\max_i(x_{ij}) - \min_i(x_{ij})} \qquad (1)$$

Where $min(x_{ij})$ and $max(x_{ij})$ are the minimum and the maximum values of the indicator j (according to all territorial units), x_{ij} – value of indicator *j* of the territorial unit. The index for each territorial unit is calculated in respect of each indicator (Misiūnas, Svetikas, 2003):

$$I_{ij}(t) = \frac{x_{ij}(t)}{x_{EUj}(t)} \qquad (2)$$

Where $x_{ij}(t)$ – value of the indicator *j* of the territorial unit *i* during the period of time *t*, $x_{EUj}(t)$ – the average value of the indicator *j* of the EU (28 countries) during the period of time *t*. The index average method is used to determine the position of a territorial unit analysed with reference to the average of all territorial units or to the situation applicable to the entire territory analysed (Beržinskienė, Būdvytytė-Gudienė, 2010).

Secondary statistical data by the Department of Statistics of Lithuania, Eurostat, etc. are used for analysis of elderly people's economic capacities.

4. The tendencies of elderly people's economic possibilities

The reorganization of the welfare systems is currently being redesigned in order to include the aging population. The most popular among the proposed solutions is "live longer-work longer", also part of the new Horizon 2020 framework, but the situation is not easy to deal with (Zanier, Crespi, 2015).

Negative demographic changes (low fertility rates, the continuous increase in life expectancy, etc.) raised significant budgetary, economic and social issues. The phenomenon increases pressure on pension systems, public finances, social and care services for older people, heightening the risks of exclusion from the labour market and family and community life, and inter-generational conflicts (Corsi, Lodovici, 2012). However, it is equally true that ageing can bring potential opportunities. The elderly may significantly contribute to tackling the challenges of population ageing by remaining active and autonomous after retirement and by delaying their exit from the labour market.

4.1.1. Older people's possibilities to participate on the labour market

Employment is a significant factor securing individuals economic possibilities. The desire for improvement of own material situation is an important factor promoting involvement into the labour market among the elderly population and younger representatives of the older generation (Okunevičiūtė Neverauskienė, Moskvina, 2008).

Elderly people's economic activity is important in view of the demographic changes: as mentioned above, population ageing is one of the most pressing issues. With an ageing population, policy attention has focused on the contribution the elderly can make to both economic life and civil society. An active elderly generation has the potential to influence a range of policy areas, including public finances, labour markets, housing, health and social care (People in the EU: who are ..., 2015).

As a result, elderly people's employment and more active participation in the economic system are viewed as important objectives of the EU labour market policy that are expected to be implemented under the principle of active ageing. The document by the European Foundation for the Improvement of Living and Working Conditions quotes the guidelines presented in the White Paper on Adequate, Safe and Sustainable Pensions adopted by the European Commission in 2012 that may help support elderly people in remaining on the labour market. The document asserts that it is important to balance time spent on the labour market and in retirement and improve activity of the elderly workforce. Potentially effective measures are presented in analysis of the issue: 1) adaptation of the work place in view of the elderly people's physical capacities and judgement; 2) continuous development and training possibilities; 3) adaptation of the social security system aimed to ensure that elderly people remain on the labour market for the maximum duration possible (Lengvinienė *et al.*, 2014).

Possibilities for the elderly people to participate on the labour market are demonstrated by the employment indicator. Min-Max indexes have been calculated for comparison of the employment indicators in EU Member States (Table 1).

Table 1: Employment indicators in European Union (28 countries), 2015

	Min-Max index				Mean index			
	20–64	55–64	65–69	70–74	20–64	55–64	65–69	70–74
EU (28 countries)	0.5938	0.4726	0.2874	0.3014	1	1	1	1
Belgium	0.4805	0.2413	0.0121	0.0959	0.9586	0.8255	0.4188	0.4643
Bulgaria	0.4766	0.4652	0.1903	0.1164	0.9572	0.9944	0.7949	0.5179
Czech Republic	0.7773	0.5274	0.2470	0.2534	1.0670	1.0413	0.9145	0.8750
Denmark	0.8438	0.7562	0.4332	0.4041	1.0913	1.2139	1.3077	1.2679
Germany	0.9023	0.7935	0.4008	0.3425	1.1127	1.2420	1.2393	1.1071
Estonia	0.8438	0.7512	1	0.8151	1.0913	1.2101	2.5043	2.3393
Ireland	0.5391	0.5299	0.5911	0.5616	0.9800	1.0432	1.6410	1.6786
Greece	0	0	0.1336	0.0274	0.7832	0.6435	0.6752	0.2857
Spain	0.2773	0.3134	0.0121	0	0.8845	0.8799	0.4188	0.2143
France	0.5703	0.3582	0.0526	0.0753	0.9914	0.9137	0.5043	0.4107
Croatia	0.2188	0.1169	0.0850	0.1712	0.8631	0.7317	0.5726	0.6607
Italy	0.2188	0.3458	0.1619	0.1918	0.8631	0.9043	0.7350	0.7143
Cyprus	0.5078	0.3532	0.3036	0.4041	0.9686	0.9099	1.0342	1.2679
Latvia	0.6875	0.6244	0.5263	0.6370	1.0342	1.1144	1.5043	1.8750
Lithuania	0.7188	0.6493	0.4656	0.3151	1.0456	1.1332	1.3761	1.0357
Luxembourg	0.6250	0.1020	0.0283	0.1370	1.0114	0.7205	0.4530	0.5714
Hungary	0.5469	0.2736	0	0.0548	0.9829	0.8499	0.3932	0.3571
Malta	0.5039	0.1493	0.1619	0.2260	0.9672	0.7561	0.7350	0.8036
Netherlands	0.8398	0.6816	0.3441	0.3493	1.0899	1.1576	1.1197	1.1250
Austria	0.7578	0.2985	0.1903	0.3493	1.0599	0.8687	0.7949	1.1250
Poland	0.5039	0.2488	0.1984	0.1781	0.9672	0.8311	0.8120	0.6786
Portugal	0.5547	0.3881	0.5506	0.8082	0.9857	0.9362	1.5556	2.3214
Romania	0.4336	0.1692	0.5020	1	0.9415	0.7711	1.4530	2.8214
Slovenia	0.5547	0.0572	0.0850	0.2466	0.9857	0.6867	0.5726	0.8571
Slovakia	0.5000	0.3159	0.0243	0.0616	0.9658	0.8818	0.4444	0.3750
Finland	0.7031	0.6393	0.3887	0.3288	1.0399	1.1257	1.2137	1.0714
Sweden	1	1	0.6883	0.5959	1.1484	1.3977	1.8462	1.7679
United Kingdom	0.8555	0.6940	0.6721	0.6027	1.0956	1.1670	1.8120	1.7857

Source: calculated by the author, based on EUROSTAT. 2016a. Population and social conditions.

The calculated Min-Max indexes show that in 2015 the lowest employment rates of aged 20–64 and employment rate of aged 55-64 were recorded in Greece (respectively, 54.9% and 34.3%), the highest employment rates in the age groups referred to were recorded in Sweden (respectively, employment rate stood at 80.5% and 74.5%). In Lithuania in 2015, the employment rate of the population aged 15–64 stood at 67.2%; over the year, it increased by 1.5p.p. Over the year, the employment rate of persons aged 55–64 grew by 4.2p.p. and stood at 60.4% (Statistical Yearbook of Lithuania, 2016). The employment rate of elderly people was considerably lower than of people of working age – in 2015 employment rate of aged 65–69 in EU (28 countries) stood at 11.7%, employment rate of aged 70–74 – 5.6%. The lowest employment rate of aged 65–69 was recorded in Hungary (4.6%), aged 70–74 – in Spain (1.2%). Estonia could boast the highest employment rates of the age groups mentioned (employment rate of aged 65–69 was 29.3%) and Romania (employment rate of aged 70–74 was 15.8%). In the 14th EU Member States (Estonia, Sweden, United Kingdom, Ireland, Portugal, Latvia, Romania, Lithuania, Denmark, Germany, Finland, Netherlands and Cyprus) employment rate of elderly people was above the EU average in the period analysed.

It shows that in most of the EU countries, the economic possibilities of elderly people are limited, thus, paving the way for economic and social problems. It is noticeable

that elderly people employment is worse, residents are pushed to the outskirts of the society and sustainable development of regions is limited. On the other hand, adaptation and entering the labour market is challenging for elderly people. According to researchers (Lengvinienė *et al.*, 2014) this should be linked to the age, health issues characteristic of the older age, ability to adapt quickly to the changing environment, and grasp the latest technological achievements. Discrimination of elderly people on the labour market has also been noticed.

4.1.2. Distribution of income of elderly people

Another significant factor determining economic welfare of elderly people is income. Across the EU-28 as a whole, people aged 65 and above had a median income which in 2014 was equal to 94% of the median income for the population under the age of 65. In six EU Member States (Luxembourg, Hungary, Romania, Spain, France and Greece) the median income of the elderly was equal to or higher than the median income of persons under 65. In Italy, Poland, Austria, Portugal, Ireland, Slovenia, Slovakia and Germany the median income of the elderly was at least 90% of that recorded for people under 65. Ratios below 80% were recorded in Finland, Denmark, Malta, Belgium, Lithuania, Cyprus, Latvia and Estonia; these relatively low ratios may broadly reflect pension entitlements (Eurostat, 2016b).

The pensions are an important determinant of the economic independence of their beneficiaries – that is to say, of the capacity of an individual to lead an independent life and to take decisions for him/herself. Pensions are linked to lifetime contributions, which are themselves a function of career earnings (Bettio *et al.*, 2013.). Education and qualification of an individual are of key importance to the quality of his/her work and career opportunities. Therefore, according to V. Gižienė and Ž. Simanavičienė (2012) education is important in the life of an individual.

Pensions are the single most important component of older people's income, and especially for women (Lodovici *et al.*, 2011). Pension systems can play an important role in addressing poverty among the elderly. The European Commission (2016) highlights pension systems as "the main source of income for about a quarter of the population, providing good protection against poverty to the majority of older Europeans". P. Frericks, T. Knijn and R. Maier (2009) argue that pension systems are very complex and vary from country to country. There are differences in pension scheme constellations, (tax) regulations, types of entitlements, and numerous additional factors. Old age pensions represent a significant proportion of social protection expenditure in all EU Member States, adding up to 39% of total social protection expenditure. This ranged from 20% in Ireland to 54% in Latvia in 2012 (Burkevica *et al.*, 2015).

Table 2 shows that average monthly pension (EUR) in different EU Member States in the year 2012 ranged from 112 EUR to 4017 EUR.

Table 2: Gender gap in pensions and average monthly pension in European Union (28 countries)

	Gender gap in pensions, %		Average monthly pension, EUR, 2012		Aggregate replacement ratio, %	
	2010	**2012**	**Women**	**Men**	**2012**	**2015**
EU (28 countries)	39	38	933	1513		
Best	4 (EE)	5 (EE)	2207 (LU)	4017 (LU)	0.79 (LU)	0.8 (LU)
Worst	47 (LU)	45 (DE, LU)	112 (BG)	171 (BG)	0.36 (HR)	0.4 (HR)
Lithuania	15	12	240	271	0.45	0.46

Source: calculated by the author, based on EUROSTAT. 2016a. Population and social conditions.

In 2012, the gender gap in pensions in EU countries stood at 38%, in Lithuania – at 12% (Table 2). The highest gender gap in pension was in Germany and Luxembourg in the year 2012 (45%). In the year 2012 the least gender gap in pensions was in Estonia (5%), Denmark (8%), Slovakia (8%), Lithuania (12%), and Czech Republic (14%). The aggregate replacement ratio is compiled as the ratio between gross retirement benefits and gross earnings. It is defined as median individual gross pension income of those aged 65–74 relative to median individual gross earnings from work of those aged 50–59; it is expressed in percentage terms (Eurostat, 2016b). The highest aggregate replacement ratio is in Luxembourg (0.8), France (0.69), Spain (0.66), Italy (0.66), Hungary (0.65), etc., and is higher than the EU's (28 countries) aggregate average (0.57).

Pensions differ by gender across the European Union Member States. "Women tend to predominate among those with atypical contracts, they tend to earn less than men and tend to take career breaks for caring responsibilities more often than men. As a consequence, their pensions tend to be lower and the risk of poverty tends to be higher among older women, also because they live longer" (European Commission, 2010).

Hence, elderly people, in particular, women have unequal access to economic resources. "Women tend to predominate among those with atypical contracts, they tend to earn less than men and tend to take career breaks for caring responsibilities more often than men. As a consequence, their pensions tend to be lower and the risk of poverty tends to be higher among older women, also because they live longer" (European Commission, 2010).

The work-family balance policies aimed to increase women's labour market participation by particularly facilitating part-time employment, as well as by providing pension entitlements for care periods outside the labor market (Gianni, *et al.*, 2015). However these measures do not guarantee a good level of individual income and pension to active women. Furthermore, according to the scientists (Zanier, Crespi, 2015; Corsi, Lodovici, 2012) the several attempts to boost female employment, family-work reconciliation, and the representation of women in politics have targeted the younger, rather than the elderly population. The different work and family paths of men and women are ignored. This means that access to economic resources is limited for the majority of women. Inequalities in access to economic resources in old age are immense, and women pensioners face higher risks of poverty in old age as compared to men.

5. Discussion and Conclusions

Statistical data indicate annual growth of the elderly population. Population ageing is becoming an increasingly pressing issue and relates to various areas of economic and social life of the society. Fairly large share of elderly population is a sign of potential additional challenges to the state. In view of the developments, the states should prepare for a new role of elderly and senior people.

Elderly people's economic capacities depend on a number of different factors, but are largely determined by their access to income sources and capacities to participate on the labour market. Statistical data analysis has suggested considerable gap between possibilities for elderly people in different countries of the EU. It shows that in most of the EU countries elderly people have uneven opportunities to pursue economic independence.

In light of the demographic ageing processes, population activity and, consequently, total number of the workforce, depends progressively on active involvement of the el-

derly population. Nevertheless, access to the labour market for elderly people remains limited. Main reasons restricting successful participation of elderly people on the labour market are age-related discrimination, prevailing stereotypical attitudes, health condition, qualifications held, professional training, etc. For greater involvement of people in this age group into the labour market, the retired must be provided with possibilities for continued employment. In view of the above, the key issue to be addressed by policy-makers is related to better promotion of elderly people's social-economic activity, adaptation of the labour market for involvement of greater numbers of elderly employees.

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Enterprise Content Management system and Search Strategy

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Abstract

In recent years, organizations focus on management of unstructured content. An Enterprise Content Management system (ECM) allows the organization to capture, store, manage, integrate and deliver all forms of content. ECM, for example, includes document management, record management, business process management, collaboration or search components. Search is probably one of the most important aspects of any ECM implementation. Search ECM engine can deliver relevant, secure, accurate information across the company and can help employees in the work to increase performance and improve decision-making process. The present paper provides an overview of search functionalities in ECM systems and proposes ECM search implementation framework. The framework developed in this article includes search strategy and can assist a decision maker to better understand and evaluate factors of implementation.

Keywords: Enterprise Content Management, Search Strategy

JEL Code: O33

1. Introduction

Enterprise Content Management system (ECM) helps to manage all forms of content across the company and offers large potential benefits for organizations. Knut R. Grahlmann et al. (2012) propose consistent and complex definition of ECM. Enterprise Content Management comprises the strategies, processes, methods, systems, and technologies that are necessary for capturing, creating, managing, using, publishing, storing, preserving, and disposing of content within and between organizations.

ECM solution can help streamline processes, reduce paper costs, improve collaboration, information sharing, and access or improve quality of searching. The increasing importance of ECM is reflected in the high growing ECM market (Gartner, 2014). ECM has become important for information and knowledge management professionals from all areas of industry (Päivärinta, Munkvold, 2005).

The greatest benefit of the ECM is the ability to search. ECM has strong indexing and taxonomy services. Kontzer (2003) publishes that the average knowledge worker spends about a quarter or his or her day looking for information and that is why ECM and search can play important role in the employee productivity.

O'Callaghan and Smits (2005) identify that management of content is based on metadata. Metadata is information about the data. The metadata is not the content. It exists under the content (Everett et al., 2002). It is crucial to use metadata to organize content because metadata improves findability.

Also, corporate taxonomy represents the logical and conceptual structuring of the whole content resource. It should provide the basis for users to conduct effective searches based on a taxonomy functioning within the search engine (Päivärinta and Munkvold, 2005)

ECM search can reduce search time, improve the results and streamline sharing ideas process. The ECM search implementation framework can be useful as it grouped key actions together and illustrated their place during implementation.

2. Method and Resources

The aim of this paper is to design an appropriate framework for ECM search implementation. Our framework is expected to provide guidelines to decision makers. The framework tries to point activities that are critical during ECM search implementation. A literature review is focused on Enterprise Search and Enterprise Content Management.

The presented framework is based on Hullavarad S., et al. (2014) ECM implementation roadmap and supported by the case study. The roadmap is in Figure 1 and has four levels: ECM strategy, ECM development, ECM implementation and ECM support. The high-level implementation roadmap is expanded and focus on search.

STRATEGY
- Business need
- Need assessmnet
- Stakeholder buy-in
- Perceived benefits
- Strategic Requirements

DEVELOPMENT
- Bussiness Requirement and Analysis
- Customize solutions
- Solution design
- Build Solution
- Test solution

DEPLOYMENT
- Implementation Plan
- Test & Validation Plan
- Deployment Preparation
- Deploy Solution
- Confirm Benefits

SUPPORT
- Technical Supportn structure
- System upgrades
- User training
- Support level customization
- In-hoouse Support

Figure 1: ECM road map adapted from Hullavarad S., et al. (2014)

For the purpose of the article, it is used qualitative research in the form of a single case study. The case study is done for an IT company. There were conducted interviews with the IT managers and employees to learn more about how knowledge workers in the company use enterprise search. The company has implemented ECM Microsoft SharePoint and SharePoint search. There are many enterprise search tools available in the market.

Software companies like IBM, Oracle, Google, and Microsoft have introduced their enterprise search. The Microsoft SharePoint is chosen for its ease of use and its ability to handle most of the requirements. The benefits of the implementation are presented and search functionalities are discussed more deeply with examples.

2.1.   Enterprise Search

Companies need to manage documents in many different media and formats. The application for information finding within organizations has been known as Enterprise Search. According Hawking (2004) enterprise search can be interpreted as search of digital textual materials owned by a company and can include search of their external website, company intranet, and any other electronic text that they hold such as email, database records and shared documents.

All ECM products have search engine embedded as a core component. It means user can do a full-text index and search content stored in ECM.

Search process can be divided into the three part: crawl, index, and queries. Crawl rules specify how crawlers retrieve content to be indexed from content sources. For example, a crawl rule might specify that specific file types are to be excluded from a crawl. Once a searchable index is created, queries can be done. Queries can be questions, terms or phrases. Queries return results from the index.

There are many requirements for search capabilities that emerge within an enterprise. Cognizant (2015) discusses top search requirement: diverse content, secured search, user interface, desktop search and social (people) search. Fundamental is possibility to crawl, index and query different content repositories. Content must be available only authorized employees. User interface requirement includes Best Bets, synonyms or related results.

According to AIIM (2016) approaches to search implementation can be application search and enterprise search. Application search is provided within the application, for example, email. Enterprise search is provided across different locations and repositories. The corporate search tool provides text search and advanced search features. Search engine provides a powerful information environment.

Stocker et al. (2015) describe differences between search on web and enterprise search and search within an organization. There is problem with heterogeneous content, access rights, employees are not motived to be their content findable and many times employee need exactly the one document to find by searching tool.

3. Results

The main contribution of this study is ECM search implementation framework. As discussed in the literature review, this paper adapts the framework which was described by Hullavarad S., et al. (2014). The framework is supposed to help in the identification and realization of ECM search requirements and can serve as a first step in exploring search possibilities and features. The framework discussed in the paper serves as support or guide and gives sets of steps.

3.1. ECM Search framework

This section describes the ECM search implementation framework and the steps included. The framework is divided into four parts: Strategy, Design and Development, Deployment and Training, Support. Parts Design and Development, Deployment and Training are divided. Figure 2 shows the framework.
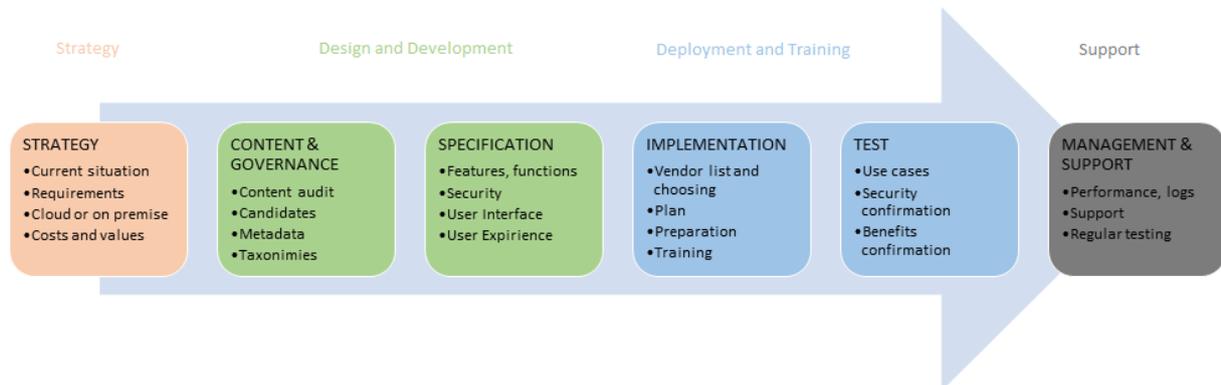
Figure 2: Framework for ECM search implementation

3.1.1. Strategy

Search strategy should be developed at the same time as ECM strategy and before considering ECM and search solution, a company should evaluate business needs. Company discover current situation and created a list of requirements for search. It should be decided which unstructured data should be under management control and which data can be unmanaged and not searchable.

The company can use on-premise solution or cloud (online) search solution. The decision depends on existing ECM solution and costs. One of the possibilities is to use hybrid solution. For example, use online search with connection to the different sources (on-premise or cloud).

3.1.2. Design and Development

Company needs to indicate repositories that wish to crawl, index and search. Should identify the volume of content, probability of growth, type of content and determine number of users. It is necessary to determine which search features, functions are needed.

Metadata and taxonomy are used to improve search relevance. Users have ability to refine a search result based on metadata property such as file type, site, author, modified date or managed metadata.

Content must be accessible only to authorized users. Some content within a repository can have unique permission access and read permission must be granted to the crawl account. It is also possible to define content in the repository not being included in the index.

The end user is the most important factor. End user experience must be known and user interface should serve end users with precise results. Search navigation or suggested words can be implemented.

3.1.3. Deployment and Training

According requirements we can choose vendor and search product from the list. Implantation is planned and prepared. We can test the solution with the test cases. Search security should be confirmed. It is crucial to prepare end user training to teach employees how to search. Employees should know all capabilities. It means that end users are aware of the new capabilities (for example, wildcards or Boolean operators).

3.1.4. Support

Support team should be created to assist end users. Search solution is monitored on a regular basis and users give regular feedback. For example search usage reports are created. Reports help to analyse search system operations and improve the search system. Search system will provide better results. Report can include what terms are searching the most or what terms are not searchable.

3.2. ECM Search functionalities

Search features and functionalities are explored more deeply with a case study. The case study is done in the medium enterprise. The company has 500 employees. The ECM system is based on Microsoft technology SharePoint and SharePoint search. There are other ECM initiatives expect SharePoint (for example, file shares or wiki platform). SharePoint is integrated with Active Directory, Microsoft Outlook and Microsoft Office. Employees have completed ECM and search training. ECM SharePoint is used for the collection, storing and managing documents, creating internal survey and forms. It helps to create and manage internal websites (internal portal). SharePoint also helps to manage the life-cycle of the documents.

Table 1: Enterprise search requirements

Crawl
Full-text search included pdf documents
Different search scopes
Pre-built search connectors or custom connectors
Query
Using operators, wildcards, metadata
Advanced search page
Query suggestions, and spell correction
Create query rules to control ranking or synonyms
Presentation
Document preview within the search results
Templates for different content
Filter search results
Search driven web content management
Other
Security
Alerts and RSS feed
Reports and analysis
People search

Enterprise search requirements for system functionalities were collecting and implementing. The list is in Table 1 and some functions are discussed more deeply. Functions are divided into 4 sections: Crawl, Query, Presentation and Other.

3.2.1. Crawl

Before end users can search for content, content must be crawled. The company requires full-text search, different search scopes and pre-built connectors. It is important to implement full-text search, included office document, pdf document, and their metadata. It is required to use default system metadata (for example, file name, title or author) and any custom keywords, metadata created by an administrator. Full-text searching improves user experience and employees have ability to search within site content and within uploaded documents.

The observed company uses different ECM systems and employees don't want to search the systems separately. Possibility to define different search scopes and use connectors allow employees to find the desired file effectively in one place.

3.2.2. Query

Search queries can be improved by Boolean (AND, OR, NOT, NEAR) and other operators (quotation marks, search wildcard). An employee can combine operators and metadata. The functionality expands and narrows search query. Search query example is in Figure 3.

Figure 3: Search query example

If a more specific query is needed, advanced search page can be used. Advanced search has a possibility to exclude results that include certain words or filter search results by language.

Suggested words are used in case a user makes mistake in the search string. Search application will ask: "Did you mean?". Each query is checked and employees can find mistake when they type in the query box. Suggested word and spelling correction are based on the content in the search index and are created dynamically or can be maintained by an administrator. An administrator can upload txt file with suggested words.

It is possible to create query rules to control ranking and synonyms. The company has monitored search logs and has decided to highlighted important information in search results by using Best Bets. Best Bets help users to get search content easier or can promote new content. For example, the company has policy site and policy creation process and want to point employees to a site containing information about policies. The keyword "policy" is defined and each time employees search for the policy the correct predefined URL with a title and description appear at the top of search results with a gold star. Synonyms and contact for phrase "policy" are defined. See Figure 4.

Figure 4: Best Bets customization

3.2.3. Presentation

The search result, metadata, and related actions are displayed in the preview mode – hover panel. The result is quick and easy to read. The hover panel shows a preview of web page or office documents before opening.

Search results can be filtered by selecting different property, metadata. Filter, refinement panel is displayed on the left-hand site in the search results page. Results can be filtered according to author, modified date or document type. Refinement panel can be customized and can display metadata creates by an administrator.

To customize search result look it can be used an existing template or can be edit existing one. Display templates are HTML and JavaScript files and can be changed. The search result can be displayed dynamically, depended on user, place and time. It is possible to use search-driven web parts.

3.2.4. Other

Search results are displayed with respect of security permissions and do not display results for content that user does not have access to.

The user can create alert or RSS feed keeping track of changes in search results. User can receive notification about changes or use RSS reader.

An administrator has possibility to create report, and analyse the usage and effectiveness of search. Reports provide a number of search queries, top queries, and failed queries. It can be identified high and low search activity. In Figure 5 number of queries during 30 days is displayed.
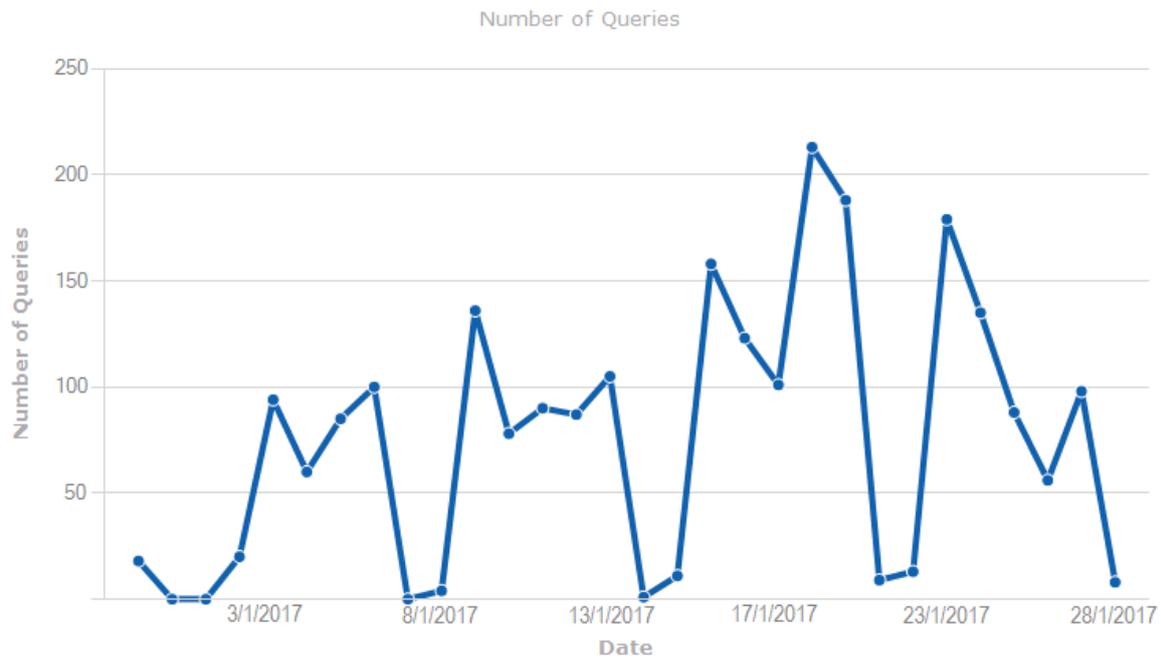
Figure 5: Number of search queries during 30 days

People search enables to find other people in the company by name, department, job title or location. The organization chart can be browsed and manager and colleagues can be displayed.

4. Discussion

It is important to implement an ECM search to meet the growing information needs to reduce amount of time spent on information exploration, discovery, and analysis.

We analysed and surveyed several information resources. This research has successfully formulated a framework for ECM search implementation. The framework is developed from existing framework and is focused on search. When implementing an ECM search, decision makers should go through four phases: Strategy, Design, and Development, Deployment and Training, Support.

The case study for an IT company was conducted and is focused on search ECM features. The company has pointed and described 15 functional requirements such as full-text search, property-based search, suggested word, refinement panel, people search and promoted results (Best Bets). The requirements should help to improve search accuracy by better understanding searcher intent and built semantic search system. However, the case study was performed, the current framework needs to be tested in more deeply.

5. Conclusions

Despite the result achieved in this paper, this topic still has many open areas for research. Future research involves custom ranking model or auto-classification model. Custom

ranking model can improve search relevance and compute what content item is more relevant than another item. The classification model can help to precisely define the metadata tags and automate the process of classifying.

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Consumer behavior on the market of yoghurts – a case study of Slovak Republic

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Abstract

The dairy products present an important commodity on the food market. There exist lots of yoghurts and their producers, so the consumer does not know how to decide about the quality of yoghurts and he is in many cases confused. Slovak Republic and Slovak consumer is not an exception. This is why the present paper deals with the issue of yoghurts, exactly yoghurts produced in the Slovak Republic, their consumption, factors leading to their purchase, as well as the information on their packaging, what can serve as a helping point not just of marketers, but also producers, to know, how the consumer behaves and decides on their market. The aim of the presented paper was to determine the consumer behavior when purchasing yoghurts in Slovak Republic. As the research methods there were used the methods of survey, structured questionnaire (total number of respondents was 1,025 randomly selected respondents from all regions of the Slovak Republic). For a deeper analysis of the obtained results, there have been set out four assumptions and eight hypotheses, which have been tested with the use of Pearson's chi-square test, Cramer's contingency coefficient and Phi coefficient. As the results of the presented paper shows – almost 76% of respondents said that they purchase yoghurts produced in the Slovak Republic exclusively and rather; more than 48% of respondents said that they look for the information about the ratio of fat in the yoghurt, more than 35% said that they buy yoghurts marked with the Quality Label "Značka kvality SK"; almost 64% of respondents said that they buy yoghurts solely in the plastic packaging and only 17.5% of them said they prefer the glass packaging. The last question of the questionnaire was focusing on a taste, which consumers miss on the market. The most frequent answers were the flavors of kiwi, muesli with cranberries, chocolate with mint, coconut and banana.

Keywords: dairy product, yoghurt, consumer behavior

JEL Code: M31, M39

1. Introduction

Milk and dairy products represent an important source of essential nutrients, including several deficient, especially, in baby food, such as Vitamin D, calcium, and magnesium (Nicklas, 2009). The consumption of milk and dairy products is associated with a reduced risk of mortality, independent of the main causes such as age, poor nutrition, poor health, education and socio-economic status (Bongard, 2012). Milk and dairy products can be unquestionably considered as products that maintain good health, as the prevention of certain diseases, as well as the support for their treatment (Habánová, 2010).

Cultured dairy products also known as fermented milk products create an important group of dairy products, which have an irreplaceable role in human nutrition – contribute to the nutrition of children, youth, people of working age and elderly people (Kubicová, 2011). They are the common name of products such as yoghurt, ymer, kefir, cultured buttermilk, filmjölk (Scandinavian sour milk), cultured fat and koumiss (a product based on mares' milk) (dairyprocessinghandbook.com, 2017).

The two most common fermented milk forms available in the Eastern Europe which contain probiotics are yoghurt and kefir. While yoghurt is produced when milk (usually cow's milk) is fermented with Lactobacillus bulgaricus and Streptococcus thermophilus under defined conditions of time and temperature, kefir is fermented milk with a characteristic fizzy, acidic taste, which originated in the Caucasus and accounted for 70% of the total amount of fermented milk consumed in the countries of the former Soviet Union (Komai, 1992).

The presented paper deals with the issue of yoghurts, especially yoghurts produced in the Slovak Republic, their consumption, factors leading to their purchase, as well as the information on their packaging, what can serve as a helping point of marketers and producers, to know, how the consumer behaves and decides on the yoghurt market.

2. Methodology and Data

The aim of the presented paper was to determine the consumer behavior when purchasing yoghurts in Slovak Republic. In order to achieve the formulated aim, as research methods, there were used the methods of survey and structured questionnaire consisting of 12 questions formulated as closed, so that respondents (total number of respondents was 1,025 randomly selected respondents from all regions of the Slovak Republic, Table 1) had the possibility to choose one, or more options and 1 question formulated as open, so that respondents could explain their own opinion.

Table 1: Characteristics of respondents

Category of respondents	Number	Age structure of respondents	Number
Male	465	15–20 years	107
Female	560	21–30 years	111
		31–40 years	529
		41–50 years	150
		Over 51 years	128
Economic activity of respondents	**Number**	**Educational structure of respondents**	**Number**
Employed	666	Primary education	23
Unemployed	56	Secondary education without A	
Student	187	level	191
Other (retired / on maternity	116	Secondary education	514
leave)		Higher education	297
Region	**Number**		
Banská Bystrica	104	Prešov	73
Bratislava	211	Trenčín	104
Košice	106	Trnava	89
Nitra	198	Žilina	140

Source: Results of the research

The questionnaire was evaluated with the use of contingency tables, which were prepared by Excel, under which they were subsequently developed graphic representations. For a deeper analysis of the obtained results, there have been set out four assumptions (assumption no. 1 – Slovak respondents prefer rather Slovak producers of yoghurts; assumption no. 2 – Slovak respondents are rather conservative in their choice of yoghurts; assumption no. 3 – the quality of yoghurts produced by Slovak producers is pretty high; assumption no. 4 – one of the most important factors leading to the purchase of yoghurts produced by Slovak producers is their price) and eight hypotheses about the dependence resp. independence between the frequency of purchase and the category of respondents; reading the information about the percentage of fat in the bought yoghurt and the category of respondents, as well as their age; the purchase of yoghurts labeled by the Quality Label "Značka kvality SK" and the category of respondents, as well as their education; between yoghurts' flavor preference and the category of respondents; the preference of same sorts of yoghurts and the age of respondents; respectively between the preference of package size and the category of respondents. To test the formulated dependencies, there have been used the methods of Pearson's chi-square test, Cramer's contingency coefficient and Phi coefficient, which have been counted in the statistical program IBM SPSS Statistics.

3. Results

Milk presents a perfect and at same time the most natural beverage with which we, as human beings, meet immediately after our birth. We consume it in various forms throughout our life and gradually it becomes an indispensable part of our nutrition – we cannot avoid it, even at an advanced age, in which the milk works like a prevention of osteoporosis (bieleplus.sk, 2017).

Human beings eat sour, better said fermented milk, for centuries, even if the precise details about their origin and formation varies (Šulcerová, 2007). Fermented dairy products represent the oldest dairy products, which composition and performance varies up to the geography and region (Simeonovová, 2003). Yoghurts are globally the most widespread and most popular fermented milk products originating in Turkey (Lengyelová, 2010). Fermented milk products, including yoghurts, are the products produced from pasteurized cow, sheep or goat milk in fermentation process with suitable, harmless, taxonomically designated microorganisms (Drbohlav, 2000). Despite the fact that yoghurts contain health-promoting lactic acid bacteria, they contain also a quantity of vitamins and minerals, which makes them particularly important part of the children's and elderly's nutrition (Zahoor, 2003).

In Slovak households, yoghurts belong among the most common and most popular fermented milk products. According to the technological process of production, yoghurt has a characteristic texture and rheological consistency – white yoghurt is made only from milk ingredients and without added starch, gelatin or other stabilizers. Yoghurts are often flavoured with fruit, chocolate and cereals. Fermented dairy products such as buttermilk and yoghurt are well tolerated even by those people, who are sensitive on the lactose (Kubicová, 2013).

When it comes to understanding the yoghurt market one thing is very clear – it is the food's amazing many-sidedness that is allowing it to deliver great results centuries after it was first eaten. From a drink to a snack to a meal replacement, from a locally-produced all-natural product to a protein-rich sport drink, from a fat-free dessert to a lactose-free addition to a lunchbox, yoghurt can be whatever the consumer wants it to be and it is just this flexibility that is enabling it to deliver great results around the world, meeting the local preferences and diversity demands (machineryworld.com, 2015).

While the consumption of milk and dairy products has a long tradition in Slovak Republic, the nowadays trend shows, that there is a permanent decline in it – the history of manufacturing of dairy products is in Slovak Republic more than 100 years old. In 1989, Czechoslovakia consumed 260 kg of milk per person and had 166 dairies which were centrally managed. After Slovak Republic joined the EU, milk quota was allocated for milk production, which was set at the level of 1,061.6 mil.kg in 2009/2010 (Kubicová, 2012) and further increased to the level of 1,115.6 mil.kg in 2014/2015 (Kubicová, 2014). After five years of a preparatory increase in their level, milk quotas disappeared on 1 April 2015 (eurostat, 2015). Despite different advertisement about the importance of milk and dairy products, in the Slovak Republic, there is still a big deficit and we have to learn how to use it better and to consume it and dairy products more often.

While in Slovak Republic the consumption of all dairy products after conversion into milk is only 163 kg per person per year, in developed countries the consumption is about 300 kg. While only in the "western" Europe, but also in the east, it is consumed for about three times more milk fermented beverages and a minimum of twice more cheese as in Slovak Republic. For these reasons, we must therefore be increasingly interested in the composition of milk and milk products and for their social and health benefits (mlieko.sk, 2017). This is why the present paper deals with the issue of yoghurts, especially of the yoghurts produced in the Slovak Republic, their consumptions, factors leading to their purchase, as well as the information on their package, what can serve as a helping point not just of marketers, but also of producers, to know, how the Slovak consumer behaves and decides on their market – which taste he misses, which information he looks for, what packaging he prefers etc.

To achieve the aim formulated in the section Material and Methodology, the questionnaire survey was realized in the time period of month October 2016 – January 2017. As it can be seen from the Table 1, the main groups of respondents were represented by women (54.6% of respondents), people with the age between 31 and 40 years (51.6% of respondents), employed (65% of respondents), people with secondary education (50.1% of respondents) and people from Bratislava and Nitra region (20.6% and 19.3% of respondents).

Because of the need to determine the situation on the Slovak yoghurt market (frequency of yoghurt's purchase, factors leading to their purchase, importance of information printed on their packaging etc.), in the questionnaire, there were formulated not just the questions aimed at the place and frequency of yoghurt's purchase, but also the questions about the preference of yoghurts produced by Slovak producers, preference of yoghurts labeled by the Quality Label "Značka kvality Sk", as well as about the respondents perception of the quality of the yoghurts produced by Slovak producers.

From the evaluation of questions formulated in our questionnaire it is clear, that most of our respondents prefer as the place of yoghurt's purchase the hypermarket or supermarket (39.5% of respondents) respectively the shop in their vicinity (36.1% of respondents) where they do their everyday shopping and most of our respondents purchase the yoghurts once a month (36.1% of respondents) respectively a few times in a week (31.6% of respondents). Regarding the factors leading to purchases of yoghurts, it can be stated, that most of our respondents think that the most important factors leading them to the purchase of yoghurts are the price (assumption no. 4 was confirmed), quality, interesting packaging, previous experience and recommendations from the family and friends (Figure 1).
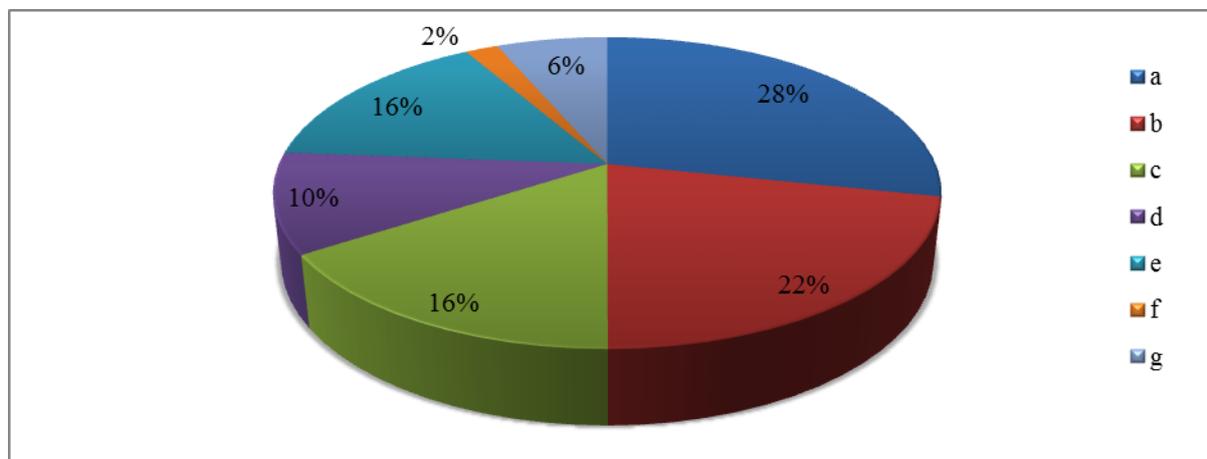
Figure 1: Factors leading to the purchase of yoghurts

Explanatory notes: a – price; b – quality; c – packaging; d – advertisement; e – previous experience; f – recommendations from the family and friends; g – other forms of promotion, e. g. tasting

Connected to the question about the frequency of purchase, there has appeared the question about whether women purchase the yoghurts more frequently than men. This is why we have tested the dependence, respectively independence between the mentioned variables and we can conclude that there does not exist a dependence between the tested variables.

Regarding question of respondents opinion about the quality of yoghurts produced by Slovak producers, as well as their preference, respectively the preference of yoghurts labeled by the Quality Label "Značka kvality Sk", it can be stated, that the situation is

pretty good – most of our respondents stated that they prefer yoghurts produced by Slovak producers (39.5% of respondents prefer them and 36.1% of respondents rather prefer them; assumption no. 1 was confirmed), only 1.4% and 5.3% of respondents think that the quality of yoghurts produced by Slovak producers is very poor, respectively poor (assumption no. 3 was confirmed), exactly 40.9% and 23.3% of respondents think that the ratio between the price and quality is preferred and advantageous (Figure 2) and most of our respondents prefer in their purchase the yoghurts labeled by the Quality Label "Značka kvality Sk" (38.3% of respondents prefer them rather and 35.3% of respondents strongly prefer them).

	1	2	3	4	5
■ quality	465	360	132	54	14
■ price/quality	239	419	293	60	14
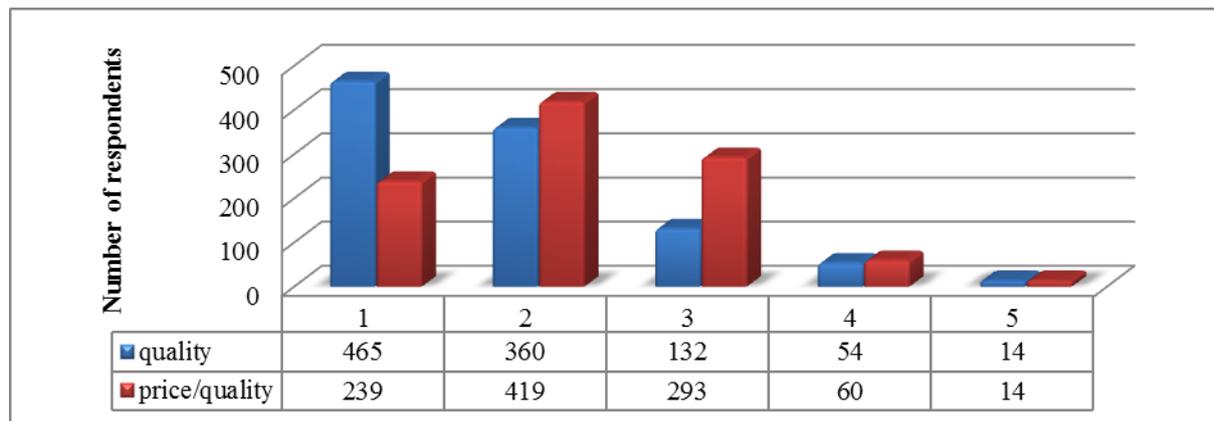
Figure 2: Respondents' perception of the quality and ratio between the price and quality of the yoghurts produced by Slovak producers

Because of the need to determine, whether there exist a dependence between the purchase of yoghurts labeled by the Quality Label "Značka kvality Sk" and the category of respondents, respectively between the purchase of yoghurts labeled by the Quality Label "Značka kvality Sk" and the respondents' education, we formulated the two zero hypotheses connected to the mentioned issues and tested them with the use of Pearson's chi-square test, Cramer's contingency coefficient and Phi coefficient. From their evaluation is clear that there does not exist dependence between the tested variables, which means that there are no differences between that even if women or more educated people buy rather the yoghurts labeled by the Quality Label "Značka kvality Sk".

As it is also clear from the results of our own research, one of the most important factors leading to the purchase of one, or another product is its taste and packaging. This is why our research dealt also with the mentioned issues. From their evaluation it is clear that our respondents read the information printed on the yoghurt's package – 48.1% of respondents look for the information about the percentage of the fat in the yoghurt, which they want to buy always and 47.3% of respondents look for this information sometimes; and that they are conservative in their choice of yoghurts, because when they are used to one sort of yoghurts, they prefer to buy it regularly (48.1% of respondents buy strictly the same kinds of yoghurts), they prefer the chocolate tastes of yoghurts (40.7% of respondents), white yoghurts (26.3% of respondents) and yoghurts with fruity flavors (15.9% of respondents) (assumption no. 2 was confirmed). Because of the need to determine, which flavor of yoghurts is now missing from the yoghurt market, respectively which flavor of yoghurts could be produced by Slovak producers who want to bring something new, what the Slovak consumers want, in the questionnaire was also formulated an open question, where the respondents could explain their own opinion, which flavor they actually miss. From the evaluation of the mentioned open question it is clear, that most of our respondents are satisfied with the actual as-

sortment of yoghurts produced by Slovak producers, but some of them miss the flavors of coconut, banana, muesli with cranberries, chocolate with mint, kiwi, nutela, banana, respectively the coffee tastes and the taste of rosehip jam.

Up to the evaluation of the mentioned block of questions, there have appeared also the questions of dependence respectively independence between reading the information about the percentage of fat in the bought yoghurt and the category of respondents, as well as their age; between the preference of yoghurts' flavor and the category of respondents; and between the preference of same sorts of yoghurts and the age of respondents. All of the mentioned hypotheses were tested (significance level of alpha = 0.05) with the use of methods of Pearson's chi-square test, Cramer's contingency coefficient and Phi coefficient. According results it can be stated that while in the case of the dependence between reading the information about the percentage of fat in the bought yoghurt and the respondent's age there exists a weak, but statistically still significant dependence (the result of Cramer's contingency coefficient was equal to 0.186 and the result of Phi coefficient was equal 0.264), in the case of other tested variables there does not exist any dependence.

The last block of questions formulated in our questionnaire was aimed at the determination of the preferred type as well as size of packaging of bought yoghurts. From their evaluation it is clear that Slovak respondents are rather frugal types of people because they prefer to purchase rather the plastic packaging of yoghurts (63.8% of respondents) and family packs of yoghurts (52.1% of respondents), which could be perceived as economic packaging of yoghurts. Regarding question of dependence between the preferred size of yoghurts´ packaging and the category of respondents it is clear that there again does not exist dependence – women do not buy bigger packages of yoghurts as men.

4. Discussion and Conclusions

The aim of the presented paper was to determine the consumer behavior when purchasing yoghurts in Slovak Republic. To obtain the formulated aim, the questionnaire survey was realized in the time period of four months (from October 2016 to January 2017). As the results of the survey shows, the situation on the Slovak yoghurt market is pretty good:

- More than 39% of respondents prefer to purchase yoghurts and fermented milk products in hypermarkets or supermarkets respectively shops in their vicinity (36.1% of respondents), which confirms the result of research done in 2008 which has shown that most of Slovak consumers (72% of respondents) indicate the hypermarket and supermarket as the main place for their shopping (Nagyová, 2008);
- More than 31% of our respondents purchase the yoghurt a few times in a week;
- Almost 76% of respondents stated that they prefer yoghurts produced by Slovak producers, which confirms the result of research done by Gfk in 2012 which has shown that 4/5 of Slovak consumers want to purchase domestic products (Kollárová, 2012);
- The majority of respondents think that the quality of yoghurts produced by Slovak producers is very high;
- The most important factors leading to the purchase of yoghurts are the price, quality, interesting package, previous experience and recommendations from the

family and friends, what to some extent confirms also the results of research done in 2008, 2013 and 2013, which has shown that increased price of yoghurts, their consumption has declined (Rovný, 2008; Nagyová, 2013; Kubicová, 2013);

- More than 73% of respondents prefer the yoghurts labeled by the Quality Label "Značka kvality Sk", what to some extant confirms also the results of our previous research, which has shown that the Slovak consumers prefer the higher quality products (Košičiarová, 2016);
- More than 95% of respondents look for the information about the fat content in the yoghurt, which they want to buy;
- More than 40% of respondents prefer the chocolate flavor of yoghurts and over 26% of respondents prefer the white yoghurts which to some extent confirms the results of a research done in 2012, which has proved that Slovak consumers prefer the white sorts of yoghurts (plnielanu.sk, 2012).

Because of the need to perform a deeper analysis of the issue, in the part Material and Methodology, four assumptions and eight hypotheses were formulated, which have been tested with the use of the methods of Pearson's chi-square test, Cramer's contingency coefficient and Phi coefficient, which have been counted in the statistical program IBM SPSS Statistics. From their evaluation it is clear, that while all the assumptions were confirmed, only one hypothesis has proved at least weak but statistically still significant dependence between the tested variables – while the respondents with the age between 21 and 30 years stage read the information about the percentage of fat in the bought yoghurt only sometimes, the respondents with lower or higher age read it always.

Despite the really promising results of our research we must conclude, that there are still some reserves and ways how to raise the consumption of dairy products and especially of yoghurts in the Slovak Republic. We know that there is running the program Biele plus, which is the extension of the previous program Objav mlieko (bieleplus.sk, 2017) and which aims to improve the consumption of milk and dairy products, but we think that there is the need to do more programs like that, to improve the knowledge of Slovak consumers about the good qualities and positive impacts of yoghurts on human health and to support the domestic producers of these products.

The current consumer is conscious, and from the structure of the answers can be stated that nowadays consumers much more read information on the package, they are interested in products that are from Slovak producers especially that are labelled with Quality Label "Značka kvality Sk", because it represents a guarantee of quality.

The government should create the suitable conditions, so that all Slovak producers could use this label, because gain this label is difficult and especially very expensive. Consumers could easier and immediately distinguish foreign and quality Slovak product and thus support domestic production.

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Identification of important places for the first year university student for the purpose of interactive map creation

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Abstract

Almost any university in the world has a map showing places around their campus. This map can have many different forms, from paper one through a map on a mobile device. Usually, these maps show important places on campus, such as buildings. However, these maps often do not cover places outside of the campus. The goal of this article is to identify categories of places important for the students and also particular locations important for the students of Faculty of Business and Economics of Mendel University in Brno. These places can be then used to create an interactive online map for the first year university students. The map will be used to help them better cope with a new school environment.

Keywords: map, GIS, university student

JEL Code: C88, Y91

1. Introduction

For the first year students of universities, it is important to become acquainted with the campus of their university. Most of the universities in the world have some map of their campus. These maps can have different forms; from paper ones, through a map on web pages to a map for smartphones. However, all these maps focus only on the campus of the University and not on the city they are in. It is important for the students also to become acquainted with the city the university is situated. Where are common meeting places? Where are the cheapest shops near the campus? These are the questions to which most of the first year students desire to find the answer. The goal of this article is to identify the categories of the most important places for the students. Also, with the categories, we will identify a particular, most important places for students in the city of Brno. All of this information can then be used to create an online interactive map for the first year students.

2. Literature overview

Any student who starts to study at university faces the same problem. He or she needs to get acquainted with the new campus environment and also with the environment of the city the university is located in. This problem is most evident among students who do not have permanent residence in the city where their university is. For the purpose of this article, we divided the students into three categories:

- Domestic students from the same city as the university.
- Domestic students from a different city as the university.
- International students.

The domestic students from the same city as the university usually do not need any help with the orientation in the city. For this reason, they are not important for this article. Therefore, we will focus on the other groups. The international students are the main concern for us. Many universities employ different systems to help students get acquainted with the new environment. Very popular is Buddy program, which connects a domestic student with the international one. The domestic student helps the international student with finding housing, getting to know the city or show the best places to hang out. Some universities have an orientation week. Before the classes begin, the students take lectures about the university life or about the city itself. Part of these orientation weeks is usually sightseeing of the city, e.g. Welcome Week at Mendel University in Brno.

Another group who is facing similar obstacles as the international students are the first-year domestic students of the university. Based on several statistics Kift (2014), McGhie (2016), the first year of the study is the hardest one, and many students do not get through it. Brunton et al. (2011) divided the students who end their first year into two groups. The first group is the students, who are not academically prepared, make the wrong course choice, encounter academic and social difficulties in integrating into the university and become disengaged. The second group is students who fail to get the points required for their preferred course, continue through the first year, succeed in passing their first-year exams, reapply for their preferred course and withdraw before the commencement of a second year. In Feldman and Zimbler (2011) the author's name as one of the reasons for ending the studies in the first year is a lack of social engagement with instructors or peers. As one of the solutions, they prepared a one-credit class where the students are exposed to the strategies for dealing with the college life (e.g. campus specific information).

To help the students with the beginning of their studies, many universities create a map of campuses. The main reason for creating the map is to help the students with the navigation around the campus. Usually, the map is created for campuses that span large areas. The map can have three different versions. The printed map. The printed map is the simplest one. The second version is the online map in the web browser. This version has a benefit of providing the user with more information than the printed one. We can find many examples of the so-called "online campus map". The University of Washington has a map of its campus. This map contains all buildings that are part of the campus. Their map uses the Google Map technology, see Figure 1. The University of Kentucky has created a 3D map of their campus. It shows all the different building in a 3D view. It also shows the locations of the Pokémons in the PokemonGO game. Another example can be found if Berkeley, the University of California. Their map also highlights different routes around the campus. An example of the online can also be found in the Czech Republic, where the

project munimap provides students of Masaryk University with the map of all buildings including the indoor map.
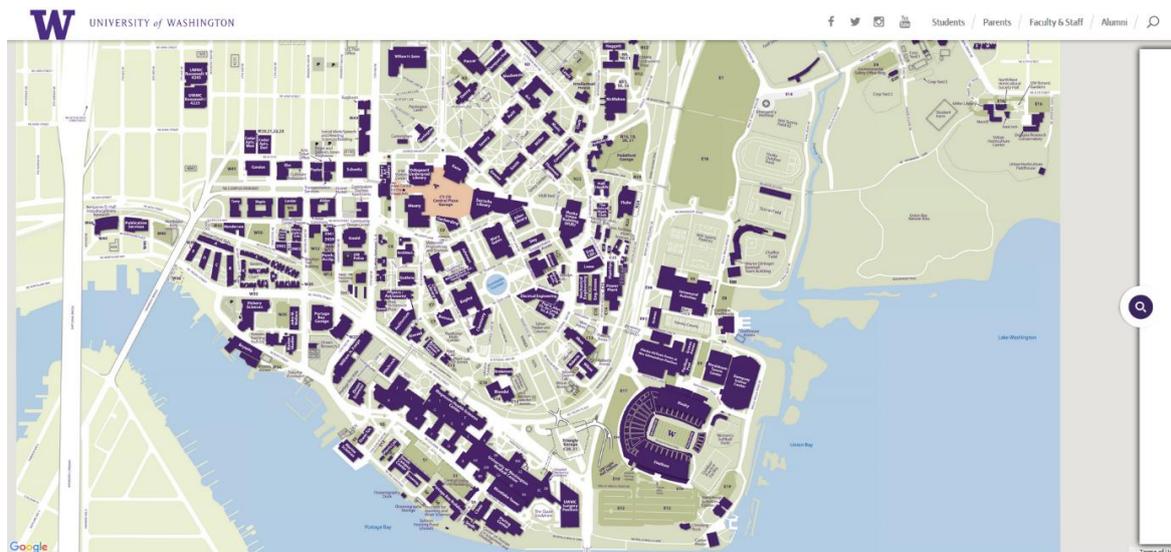
Figure 1: The online map of the University of Washington campus.

The third version is the map for the mobile device. The University of Toronto has both mobile and online versions of the map. The map shows different parts of the campus, but also the points of interest on the campus (e.g. cafeterias, bike tracks and Wi-Fi hotspots). The University of Queensland has also a mobile map app.

All above-mentioned maps focus only on the campus itself and not on the city, they are located in. One of the main reason is probably that there are several sites providing this kind of information, e.g. Google Maps, Yelp of Foursquare. However, these sites do not provide the key information for the students of a particular university.

3. Methodology and Data

In the first seminar of the course Geographical Information Systems at Faculty of Business and Economics at Mendel University in Brno, the students were given a task: "Create an online map using Google Maps. This map will show ten most important place for you as a student of the Faculty of Business and Economics at the Mendel University in Brno". The students were given 30 minutes to complete the task.

The purpose of the task was to answer two questions:
1. What are the key categories of places important for the students in Brno?
2. What are the most important places for students in Brno?

The task completed 47 students. Some of the students marked more than ten places. In the 47 maps, the students marked the 244 places in the city of Brno. Some of the places were marked more than once giving a total number of 575 results.

The students were divided into groups based on their permanent residence (Brno and its vicinity, others) and based on their sex. Out of the 47 students, 23 were females, and 24 were males. Fourteen students have permanent residence in Brno or its vicinity, and 33 have permanent residence outside of the Brno.

4. Results

The results of this paper are divided into two parts. First part is the identification of the categories of places most important for the students. The second part is the identification of the most important places.

4.1. Categories of the places

From all the collected places, we identified 16 categories. Some of the categories are the same as a place types provided e.g. with Google Places API. However, some of them are different. All the categories are shown in Table 1.

Table 1: Defined categories of the places

Category	Permanent residence		Sex	
	Brno	Other	Female	Male
Food and drink	49	63	48	64
Shop	14	64	42	36
Transportation	20	54	33	41
Mendel university place	22	52	32	42
Nature	14	39	26	27
Sport	13	25	13	25
Sight	8	23	15	16
Dormitory	3	24	14	13
Culture	10	14	9	15
Square	7	16	14	9
Bank and ATM	4	12	7	9
Street	3	6	3	6
Other	4	3	3	4
Medical care	1	3	3	1
Library	0	3	2	1
Post office	0	2	1	1

The most favorite category is Food and drink. This category is popular with both males and females. The second most important category is a Shop, particularly the largest shopping center close to city center and a large grocery store near the dormitory. The very popular category was Nature, where students marker down most of the parks near the university. The most popular among students was Lužánky, which is a large park very close to the university. This park is very popular as a place for running. Two categories that could be merged are Street and Squares In both of these categories, the students marker the most popular meeting places in Brno. These categories were mostly marker by the students with permanent residence outside of the city.

Some of the categories have a small number of responses so they can be omitted or merged. Based on this, we revised the list of categories to just eight. They are:
- University place
- Food and drink
- Shop
- Transportation
- Nature
- Sport
- Culture
- Meeting place

All of the other categories are the most relevant categories of places any complex map for the student should have. The rest of the categories can be easily find using a normal map application, e.g. Google Maps. There of the categories: Food and Drinks, Shop and Sport are commercial categories. Meaning these categories will show places of business. The Vital category is the meeting places. These places cannot be found in any normal map, however, are very well known to people in the city and are commonly used in normal conversation.

4.2.   Identification of the most important places

We selected 15 most important places for the student. These places can be found in Table 2. The most important place is the faculty building. The second most important place is Lužánky Park, and the third is the main train station. Very interestingly, the seventh most important place is the Špilberk castle.

Table 2: The list of most important places

Place name	Frequency
Building Q	40
Lužánky park	29
Main train station	26
University cafeteria	21
Vaňkovka (large shopping center)	20
JAK (student dormitory)	19
Špilberk (castle)	18
Mendel university botanical garden	17
Náměstí Svobody (central square of Brno)	16
Na Chatě (pub near school)	9
Large grocery store near dormitory	9
Main bus station	9
U Dřevěného vlka (steak and bear bar)	8
Česká street (frequent meeting point)	7
Bus and Tram stop closes to the university	7

Out of all the places, we created a map showing the most popular places. The can be seen in Figure 2. The map clearly shows two main concentration of places. The first concentration is around the Mendel University. The second concentration is in the city center.
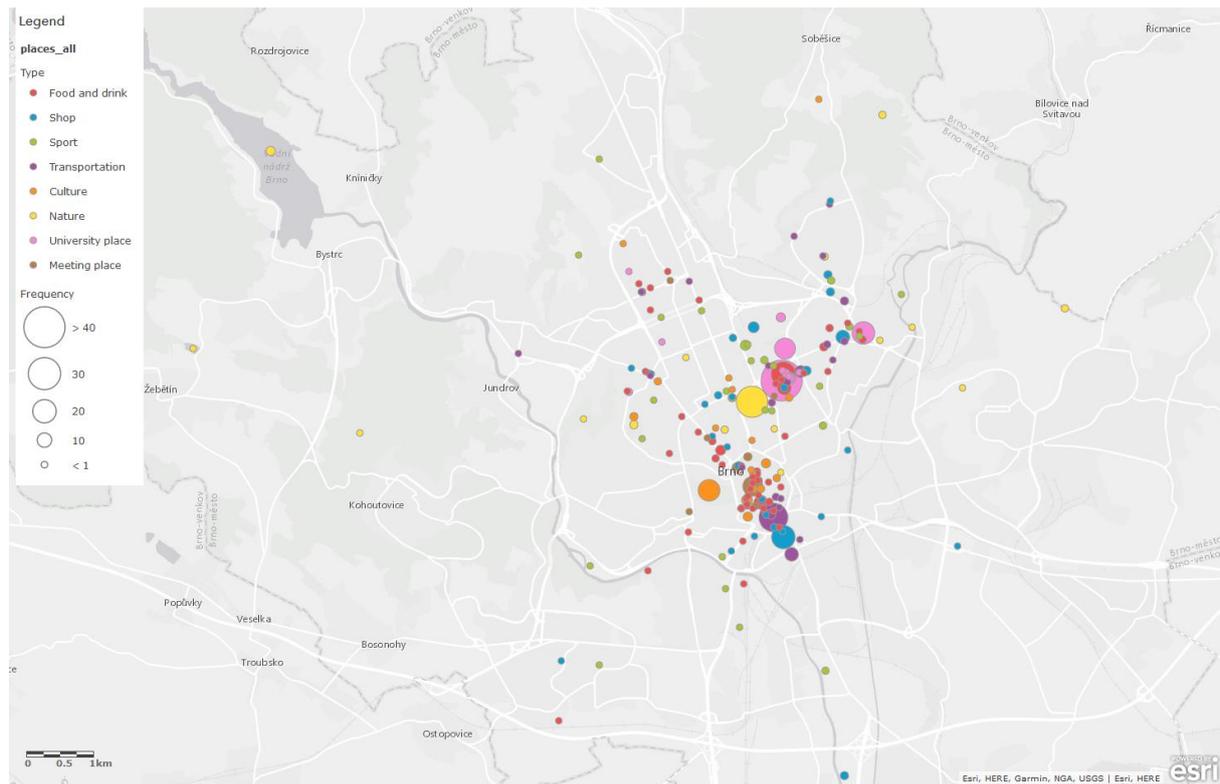
Figure 2: The map of important places for students.

Figure 2 shows a map of city center of Brno which contains points which students marked as an important points to them as a Mendel university students. Color of the points represents the category of the point and size shows how often was the point chosen by students.

The students were asked to mark down most important places for them. As can be seen from the results, most of the places are outside of the university campus. The university life is very important for the students; however, as is in case of the Mendel University in Brno, most of the "life" is lived outside of the campus. Any university considering creating a map for students should consider these factors:

1. The map should perfectly describe the campus itself.
2. The map should contain most favorite places outside of the campus, especially the meeting places.
3. The map should also show not just the campus buildings (as is common), but also interesting places on the campus (e.g. relaxation zone).

5. Discussion and Conclusions

As we showed, some of the categories of the places can be easily merged or left out. The most important category, in our opinion, is the Meeting place. This category cannot be found in any publicly available databases and is very well known to people living in the city. Any map for the first year students should contain the most common meeting places for students. Also, as can be seen, very important categories are nature and sport.

Next step of the research will be the creation of the more accurate online map for the students. This map will show the most important places and basic information about them. The purpose of this map would be to help the first year students to get acquainted with a new university environment, and also with a new city environment. By helping the

first year students to get oriented, we can also help them to better manage their first year of study and to lower the rate of the students that quit their studies in the first year. Very important part of the research will be the inclusion of the foreign first year students.

The data for the map were collected mostly among third-year university students. These students are already very well acquainted with the university and city environment. For this reason, the map should also provide a possibility for other students to participate in data collection. This can be done using a Public Participation GIS principle. The should by an integral part of any map project at any university. Usually, only the students are most qualified to provide the information needed for the map.

Acknowledgements

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Factors which have an impact on making decisions about crowdsourcing

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Abstract

The subject of this article is searching for an answer to the question about which factors influence decisions made by public organisations in the context of crowdsourcing. The answer to this question will become possible owing to a review of the most important factors indicated by the subject literature. On the basis of the obtained results one may conclude that factors grouped into four categories: task, people, management, and surroundings impact to a large degree decisions about crowdsourcing.

Keywords: crowdsourcing, crowdsourcing decision, factors

JEL Code: M20, O31, L3

1. Introduction

Crowdsourcing is a relatively new notion, nonetheless raising more and more interest with researchers. In short, it means selection of functions which until present have been performed by employees and transferring them, in the form of an open on-line call, to an undefined virtual community. In economic practice it has become a megatrend, which drives innovations, collaboration in the field of scientific research, business, or society. It is reached by more and more organisations, for instance considering its potential business value (Rouse 2010; Whitla 2009). The first paper dedicated to crowdsourcing appeared relatively recently, in 2006 thanks to J. Howe's article entitled: "The Rise of Crowdsourcing". Although crowdsourcing is more and more the subject of scientific research, one may note in the literature many ambiguities, which result from proliferation of various research approaches and perspectives. Therefore, this may lead to many misunderstandings (Hopkins, 2011). This especially concerns the key aspects and factors, which have an impact on making decisions on crowdsourcing by organisations, particularly public ones.

The aim of this article is identification of factors that influence decisions about crowdsourcing. The article is of a theoretical and review nature. Searching for the answer to this question, a literature review was conducted and an analysis of crowdsourcing initiatives used by self-government units in Poland was made. Factors, identified

based on the literature review, will constitue a basis for further deeper research in this scope.

The article is composed of three parts. The first part concerns the essence and notion of crowdsourcing and its importance to organisations. The areas of applying crowdsourcing in public organisations using the example of Poland with a division to crowdsourcing typology were presented in the second part. The last, third part of the article was devoted to identifying factors which decide about making a decision about initiating of crowdsourcing in a public organisation. A literature analysis was used here. The necessity for identifying these factors is justified by the fact that an organisation which intends to use crowdsourcing should be aware of the reasons for reaching for it. It will contribute to increasing the level of crowdsourcing.

2. Literature review

2.1. The essence and notion of crowdsourcing

Crowdsourcing is a relatively new notion (Howe, 2006), however year after year it has been gaining on popularity in sciences on management taking into account its potential (Afuah, Tucci, 2012; Gassenheimer, Siguaw, Hunter, 2013).

For the first time the notion of crowdsourcing appeared in the subject literature in 2006 owing to J. Howe. Crowdsourcing was defined as "the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call. This can take the form of peer-production (when the job is performed collaboratively), but is also often undertaken by sole individuals" (Howe, 2006). The basic building block is thus the wisdom of the crowd (Surowiecki, 2004). It is assumed that a group may achieve and generate more benefits than any expert (Jeppesen, Lakhani, 2010; Leimeister, 2012). The Internet and open collaboration with the crowd gains importance here (Prpić, Shukla, Kietzmann, McCarthy, 2015).

2.2. The importance of crowdsourcing

The existing scientific output indicates that crowdsourcing is of big importance to organisations, which make use of such initiatives. To a large extent the researchers focus many times on the benefits possible to achieve by the organisation owing to precisely crowdsourcing (Table 1).

Table 1: The importance of crowdsourcing

Date	Author/authors	Importance
2006	Reichwald, Piller	Interactive creation of values: collaboration between the organisation and the users in the development of a new product
2008	Chanal, Caron-Fasan	Opening of the innovation process in the organisation in order for integration through a competence network
2008	Howe	Act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call. This can take the form of peer-

Date	Author/authors	Importance
		production (when the job is performed collaboratively), but is also often undertaken by sole individuals
2008	Kleeman et al.	Form of integration of users or consumer in internal processes of value creation. The essence of crowdsourcing is an intended mobilisation with allocation of commercial exploration of creative ideas and other form of work performed by the consumer
2008	Yang et al.	Making use of a virtual community to transfer tasks
2009	DiPalantino, Vojnovic	Methods while using an open call to encourage communities to solve problems
2009	Poetz, Schreier	Outsourcing of the phase of generating ideas to potentially large and unknown groups of people in the form of an open call
2009	Vukovic	A new production model widespread on the Internet in which people collaborate in order to complete a task
2009	Whitla	The process of outsourcing of an organisation's activity to the virtual community. The process of organising work in which the organisation offers payment for realisation of tasks by the crowd members
2010	Buecheler et al.	A specific case of collective intelligence
2010	Burger-Helmchen, Penin	The way in which the organisation gains access to external knowledge
2010	Heer, Bostok	A relatively new phenomenon in which Internet workers carry out one or more micro-tasks, often for a micro-payment ranging from $ 0.01 to $ 0.10 for the tasks
2010	La Vecchia, Cisternino	Tools for solving problems in the organisation
2010	Ling	A new business model of innovation through the Internet
2010	Mazzola, Distefano	Purposeful mobilisation through web 2.0, creation of innovative ideas, incentives for problem solving, where users coming forward voluntarily are taken into account by the organisation in the process of solving internal problems
2010	Oliveira et al.	A way of outsourcing to the crowd of tasks related to creating of intellectual assets, often together in order for an easier to access to the necessary palette of skills and experience
2011	Alonso, Lease	Outsourcing of tasks to a large group of people rather than assigning these tasks to the employees or contractors at home
2011	Bederson, Quinn	People devote themselves to perform Internet tasks manager by organisations
2011	Doan et al.	A method of a general purpose of solving problems
2011	Grier	A way of making use of the Internet to employ a large number of dispersed workers
2011	Heymann, Garcia-Molina	Acquiring one or more Internet users to remote performance of work

Source: own elaboration.

Firstly, access to talents, external knowledge (Burger-Helmchen, Penin, 2010), valuable information (Greengard, 2011), resources (Brabham et al., 2009; Chen, 2016), skills and experience (Oliveira, Ramos, Santos, 2010), mobilisation (Zhao, Zhu, 2012), competences (Chanal, Caron-Fasan, 2008). The organisation gains, thanks to crowdsourcing, access to resources, which are present in its surroundings. The importance of crowd capital (Prpić, Shukla, 2013; Lenart-Gansiniec, 2016) and collaboration with the crowd (Prpić, Shukla, Kietzmann, McCarthy, 2015) are emphasised here. One may say that crowd capital is a side effect or an indirect phenomenon resulting from the crowd's competences. These are a specific kind of competences and their combining in the scope of acquiring of contents, possessed IT structure, and internal processes. These competences define the form and type of the sought for knowledge, information, knowledge, data, money from the crowd– using IT technology. It leads to involving the crowd in the process of realising a given idea.

Secondly, creating of new products and open innovations (Whitla, 2009). By the same token one may ascertain that crowdsourcing is a specific kind of participational on-line activity, participation (Lönn, Uppström, 2013), in which the organisation invites the crowd to collaborate. At the simplest, we may speak of crowdsourcing in a situation when: the organisation wants to transfer a task for execution into the hands of the crowd and the crowd executes it in a voluntary way (Gassmann, 2012), whereas the results of this work are beneficial to both parties.

Thirdly, one perceives a connection between crowdsourcing and building of a competitive advantage (Leimeister, Zogaj, 2013), improving business processes (Burger-Helmchen, Penin, 2010; Brabham, 2008; Roy, Balamurugan, Gujar, 2013), optimising of the costs of the organisation's activity or business models (Garrigos-Simon et al., 2014).

3. Crowdsourcing in public organisations

3.1. Areas of applying crowdsourcing in public organisations

There have not yet been any attempts to comprehensively look at the problem of crowdsourcing in public organisations (Brabham, 2015). Daren C. Brabham as the first person pointed to justification for making use of crowdsourcing in the public sector – taking into account the possibility of increasing the share and involvement of the community and making use of a new source of ideas and solutions. Since that moment one has observed a slowly growing interest of researchers in these problematic aspects. The Google Scholar data indicate 57,600 theoretical and empirical articles devoted to crowdsourcing, but only 19,200 speaking of crowdsourcing in a public organisation. Most of these publications cover the area of psychology and information science. In rare papers related to economic sciences it is indicated that crowdsourcing may be useful in urban planning (Brabham, 2009), collecting (Crampton, 2009; Goodchild, 2009), or data sharing (Hudson-Smith et al., 2009). At the same time it is emphasised that crowdsourcing in public organisations is the current direction of research since crowdsourcing is viewed as a combination of collaboration, aggregation, collective work, consensus, and creativity. What is important is that the "crowdsourcing" activity of public organisations in Poland so far enables ascertaining that it may generate large interest among the citizens and serve as a source of new innovations (an example of that is Otwarta Warszawa (Open Warsaw) platform: 16,600 registered users, 1,147 ideas handed over by the crowd, 24 ideas were implemented).

   A review of crowdsourcing initiatives was performed taking into account the division into crowdsourcing types (Table 2). In the literature various typologies are indicated, nonetheless most often two are indicated, those by J. Howe and D. C. Brabham. J. Howe distinguishes four types of crowdsourcing: (1) collective intelligence, wisdom of the crowd, (2) crowdcreation, (3) crowdvoting, (4) crowdfunding. Whereas, D. C. Brabham considers the following as variants of crowdsourcing: knowledge discovery and management, broadcast search, peer-vetted creative production, distributed human-intelligence tasking). Only a few authors additionally point to crowdfunding (Corney et al., 2009). Selected crowdsourcing initiatives of public organisations including the typology were presented below D. C. Brabham's division was chosen taking into account its multidimensionality.

Table 2: Selected examples of crowdsourcing initiatives realised by public organisations

Type	Examples	Potential usage
Broadcast search	White House SAVE Award	Identification of new solutions to problems, e.g. improvement of clerks' work
Peer-vetted creative production	Open Data, Dear Mr. President, Challenge.gov, Change by Us, Amsterdam Opent, Medellin, Otwarta Warszawa, Dobre Pomysły, Next Stop Design, Logo for the Police in Poland, logo for Muzeum Żołnierzy Wyklętych in Ostrołęka, idea for developing a crossroads in Salt Lake City, National Defence Ministry – idea for the name of an army truck, constitution in Iceland, Share an Idea, Ministry of Environment and the Future Commission in Finland: change of regulations of the act on road traffic, Ministry of Justice in Brazil: act on cyberspace, Paris: "Madame La Maire, j'ai une idée" (Madame mayor, I have an idea), Plamus, Malasia: MyIdea (Ministry of Science, Technology and Innovation), Genovasi Challenge (National Innovation Agency), MY Innovation Tree (Malaysian Productivity Corporation), Budget2014 (Finanse Ministry), Melbourne (futuremelbourne.com.au),	Obtaining of ready design of logotypes, names, plans for developing of Urban space, strategies
Knowledge discovery and management	We the People, FixMyStreet, SeeClickFix, NaprawmyTo.pl, San Jose Mobile City Hall, Did You Feel It?, Ushahidi, Kidenga, POPVOX	Reporting about occurring threats, problems,
Distributed human intelligence tasking	mTurk.com	Processing, analysis of a big quantity of data, arranging of information, creating registers
Crowdfunding	Citizinvestor, Neighborly, Spacehive	Financing of construction design, social infrastructure facilities

Source: own elaboration.

   A specific forerunner of making use of crowdsourcing in public organisations was the United States President Barack Obama. On his initiative a project named "Open data"

was implemented. It was a repository where the virtual community could add examples of solutions to various problems (https://project-open-data.cio.gov). Another endeavour was named "Dear Mr. President" (http://inauguration2013.tumblr.com/). The virtual community was given a possibility of writing a letter in the form of a postcard to President Barack Obama, in which ideas on how to solve some nationwide problem were included. A similar solution was used in Paris: "Madame La Maire, j'ai une idée" (https://idee.paris.fr). The citizens had a chance to submit their ideas for the development of the city of Paris by means of this service.

Currently, as for 20th December, 2016, there are four crowdsourcing platforms operating in Poland that were initiated by public organisations, i.e. Lubelskie Dobre Pomysły, Krosno Dobre Pomysły, Rzeszów Dobre Pomysły, and Otwarta Warszawa. They are used as a place for submitting ideas. Through the service members of the virtual community may submit ideas, which are later on analysed by a jury composed of a team of experts and city representatives. The ideas are evaluated from the point of view of their consistence with the regulations, appropriateness for the question asked, creativity and ingenuity, potential of change that it brings to the city, number of obtained votes in favour from other users, the idea's advantage over other proposals. Further on the best ideas are implemented.

4. Factors impacting decisions about crowdsourcing

According to Rouse (2010) the knowledge of factors, which influence the decision about crowdsourcing in the organisation is important in so far as the lack of knowledge about it may contribute to the organisation's losing of valuable resources. Many researchers of crowdsourcing initiatives attempted to select a group of factors, which determine the decision on making use of crowdsourcing (Table 3). Such grouping may contribute to minimising the potential threats resulting from the limitations brought about by entrusting tasks for realisation with an unknown, virtual group of recipients.

Table 3: Factors impacting making of a decision on applying of crowdsourcing

Level of analysis	Date	Author/authors	Factors
Task	2009	Kazman, Chen	Type of task
	2010	Malone, Laubacher, Dellarocas	
	2012	Ranade, Varshney	
	2012	Heimerl et al.	
	2012	Afuah, Tucci	
	2010	Burger-Helmchen, Pénin.	Interactions with the Internet community
	2013	Muntés-Mulero et al.	Openness
	2012	Feller et al.	Confidential information
People	2010	Malone, Laubacher, Dellarocas	Number of employees
	2010	Sharma	Resources
Management	2011	Rouse	Cost-saving
	2012	Zhao, Zhu	

Level of analysis	Date	Author/authors	Factors
	2012	Van Pelt, Sorokin	
	2011	Rouse	Coordination
	2009	Whitla	
Surroundings	2012	Zhao, Zhu	Platform accessibility
	2012	Van Pelt, Sorokin	

Source: own elaboration.

The factors presented above were matched with four groups in order to indicate as precise as possible the dilemmas and true motives of the actions taken, and so these are the following: tasks, people, management, and the surroundings.

A task or more appropriately its type was assigned to the first category. The importance of the task is considered as the decisive factor for making a decision about crowdsourcing (Ranade, Varshney, 2012). What is important – not all types of crowdsourcing initiatives may be used for realising each task directed to the virtual community (Burger-Helmchen, Pénin, 2010). The reason for this state of affairs is the fact that the members of the virtual community are anonymous – the issues of the crowd's involvement, confidential data protection, intellectual property, or privacy and data security appear here (Muntés-Mulero, 2013). It is suggested in the literature that in order to increase intellectual security, larger tasks may be divided into smaller ones (Feller, 2012). The most frequent tasks directed to the crowd are the following: micro-tasks, macro-tasks, and creative tasks. Micro-tasks are tasks, which do not require collaboration of many persons, time involvement, or the necessity for financial remuneration for the virtual community. What is important is the crowd's involvement. They may include for example indicating facilities on a map or translating of short texts and notifying about a certain problem. This type of tasks may be applied in "knowledge discovery". Macro-tasks are tasks, which require involving a larger number of persons who collaborate with each other and further bigger amount of time, knowledge, and skills. They may concern searching for ideas, means of solving, or answers to problems reported by the organisation. It is about such crowdsourcing initiatives as "broadcast search". Creative tasks are connected with making use of creativity, innovativeness of the virtual community's members. They concern improving the offer or way of functioning of the organisation – and therefore the crowdsourcing initiative – "peer-vetted creative production". In Poland public organisations direct tasks of various nature to the crowd. The biggest interest is raised by encouraging the crowd to generate new ideas, test products, services, and solve various problems. However, it is difficult to ascertain that it is a type of task, which constitutes a significant factor that influences crowdsourcig decisions. Research in this scope has not been conducted so far.

The next factor are the people. The organisation may take crowdsourcing actions in case when it does not possess a sufficient number of employees for executing a given task (Malone, Laubacher, Dellarocas, 2010). In particular, when this task requires great resources, skills, or competences. An example are actions of the "peer-vetted creative production" type. Then what is required is the knowledge, creativity, or innovativeness for generating of new ideas or solutions. The probability of adopting and accepting new solutions is also increased then. What is more, new solutions will not be adopted if the employees do not see the benefits (Simula, Vuori, 2012; Louis, 2013). This refers to the fact that the internal motivation of the employees may stimulate making use of knowledge coming from the crowd (Hoosain, 2012). It is difficult to state that an inadequate number of employ-

ees may constitute a decisive factor on making a decision about crowdsourcing. In Poland one rather talks about overstaffing (Czarzasty, Zieleńska, 2013). Possibly the determinant is illingness to reach for diverse knowledge – however there has been no reserach conducted in this scope in the context of public organisations in Poland.

Management constitutes an important factor which determines making of a decision about crowdsourcing. In particular this concerns costs, coordination, and risk. The will to save money or lack of funds for realising an action may constitute the premise for making a decision about crowdsourcing (Zhao, Zhu, 2012). Next, coordination of actions or the mechanisms of coordination in the organisation are of key importance to crowdsourcing. Their lack may mean resource leakage. Therefore, the organisation should possess workflow management (Potter, McClure, Sellers, 2010), members management (Dow et al., 2011), and agreement management (Psaier et al., 2011). Moreover, what is important is the ability or the developed mechanisms of controlling and motivating of the virtual community. Otherwise, there is a risk of receiving by the organisation of useless ideas (Zhao, Zhu, 2012). It is particularly required in the case of "distributed human intelligence tasking" since the crowd's knowledge is used here to execute specific, often complicated tasks or analyse large quantity of data. More and more often one points out that public organisations should increase their efficiency, effectiveness of public tasks or the rationality of spending public funds (Frączkiewicz-Wronka, 2013. By the same token it seems that these premises may decide about making a decision about crowdsourcing – nonetheless, there is a lack of research in this scope.

The last group of factors is connected with the surroundings, especially possessing of a specific crowdsourcing platform. The multitude of existing crowdsourcing platforms may cause that the decision on their choice should be dictated by the goals which a crowdsourcer wishes to achieve. What is more, the possessed platform determines the choice of a strategy of conduct and selecting a suitable type of virtual community. And so, the functionality, possibility of collecting a number of offers, a communication module, or aggregating of data gain on decisive significance. The platforms that operate in Poland are oriented at collecting ideas from the crowd. However, a deeper analysis of the existing platforms (Lenart-Gansiniec, 2016) enables to ascertain that they are not intended for the aggregation of mass data and moreover they do not allow for interacting with the crowd. Thus, one may conclude that this factor has no influence on decisions related to crowsourcing.

5. Discussion and Conclusions

The analysis of the factors impacting decisions about crowdsourcing enables drawing some conclusions:
1. Before an organisation makes a decision about crowdsourcing, it is necessary to identify the factors that the organisation has at its disposal, i.e. which tasks it wants to direct to the virtual community, what mechanisms of coordination, financial and human resources, and accessibility to the platform are in its possession. The awareness of the reasons for making a decision about crowdsourcing is also important.
2. The decision on taking up crowdsourcing initiatives should be the subject of the organisation's decision. A premise for it is a systemic analysis of all the factors that influence this process.

3. Knowledge of the factors which impact the decisions about crowdsourcing may contribute to achieving of the proper goal, obtaining of the expected benefits, or achieving of an appropriate level of crowdsourcing, but also its effectiveness.

4. The group of potential factors varies greatly. Beside the types of tasks directed to the crowd, there are also resource or managerial factors, but also the fact of possessing a crowdsourcing platform consistent with the organisation's needs. In particular the latter is important in the case of public organisations – the issue of costs and fees for this platform appears.

5. Skilful management of crowdsourcing is the resultant of many factors, which should be taken into consideration by organisations, which intend to implement it. All factors should be treated jointly since treating them separately may bring about different results. Then the risk of resource drainage or leakage of confidential data from the organisation appears.

6. Taking into account the fact that the decision is a conscious choice from amongst the recognised and deemed possible variants of future action, each crowdsourcing initiative requires from the organisation involvement of not only the people, but also financial means. What is more, public organisations are the ones that are more and more willing to reach for such type of solution.

7. The identification of the factors which have an impact on making of a decision about crowdsourcing still belongs to relatively new areas. There is still no answer to numerous questions, in particular whether one should distinguish between the factors taking into account the type of organisation (e.g. commercial or public). An attempt to find the answer to this question will contribute to neutralising the negative consequences of crowdsourcing. Particularly in the context of public organisations in Poland – it seems that the factors, identified based on the literature, do not correspond with the specificity of these organisatinos. Thus, it is important to conduct further and very detailed research in this scope. This article may, therefore, be considered as an interlude to research and verification of of the factors found in the literature in the conditions of public organisations in Poland.

Acknowledgements

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The impact of store design on shopping behavior

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Abstract

The main objective of the paper is to explore the impact of store design factors on consumer behaviour and to indicate how the store design evaluations influence customers´ relationship to a particular store. In our research we explore the store design factors of shelf height and shelf layout. We examine both cognitive and affective information processing in shaping store preference framework. Empirical research was conducted using laboratory experiments with photographic images of store design. Data was gathered from a total of 240 respondents. Non-probability sampling in the form of convenience sampling was employed. Analysis of variance was employed to test the hypotheses. We conclude that both design factors investigated in the study are important determinants of repeat purchase intention, however with different effect on cognitive and affective level.

Keywords: store design, store atmosphere, stimulus-organism-response model, approach behavior, avoidance behavior, repeat purchase.

JEL Code: M30

1. Introduction

The store environment is among the most important determinants of store choice by byers. It has long been recognized that the atmosphere of the store can be more influential than the product itself in the purchase decision (Kotler, 1973). Many buying decisions are made at the point-of-sale, so that atmosphere in the store can increase sales. In a highly competitive environment, where retailers pursue customers´ retention strategies, the store atmosphere is an important differentiator. Professionals concerned with the management side of retail stores recommend how to use space, colours, lighting and interior design to create environments that attract customers.

Psychologists have studied environment-behaviour relationships, developing a distinct psychological discipline known as "environmental psychology". This discipline attempts to predict the effect of stimuli upon human´s feelings and behaviour. Models used to explain the impact of environment on decision processes are based on the assumption

that particular environmental stimuli provoke shoppers to evaluate the information presented through the stimuli and then, based on these evaluations, positively or negatively respond to these stimuli. In this context, the atmosphere is the stimulus (S) that causes a consumer´s evaluation (O) and this evaluation causes some behavioural response (R), which could have a form of approach or avoidance.

According to stimuli-response models, the environment-person interaction consists of two phases. In the first phase, environmental stimuli generate emotions of pleasure, arousal and dominance referred as the "PAD". In the second phase, the emotions stimulate approach (positive) or avoidance (negative) behaviours. In 1982 Donovan and Rossiter (Donovan and Rossiter, 1982) applied the environment-response framework to test the store atmosphere´s impact on customers´ behaviours. Their finding suggest that store-induced feelings can increase time spent in the store and also willingness to interact with sales personnel.

2. Theoretical framework of human responses to environment

The most widely used theory explaining the impact of environment on humans´ evaluation is the environmental response model proposed by Mehrabian and Russel (1977). The Mehrabian-Russel approach uses a stimulus-organism-response sequence (SOR). The first component in the SOR and in the Mehrabian-Russel sequence is the stimulus. While the variables representing the evaluation part (O) and the response part (R) of the model are clearly defined, the taxonomy of stimulus variables (S) is less unambiguous. The selection of appropriate stimulus taxonomy is extremely difficult because of the complex and changing combinations of stimuli in any environmental setting.

To investigate the stimulus side, Mehrabian and Russel (1977) use information theory. They apply an all-encompassing stimulus descriptor called "information rate", representing the amount of information contained or perceived in the environment (Mehrabian, 1996). This rate is described as the information load of an environment. It is the quantity of elements in a particular environment and their degree of change. The more information in the form of stimuli, the higher the load of the environment. Mehrabian and Russel (1977) define the information load of any environment as a combination of its novelty and complexity. The novelty of an environment refers to the degree of unfamiliarity and uncertainty. Complexity represents the number of elements, features or changes in an environment. Summary of the factors of novelty and complexity creates "a load" – a measure representing the environmental stimuli part.

The second component in the SOR framework is the organism, representing the stage in which the stimuli are evaluated by the individuals. Various physical or social stimuli produce evaluations that can result in one (or more) of three emotional states: pleasure, arousal, and dominance. These three emotional states can be described by how an individual feels, how much an individual is stimulated, and how much an individual has the situation under control. Pleasure refers to the humans´ level of happiness, joy and satisfaction. Arousal refers to the humans´ level of excitement, activity and stimulation. Dominance refers to the level, in which a person feels unrestricted and in a control of the situation. Mehrabian and Russell (1977) argue that pleasure, arousal, and dominance are the three basic emotional reactions to all environments. An important point of the evaluation stage is the information-processing level, at which the stimuli are evaluated. Stimuli can be evaluated either at an affective or cognitive level. The model of Mehrabian and Russel

considers only the affective part and emotional states of a person as a mediating variable, influencing human´s behaviour. It is assumed that information load of an environment is a direct correlate of arousal. The higher the load, the higher a person´s arousal level. Therefore, an environment that is unfamiliar, surprising, crowded and complex will cause that a person becomes stimulated, excited and alert. Conversely, an environment that is common, usual and expected, will cause feelings of relaxation and calmness.

An individual´s response (R) to any environment may be categorized as either approach or avoidance behaviour. Approach behaviours include physically moving toward, exploring, and performing in an environment, as well as returning to that environment. Avoidance behaviours include a desire to leave, disinvest, poor performance in an environment, as well as never returning to that environment. In the context of retailing, approach behaviour includes spending more time and money in the store, enjoying the shopping experience and more time spent browsing through the store (Donovan and Rossiter, 1982; Donovan et al., 1994). Avoidance behaviour means discomfort and displeasure or a shorter time spent in the store (Bitner, 1992). Retailers intend to encourage approach behaviour and to eliminate avoidance behaviour in customers. Compared to Mehrabian and Russel (1977) take Baker et al. (1992) a more detailed approach to environmental stimuli and define three categories of stimuli: ambient, social, and design. Ambient factors include lighting, music, climate. Social factors are concerned with the human element and refer to the environmental conditions created by employees, customers and their interactions. Design dimensions include the layout, architecture and other physical features of the environment (Baker et al., 1994). The model explaining the influence of store environment on customer behaviour was developed by Donovan and Rossiter (1982). They identified pleasure (positive emotions) and arousal (feelings of excitement and stimulation) as intermediating variables in the evaluation of store environment effects. In applying the Mehrabian-Russell model to the retailing, it can be predicted that customers would spend more time and make more purchases in the stores which evoke pleasure and a moderate to high degree of arousal (Spies et al., 1997).

2.1. The concept of Retail Store Atmosphere

The concept of retail atmosphere (referred also as atmospherics) was introduced by Kotler in 1973, in his article "Atmosphere as a Marketing Tool". Kotler (1973) introduced four dimensions of store atmosphere in terms of the humans´ sensory channels as visual, aural, olfactory, and tactile. According to his definition the main visual elements of an atmosphere are: colour, brightness, size, and shapes; the aural elements are represented by volume and pitch; olfactory elements refer to scent and freshness; and finally the tactile elements include softness, smoothness and temperature. The fifth sense of taste has not been included as a dimension into Kotler´s categorization (1973) because the atmosphere of a retail store cannot be described in terms of this sense. The ultimate goal of creating positive atmosphere was to evoke certain effects in buyers. A more detailed definition of store atmosphere can be found in the study of Levy and Weitz (2004) as "the combination of store´s characteristics such as design, layout, display, signs, colours, lighting, temperature, sounds and smells, which together create an image in consumer´s mind, stimulate customers´ perceptual and emotional responses and affect his purchasing behaviour". Bitner (1992) adopted in his atmosphere typology broader approach and included ambient cues (those affecting the five senses); layout and functionality (store arrangement and

ability to facilitate consumer goals); and signals that communicate information to the shopper (signs, symbols, and artefacts).

Berman and Evans (1995) have formulated a different categorization. They divided atmospheric stimuli into four categories: the exterior of the store, the general interior, the layout and design variables and the point-of-purchase and decoration variables. The design factors contributing most to the visual environment of the store are the exterior, interior and the layout of the store, colours and lighting. Store layout and space architecture influence customers´ buying decision. Main goal of a store design for a customer is convenience, which means entering and leaving the store quickly and finding the products easily. Badly designed stores may cause emotional stress and reduce the shopping pleasure (Baker et al., 2002).

Several research studies found that colour is a design factor, which affects mood, feelings and emotions of customers and can have positive or negative perceptions of store environment (Turley et al., 2002). Warm colours were perceived to catch attention and attract customers, while cool colours are relaxing, pleasant and peaceful. Lighting is an important atmospherics element used to draw attention on specific areas and products and to create the store´s image (Turley et al., 2000). Appropriate lighting can have a positive impact on customer´s purchasing behaviour. Brighter lighting stimulates higher product involvement of customers and more positive customer perceptions of the store image.

The concept of a store design has an impact on forming customers´ cognitive maps, which can help in understanding the store environment (Kaplan, 1987). Creating simple symmetric (grid floor pattern) with lower shelves is proposed to help consumers better understand the store environment. Titus and Everett (1995) found that it is easier for individuals to understand environments with visual symmetry than environments with visual asymmetry. Following this logic, a store which is more symmetric (simple shelves layout) and more visually accessible (lower shelves) is considered to be less arousing and more legible. Most retail store settings use one of two types of store layouts: simple (grid) store layout and complex (free-form or racetrack) store layout. A simple store layout is characterised by long parallel aisles, with merchandise on shelves on both sides. This layout is often not very stimulating, but it can be suited for shopping in which customers need move fast through the entire store and easily locate products without losing time. Customers perceive this shopping process as fast and efficient (Iyer, 1989). In simple layout form the space is utilised to a large extent. A complex store layout follows an irregular pattern. It is organized into individual, separate areas, each built around a particular product category / shopping theme. The complex layout leads the customer to visit as many store sections or departments as possible and to encourage impulse buying. It stimulates more relaxed and unplanned shopping. The aim of such a layout is to stimulate and provoke the customer to explore the store. The complex layout is often used in department stores and stimulates customers to visit more departments. This layout, however, requires the availability of personnel to help the customers to find the products needed.

3. Methodology and Data

The principal goal of our research is to investigate the stimuli effect on store evaluation (organism stage) and repeat purchase intention (response stage). In particular, we test the impact of shelves height (visibility) and shelves layout (complexity) on cognitive and affective path of store evaluation, and based on these results we identify how these evaluations influence repeat purchase intention of customers.

One of the methodologies most widely used to investigate the impact of the environment on human decision is experimental design. In our experimental research the effect of the store environmental stimuli of shelf height and shelves layout on consumer behaviour and specifically on repeat purchase intention was studied. We used pictures of store environments to test the environmental preference and perception. The photographs concerning the 2 design factors used the following four design alternatives: high / low shelf height and simple / complex shelves layout. Thus, four environments were created with the selected images as a basis for questionnaire. Empirical research was conducted on a sample of 240 students. Four groups each consisting of 60 students were exposed to one particular image and asked to respond to the pictures of shelves layout and shelf height and to express their views to the questionnaire. In our paper we investigate cognitive as well as affective store design evaluations of consumers. The cognitive part of evaluation is tested on legibility, representing how easy the store environment can be recognized, or how easy it is to find a way in a store. The affective part of evaluation is tested on arousal, that is a psychological construct related to emotions stimulated by the store. Both evaluations are explored by employing design factors of shelf height and shelves layout. These cognitive and affective evaluations of retail stores may influence repeat purchase intention of consumers (Vrechopoulos et al., 2004; Smith and Burns, 1996; Titus and Everett, 1995; Mehrabian and Russell, 1974).

Focusing on the design factors of shelf height and shelves layout we investigate whether a store which is more symmetric (e.g. simple-grid shelves layout) and more visually accessible (e.g. low shelves), is perceived as less arousing and more legible. Therefore, our hypotheses are:

H1: A store with low shelves generates a higher level of legibility than a store with high shelves.

H2: A store with a simple shelves layout generates a higher level of legibility than a store with a complex shelves layout.

H3: A store with low shelves generates a lower level of arousal than a store with high shelves.

H4: A store with a simple shelves layout generates a lower level of arousal than a store with a complex shelves layout.

The impact of legibility and arousal on repeat purchase intention is tested in the hypotheses:

H5: A store with higher level of legibility will result in a higher repeat purchase intention.

H6: A store with lower level of arousal will result in a higher repeat purchase intention.

Following statements were used to assess the variables as measurement items: shelf height: "This store has high shelves"; shelf layout: "Finding products in this store is easy"; legibility: "I am confident to find my way in this store"; arousal: "I feel excited in this store"; repeat purchase intention: "My shopping in this store will be in the future probable". All measurement items were assessed on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree).

As mentioned earlier, legibility is related to the navigation and comprehension of the environment, and therefore more related to cognitive processing rather than emotions stimulated by the store (Zeithaml, 1996). On the other hand, arousal is less related to the navigation and comprehension of a store and more to emotions. Thus, both cognitive and affective part of the information processing was explored.

The level of legibility was assessed on a 7-point scale (7 = no problems in way finding, 1 = massive problems in way finding). Arousal was measured using 7-point scale, where 7 = highest excitement and 1 = lowest excitement. Repeat purchase intention is associated

with preferring one store over the other, frequent purchasing from this store, and intentions to shop in the store in the future. For the purpose of our research a 7-point scale was used with extremes 7 = very high purchase intention and 1 = very low purchase intention.

Analysis of variance was employed as a primary statistical technique in the research to test the hypotheses (Rossiter, 2002; Parasuraman et al., 1998).

4. Results and Discussion

To analyse whether the manipulations of the two design factors reached the intended levels, one-way ANOVA was used. Four conditions with appropriate store pictures were produced in a 2 (shelf height: high vs low) x 2 (shelves layout: simple vs complex) design.

The analysis of variance for both shelf height and shelf-layout indicated that the difference between high vs low shelves height and simple vs complex shelves-layout was statistically significant at $p< 0.001$ (Tab. 1).

Table 1: Analysis of variance for design stimuli

Design stimuli	Mean value (M)	F-value	p-value
Shelf height	M high shelves = 6.05 M low shelves = 3.75	96.54	$p< 0.001$
Shelves layout	M simple layout = 4.92 M complex layout = 3.85	37.12	$p< 0.001$

Source: own calculation

The results for shelf height indicated that the difference between the high-shelf and low-shelf conditions was statistically significant. The p-value was beyond a level of 0.001 with an F-value 96.54. The mean (M) of high-shelves was significantly higher than for the low-shelves (M high shelves = 6.05 vs M low shelves = 3.75). Results for shelves layout produced F-value of 37.12 and a p-value below 0.001. The difference between the group means for simple layout and complex layout was statistically significant (M simple layout = 4.92 versus M complex layout = 3.85).

Hypotheses 1 and 2 relate to the cognitive path of the model. Hypothesis 1 proposes that stores with low shelves are more legible than stores with high shelves. Analysis of variance was used to test the difference. The one-way ANOVA test indicates that the mean legibility (L) for high-shelf stores is significantly lower than the mean legibility for low-shelf stores (ML high shelves = 3.64 < ML low shelves = 4.88; F = 19.472; $p < 0.001$). Hypothesis 1 is supported, because a store with low shelves will produce a higher level of legibility than a store with high shelves. In general, shelf height has a significant impact on legibility.

Hypothesis H2 investigated the impact of floor pattern on legibility and proposed that a simple shelves layout is associated with a higher level of legibility. For retail stores with simple shelves layout as compared to complex shelves layout the difference in means for legibility was statistically significant. The results of ANOVA reveal a higher level of the mean legibility in simple shelves layout than the mean legibility of complex shelves layout (ML simple layout = 4.97 > ML complex layout = 3.56; F = 84.203; $p< 0.001$). Thus, the hypothesis H2 was supported.

Hypotheses H3 and H4 relate to the affective path of the stimuli evaluation and test whether the effects of shelf height and shelves layout are statistically significant. Hypothesis H3 testing differences in arousal (A) caused by shelf height was not supported (MA high shelves = 4.13 > MA low shelves = 3.66; F = 2.498; p = 0.079). The same was found in

examining the design factor shelves layout in hypothesis H4, which proved also not statistically significant (MA simple layout = 3.79 < MA complex layout = 3.89; F = 2.042; p = 0.299). It is an important result indicating that also subsequent hypothesis (H6) working with arousal cannot be supported, because a precondition of any hypothesis to be tested is that the prime variables are effective. A possible explanation for the results of H3 and H4 is that store design factors examined in the research do not evoke enough affective responses in consumers.

Hypothesis H5 proved to be supported. The ANOVA findings suggest that the repeat purchase intention (RPI) for higher level of legibility was significantly higher than for the lower levels of legibility (MRPI higher legibility = 5.89 > MRPI lower legibility = 3.04; F = 79.793; p <0.001). In summary, a store design that evokes a higher level of legibility, stimulates more intention to return to the store.

5. Conclusions

The aim of the paper was to identify the effect of retail design on shopping behaviour using a cognitive and affective information processing. We explained how the environmental stimuli (store design elements) influence legibility and arousal (evaluation states) and how these evaluation states mediate the effects of stimuli on responses and thus affect the behavioural outcomes (repeat purchase intention).

The design factors of shelf height and shelves layout were investigated and found to impact the store evaluations. Legibility was tested for the cognitive part and arousal for the affective part of the evaluation. Experimental research with pictures of store environments was employed to assess the design changes and test the hypotheses.

Summarizing the results of our research, the design factors of shelf height and shelves layout have an impact on shopping behaviour. Stores with low shelves and simple shelves layout result in a higher level of legibility as compared to stores with high shelves and complex shelves layout. However, the shelf height and shelves layout do not result in significantly different levels of arousal. These findings support the conclusion that both the design factors have a significant effect on the cognitive, but not on the affective part of the information processing. The study illustrates the importance of shelf height and shelves layout in designing the stores and helps managers in better understanding the customer´s shopping decisions.

Several studies confirm that attitudes toward the retail store environment can sometimes be more influential in determining the store choice than attitudes toward the product (Dawson et al., 1990). The amount of time, which a customer spends in a store, is very important, therefore retailers design their stores to increase this time by enhancing the shopping experience. The higher the assessment of design factors, the longer the visit to the store and the higher the probability of the purchase. Findings of our research entitle the recommendations to retail management in the area of adopting direction-labels helping orientation in the store, improvement of shelf labelling and ensuring visual accessibility of the store (avoiding high shelves).

Store atmosphere is very critical in stimulating customers to visit a store and to increase the shopping frequency. Positive shopping experience and store evaluation can influence future shopping preferences and help in developing store loyalty.

Acknowledgements

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Metal markets drivers

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Abstract

Due to hybrid nature of metals and to recent financialization of commodity market it is crucial to examine what drives metals markets to understand and to predict their development. The aim of the paper is to explain metal price movements by assessing an impact of multiple economic and financial factors. Eight macroeconomic and financial variables are considered as candidates for the metal markets drivers. The data are collected from Bloomberg. Mixed-data-sampling regression model is used to process various frequencies of the drivers (daily and monthly). Interest rate, exchange rate, stock levels, stock index returns and crude oil returns are found generally significant to drive metal markets. The stock index has the most significant impact on the metals returns that is negative. Considered drivers best explain variability of the platinum returns (27%), on the other hand they explain only 9% of the silver market variability.

Keywords: financial markets, MIDAS, metal markets, commodity markets, drivers

JEL Code: G17, C53

1. Introduction

In the world of metal markets, volatility is high and traded assets lack an intrinsic value. It is not possible to conduct a financial analysis to compute a fair value of a commodity, to which its price should converge, as it is in the case of equities. Moreover, the markets are driven by diverse range of factors, due to a dual nature of commodities being both real as well as financial assets. Frankel (2014) describes this hybrid feature of commodities, specifically of fossil fuels, minerals, and agricultural commodities as follows. On the one hand, they are like assets having their price determined by supply of and demand for *stocks*, and on the other hand they bear features of goods, for which the *flows* of supply and demand drive the price. Taking all into account, predicting prices on metal markets is substantially challenging. To be able to do so effectively, it is of great importance to examine metal markets drivers.

The paper is aimed to explain metal markets price movements by assessing an impact of multiple economic and financial factors of different frequencies using innovative econometric approaches. Drivers of various nature are considered, ranging from macro-

economic variables to financial market characteristics, implying that collected data are observed in different frequencies. Thus, an innovative econometric model of mixed data sampling (MIDAS), which enables one to include data of different frequencies into a model without a need of their aggregation, is used. In other words, full explanatory potential of the data is exploited.

The role of financial market characteristics in a determination of metals price increases with the recent financialization of financial markets. Büyüksahin and Robe (2014) use unique, non-public dataset of trader positions in U.S. commodity futures markets to find evidence on greater participation of speculators in commodity market. They also show that correlation between the rates of return on investible commodity and equity indices rises.

The problem of what drives metals prices, or commodity prices in general, have been addressed in several papers, especially after the global economic crisis that burst out in 2008. Frankel and Rose (2010) argue that there have been long time periods in which majority of commodities has been moving in the same direction indicating a presence of fundamental drivers behind these moves. They consider four prevailing theories explaining this phenomenon: strong global growth, easy monetary policy, speculation, and risk (or geopolitical uncertainties) and they build an "overshooting model" in which commodity prices should converge to an equilibrium level in the long-run. They find global output and inflation to have positive effect on real commodity prices as well as strong effect of microeconomic variables, specifically volatility, inventories and spot-forward spread.

More recently, Śmiech et al. (2015) used the structural VAR framework to examine an effect of real and financial processes on energy and non-energy commodity prices in the euro area macroeconomy. They also work on the assumption that certain common fundamentals cause co-movements of the commodities. Real processes are represented by industrial production, interest rates are used as a proxy variable for financial processes. Whereas before the financial crisis energy prices were rather linked to financial processes, after the crisis the commodity prices were driven by the real processes. More importantly for this study, they find non-energy commodity price index (including metals prices) insensitive to industrial activity. On contrary, interest rate is found a significant driver for both energy and non-energy commodities. The latter is explained by Frankel (2014) who argues that interest rate drives the price of storable commodities through its impact on the demand for inventories.

Kagraoka (2016) uses a generalized dynamic factor model to examine vast panel data of monthly returns of numerous commodities. Number of common factors driving commodity prices in general is determined to 4 corresponding to the U.S. inflation rate, the world industrial production, the world stock index, and the price of crude oil.

Crude oil is also considered as one of the possible factors in the paper of Sari et al. (2010), which focuses on the co-movements and information transmission between spot prices of gold, silver, platinum, and palladium and oil price and the US dollar/euro exchange rate. Although they do not find evidence of a strong long-run equilibrium relationship, strong feedbacks in the short run between the prices and both variables are discovered.

Based on the aforementioned papers, following variables are chosen to be candidates for possible metal markets drivers: industrial production, inventories, inflation rate, interest rate, stock index, US dollar/euro exchange rate, price of crude oil and GDP growth.

Higher industrial production is expected to drive the prices up through raised demand, since the metals are amply used in numerous industries. Inventories may signalise both excess supply and excess demand. In the first case, there is an overproduction of metals that are not sold that quickly and have to be stored. In the latter case, raised stocks of metals may imply that suppliers hold more of the metals in their stocks to be prepared to satisfy the excess demand. Thus, the anticipated effect of inventories is ambivalent. Third, inflation rate may mean rising prices in economy, including metal prices. Interest rate drives the storable commodity prices through its impact on the demand for inventories according to Frankel (2014). Stock market (represented by stock index) and crude oil market could be understood by investors as alternatives when they consider their investments. In this case funds would spill over the markets and the coefficients would be negative. All metals are mainly traded in US dollars. Therefore, weaker dollar should result in increase of metal prices.

The paper sheds light into understanding of metal markets dynamics. Through the analysis of main market drivers, it aspirates to make price predictions on metals market more accurate. The remainder of the paper is organized as follows. Section 2 describes methodology and data that are used in the paper. Section 3 presents achieved results. The last section discusses the results with those obtained by other studies and concludes.

2. Methodology and Data

2.1. Mixed data sampling

The analysis is based on mixed data sampling regression models (so called MIDAS regression) introduced in Ghysels et al. (2004) and advanced in Ghysels, Santa Clara, and Valkanov (2006) and Andreou, Ghysels, and Kourtellos (2010). MIDAS regression enables the researcher to include time series of several different frequencies in the modelling. Such facility is achieved through frequency alignment procedure.

Frequency alignment transforms the time series of the high-frequency variable to a matrix formed by vectors of a length corresponding to the length of the low-frequency variable time series. Consequently, the number of vectors forming the high-frequency matrix is equal to the number of high-frequency observations falling into one low-frequency period (or its multiple, if we consider lags through numerous periods). Coefficients for each vector of the matrix are then estimated by a regression. A general example may be more instructive.

Let y be a dependent variable observed in m periods and x be an explanatory variable observed in n periods, k times more frequently then y. Thereafter, to be able to perform a regression, we need to transform variable x to a matrix of k vectors of a length m (provided that we consider data from only one low-frequency period to influence the contemporary observation). In such case, n is equal to a product of m and k.

$$\begin{bmatrix} y_1 \\ \vdots \\ y_m \end{bmatrix}, \begin{bmatrix} x_1 \\ \vdots \\ x_n \end{bmatrix}, n = k * m$$

$$\begin{bmatrix} y_1 \\ \vdots \\ y_m \end{bmatrix} = \alpha + \begin{bmatrix} x_1 & \cdots & x_k \\ \vdots & \ddots & \vdots \\ x_{n-k+1} & \cdots & x_n \end{bmatrix} \begin{bmatrix} \beta_1 \\ \vdots \\ \beta_k \end{bmatrix} + \varepsilon, \tag{1}$$

where matrix of the variable x is a $m \times k$ matrix. In the paper, dependent variable is observed monthly, whereas explanatory variables are observed on monthly as well as on daily basis. Thus, daily explanatory variables are transformed into matrices of 21 vectors, each representing particular number of a day in month.

Foroni et al. (2015) introduced a modified version of MIDAS, so called reverse unrestricted MIDAS that enables one to incorporate a high-frequency variable as the dependent one. In this case, it would mean that a use of daily metals returns would be possible. On the other hand, it would result in a system of 21 equations instead of 1 in each step of the analysis, which would make the results of the study considerably more complex. For the sake of the results transparency it was thus decided to use monthly returns as a dependent variable.

There are several ways to employ functional constraints in order to reduce the number of coefficients that need to be estimated. Such feature can be particularly useful when
a model is not feasible to be estimated unrestricted for too many coefficients. However, it is not a case of this study and so employing functional constraints was not found necessary. Moreover, restricting the model by the constraints means adding an information in it, which often can be plainly arbitrary and leading to in some way biased results. Additionally, unrestricted MIDAS regression can be estimated using standard OLS method.

2.2. Factors impacts analysis

Impacts of factors on metal prices are compared as follows. First, regressions of each factor on each metal monthly returns are run separately. These regressions always contain monthly GDP growth as a control variable, although its own significance is not considerable. Adjusted coefficients of determination are estimated for each regression. Afterwards, they are compared to determine which of the factors contribute to explanation of the returns variability significantly.

$$r_{a,t} = \alpha + GDP_t + x_{b,t} + \varepsilon_t \; ; \; a \in \langle 1; 2; 3; 4 \rangle, b \in \langle 1; 2; \ldots; 7 \rangle, \tag{2}$$

where r_a represent monthly returns of gold, silver, platinum and palladium respectively and x_b denotes each of the 7 possible drivers chosen. Consequently, we have a system of 7 equations for each of the 4 metals, totalling 28.

Subsequently, an overall regression is estimated for each metal, including all factors that were found relevant for this metal in the previous step, accounting for 4 equations. Out of all coefficients estimated (there is a large number of them due to the MIDAS technique) the most significant ones for each factor are chosen and compared.

$$r_{a,t} = \alpha + GDP_t + \sum \beta_b x_{b,t} + \varepsilon_t \; ; \; a \in \langle 1; 2; 3; 4 \rangle, b \in \langle 1; 2; \ldots; 7 \rangle, \tag{3}$$

2.3. Data

Data are collected across the period of 1997:01–2016:12, which accounts for 240 monthly and 5,040 daily observations. Monthly spot prices are collected for gold, silver, platinum and palladium in dollars per troy ounce. Their development from across the

examined period can be seen in Figure 1. Monthly returns are computed from the prices using their log difference.
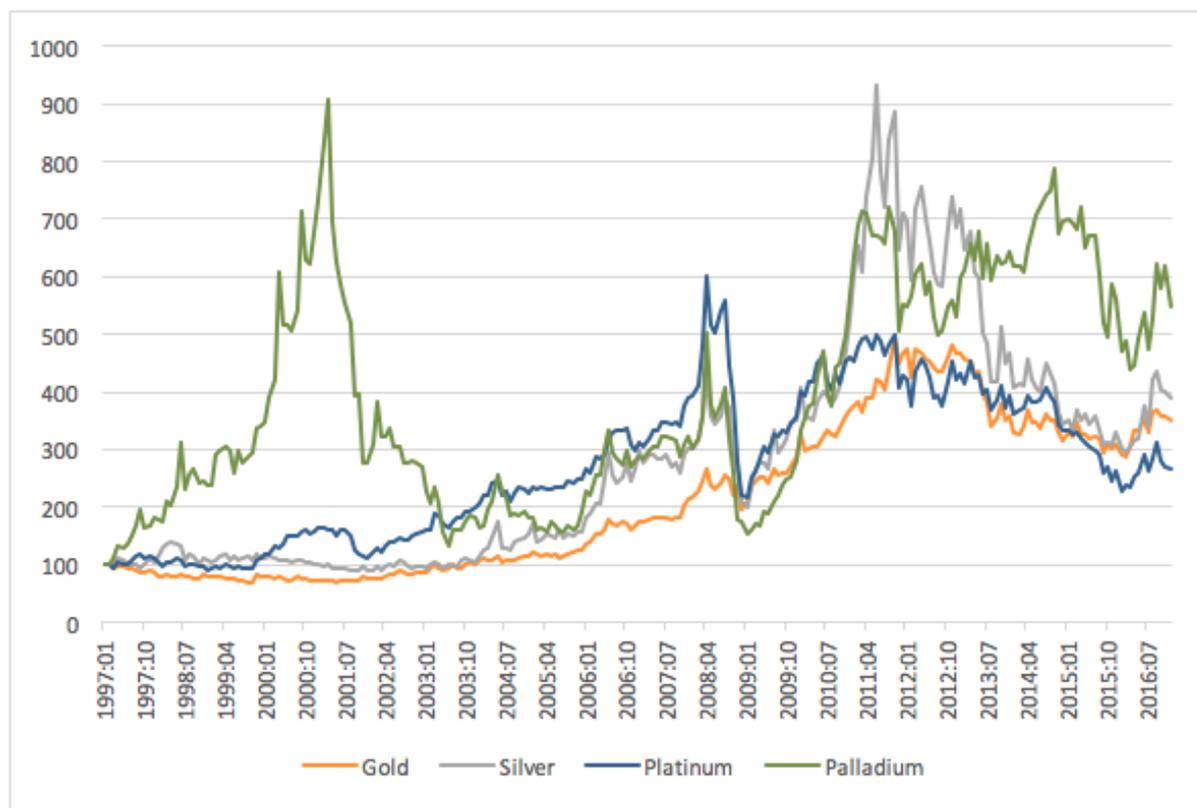
Figure 1: Monthly spot prices of gold, silver, platinum and palladium. 1997:01 price = 100.

8 variables are considered as possible price drivers. Macroeconomic variables comprise *GDP growth, inflation, industrial production and interest rate*. Financial market characteristics include *exchange rate, stock index and crude oil prices*. Returns are calculated from the stock index and crude oil prices in the same manner as it was for the metals returns. *Stock of each metal* is included to reflect the supply side of the metal market. Descriptive statistics of the metals monthly returns and all drivers are reported in the Tables 1, 2 and 3. Data for all variables are collected from Bloomberg.

Table 1. Descriptive statistics of the metals monthly returns.

	Mean	Median	Standard deviation	Minimum	Maximum
Au	0.0048	0.0016	0.0502	−0.1853	0.1966
Ag	0.0052	0.0038	0.0894	−0.3125	0.2199
Pt	0.0038	0.0059	0.0690	−0.3327	0.2316
Pd	0.0078	0.0128	0.1112	−0.3768	0.3638

While inflation and industrial production are observed monthly, the rest of the factors are observed daily. The daily time series consist of 252 working days per year, resulting in 21 days per month on average. GDP growth is typically observed quarterly. However, for purposes of this study the data were collected on a monthly basis. Time series of quarterly frequency would make the MIDAS regression model considerably less feasible. It is thus assumed that if a certain year-over-year growth rate was registered

for the quarter, the equal year-over-year growth rate holds for each month of this quarter.

Table 2. Descriptive statistics of the price drivers.

	Mean	Median	Standard deviation	Minimum	Maximum
GDP	2.35	2.40	1.87	−4.10	5.30
Inflation	2.16	2.10	1.25	−2.10	5.60
IP	1.55	2.31	4.34	−15.40	8.65
IR	2.38	1.50	2.22	0.25	6.50
ER	1.2036	1.2205	0.1696	0.8272	1.5991
S&P 500	0.0002	0.0003	0.0122	−0.0947	0.1096
Crude oil	0.0001	0	0.0239	−0.1654	0.1641

Table 3. Descriptive statistics of the price drivers – stock levels.

	Mean	Median	Standard deviation	Minimum	Maximum
Au stock	5903159	7077126	3711497	427584	11728462
Ag stock	124677	116414	30624	71919	203982
Pt stock	1840	1068	1561	106	4320
Pd stock	4101	5496	2979	39	11931

All the macroeconomic variables correspond to the US economy since it is considered world centre of the precious metals trade. From the US stock indices S&P 500 is chosen being the most traded one. Source of metal stocks data is the New York Mercantile Exchange (NYMEX) and Commodity Exchange (COMEX).

3. Results

As it was mentioned in the previous section, the analysis is initiated with separate regressions of each factor on each metal. Adjusted coefficients of determination are presented in the Table 4. Coefficients of determination of industrial production and inflation were negligible for all four metals. GDP growth was included in all regressions as control variable.

Table 4. Adjusted R^2 of partial regressions. Based on analysis performed in R on data collected from the Bloomberg Terminal.

	IR	Stock	S&P 500	ER	Crude oil
Au	–	0.0696	0.0452	0.0394	0.0633
Ag	–	–	0.0665	–	0.0422
Pt	0.0799	0.0569	0.1374	0.0412	0.1450
Pd	0.1158	0.0366	0.0980	0.0167	0.0931

Note: In partial regressions, GDP growth and respective factor were included as explanatory variables.
    "–" represents adjusted R^2 being inconsiderable.

Different nature of behaviour can be seen for the two pairs of metals. Platinum and palladium are relatively better explained by the considered factors then gold and silver, silver being the most problematic with only stock index explaining at least some varia-

bility. A fact that gold and silver are traded in larger volumes and that silver has a vast application in various industries may result in more factors being involved in market price moves. Leaving silver apart, gold is explained in a similar nature as platinum and palladium by the stock and exchange rate changes. On the other hand, platinum and palladium are significantly better explained by interest rates and the stock index.

The returns of stock index and crude oil contribute considerably to the return variability explanation with all four metals examined. The stock market activity and sentiment are thus linked with the returns on commodity markets. Aforementioned financialization of the commodity markets empirically demonstrated in Büyüksahin and Robe (2014) stand for possible explanation of this phenomenon. In other words, metals are considered an asset class to invest in, an alternative to equities and bonds for the investors. Moreover, this holds true not only for gold and silver, which are traditionally seen as an instrument to invest in real assets, but also for platinum and palladium, expected to be rather industrial resources. Crude oil seems to be important driver as it is an important resource for the metals production. Another explanation of its significant role may relate to its industrial use. When a demand for crude oil is high due to high industrial production, it can be concluded that the metals are demanded for the production as well. On the other hand, the analysis determined neither inflation nor industrial production as relevant factors to explain any metal return variability.

Next step is to estimate regressions incorporating factors that showed explanatory potential for respective metal in the regressions of the previous step. Coefficients of relevant factors for each metal are presented in Table 5.

Table 5. Estimated coefficients for overall regressions. Based on analysis performed in R on data collected from Bloomberg.

	IR	Stock	S&P 500	ER	Crude oil	Adjusted R^2
Au	–	2.0e–07' (4)	–0.84* (5)	1.09' (16)	–0.51** (19)	0.138
Ag	–	–	–2.08*** (2)	–	–0.68* (19)	0.089
Pt	–0.82* (16)	7.9e–04* (0)	–1.78*** (2)	–2.00* (18)	0.56** (9)	0.270
Pd	–0.37* (20)	–3.4e–04 (7)	1.98* (14)	3.06* (16)	1.03** (15)	0.205

Note: "–" marks that the factor was not included in the regression.

Figures in brackets represent number of lag, in which the most significant coefficient was found.

***, **, *, ' represent the level of significance of 0.001, 0.01, 0.05, and 0.10 respectively.

Interest rate is negative for the metals where its explanatory potential was determined at the level of 0.05. Coefficients for stock are not considerably significant whereas those for the S&5 500 significant at least at the level of 0.05 for gold and palladium and even at the level of 0.001 for platinum and silver. Except for platinum the coefficients are negative, meaning that metals can be understood as an alternative to stocks for the investors, a safe haven where they fly to when the conditions on the stock market are unfavourable. Coefficients of the exchange rate are again not so significant and rather heterogeneous. In contrast, estimates for crude oil are for 3 metals significant at the level of 0.01. A division between the two pairs of metals is clear here. On the one hand, the coefficients are negative for gold and silver. On the other hand, they are significantly positive for platinum and palladium. While gold and silver may be considered as an alternative

asset class to invest in to crude oil (similarly to the equities), for platinum and palladium the co-movement with oil arising from the industrial use of all the resources may prevail.

The best score achieved by the model for platinum can be due to low volatility of its returns in the examined period. This could mean that we are able to forecast some of the variability according to factors considered in this study in periods of continuous market development. In contrast, in turbulent periods these factors lose their explanatory or forecasting power. Such hypothesis could explain low number of considerable factors for silver and low levels of significance of the palladium equation estimates. Both metals are relatively more volatile with respect to gold and platinum.

4. Discussion and Conclusions

In literature, evidence of negative impact of interest rates on commodity prices is one of the most present (see Frankel (2014) or Śmiech et al. (2015)). Significant and negative coefficients for the interest rate were found for platinum and palladium in line with the present research. Easy monetary policy supplies financial markets (including metal markets) with relatively cheap funds, which drives the prices up. On contrary, this was not the case for gold and silver, which may indicate that these metals are not subject to financial conditions and are rather driven by different factors.

Furthermore, the stock index and the crude oil returns are factors for which general conclusions may be drawn too. The stock index was confirmed as one of the main common factors for all commodities in Kagraoka (2016). Büyüksahin and Robe (2014) also find evidence on existing link between stock market and commodity markets. The relevance of stock market returns is confirmed in this paper and I find that, except for palladium, the impact of the stock market is negative. Investors understand gold, silver and palladium as an alternative to the equities, which is in line with the financialization of the commodity markets proved by Büyüksahin and Robe (2014).

Impact of crude oil returns divide the metals into two groups with gold and silver on the one side and palladium on the other. Similar conclusion is drawn here as in the case of the stock index. Gold and silver may serve as an alternative investment to crude oil causing a funds spillover. However, platinum and palladium are demanded alongside crude oil in periods of high industrial production, which explains positive sign of the coefficient.

Variables of the stock and the exchange rate are found relevant for three metals (silver being the exception), although their coefficients are of miscellaneous nature and relatively low significance, which is in line with the findings of Sari et al. (2010). Industrial production and inflation rate are not found contributory to the explanation of the metals returns variation in opposition to Kagraoka (2016). A link between metals prices and how much industries produce is not so direct as producers are usually hedged against instant price changes. Moreover, metal prices do not reflect an increase caused by diminishing purchase power of money unlike other prices in the economy.

To sum up, platinum is best explained by the drivers considered with adjusted R^2 at 0.27, followed by palladium, gold and silver. For investors willing to invest in precious metals, interest rate, stock index and crude oil market should be the most relevant clues before an investment decision is made. They should also be careful about the nature of effect that these drivers have on metal prices since it varies concerning each metal.

The research may be extended with additional variables as candidates for metals price drivers. Reverse form of MIDAS model can be employed as well, to incorporate daily returns of metals instead of the monthly ones. It might be tested if employing any functional constraints improves the model. Finally, such approach may be applied to other commodity classes and the results can be compared.

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Increasing responsibility of manufacturing companies to the environment – an introduction to environmental management systems

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Abstract

The scarcity of natural resources and anthropogenic environmental impacts lead to rising costs and are thus increasingly being placed in the focus of the society and the companies. Especially in today's discussions, the environmental behavior of companies plays an increasingly important role. Through the media and internet age, information about the companies are quickly available and accessible. Therefore, companies' communication policies must be based on an environmentally compatible distribution, environmentally compatible production and environmentally compatible products.

Because of this, appropriate systems have to be implemented within the company in order to be able to influence the environmental effects. This can be done with the implementation of an environmental management system. The systematic environmental management was also introduced in Europe in 1988. This was based on the "Responsible Care Programs" of the Association of the Chemical Industry and the "Codes of Good Practices".

Keywords: manufacturing companies, environment, environmental management systems

JEL Code: E00

1. Introduction

The current environmental movement and the history of its emergence are quite comparable to the social movement, which in the form of trade unions have made the most powerful system for the distribution and creation of wealth within a hundred years of the occidental economy (Backer, 1996).

Environmental management developed already at the end of the 1970s in the chemical companies of North America due to a large number of accidents and the resulting

stricter regulations. The result was compliance audits, which were an extension of the financial audit and were intended to ensure that shareholders were informed in good time about compliance with environmental regulations (Hoffmann, 2001).

The systematic environmental management was also introduced in Europe in 1988. This was based on the "Responsible Care Programs" of the Association of the Chemical Industry and the "codes of good practices" contained therein. The publication of a position paper in 1989 by the International Chamber of Commerce (ICC) gave further impetus to the establishment of voluntary environmental management systems (Hoffmann, 2001).

The Charter is intended to provide a practical framework, including tools for companies in all sectors and geographic regions, to help them develop their own sustainability strategy. The guidelines of the ICC for sustainable management are explained below (ICC International Chamber of Commerce, 2015):

Sustainable development as a precedent in business life

- The contribution of the economy is a key factor in sustainable development
- The necessary awareness and understanding must be created among customers, employees, shareholders and other stakeholders
- Sustainability must be individually integrated into the management style, the strategies, the measures as well as the activities

Economic growth and development

- Business practices which contribute to economic growth in the context of sustainable development should be encouraged
- Cost-effective and efficient measures to support entrepreneurship and start-ups should be encouraged
- The economic activities must be designed in such a way that no negative effects on the environment arise

Responsibility for the environment and management

- The environmental influences arising in connection with the business activities should be recognized and assessed
- The implementation of an environmental management system to minimize the current and potential negative impact on the environment is imperative
- The resource efficiency of all natural resources, e.g. Energy, soil, water and raw materials are to be maximized

Responsibility towards people and society

- The importance of people, employees and external stakeholders must be recognized as a decisive factor in the success of the company
- The abilities of the employees should be encouraged and developed
- Human rights must be respected

Products and Services

- Products with a high quality should be developed and unwanted environmental influences during the production processes should minimized
- Taking into account the product lifecycle, social-, economic- and environmental benefits are to be maximized
- Customers and suppliers should jointly identify hidden opportunities. From research and development to sustainable products and services

The importance of sustainable development as well as the introduction of environmental management systems has been demonstrated. It is now to be examined how this is implemented in German companies

2. Methodology and Data

The author wants to identify the actual environmental movement in Germany, because Germany wants to play a leading role concerning the environment. Therefore the method of the literary research was used. In doing so, books were selected which specially deal with the topic of environment and waste management in Germany and Europe.

The databases of different organizations were examined and evaluated.

Useful information and data were found on the homepage of Eurostat, International Organization for Standardization, German Federal Environmental Agency and the Federal Office of Statistics.

3. Results

The environmental movement has created a set of rules, which is spread in all countries of the European Union. The introduction of Directive EG 82/501 / EWG has led, for example in France, that 600.000 companies are subjected to an assessment, 60.000 of them are subjected to an official control and 4.000 new companies are subjected to authorization (Backer, 1996).

The turnover of products and services from the fields of environmental protection and environmental remediation amounted to over 15 billion euros already in 1988, for France alone (Backer, 1996). The figures below illustrate the development of the sales for environmental protection goods and services:
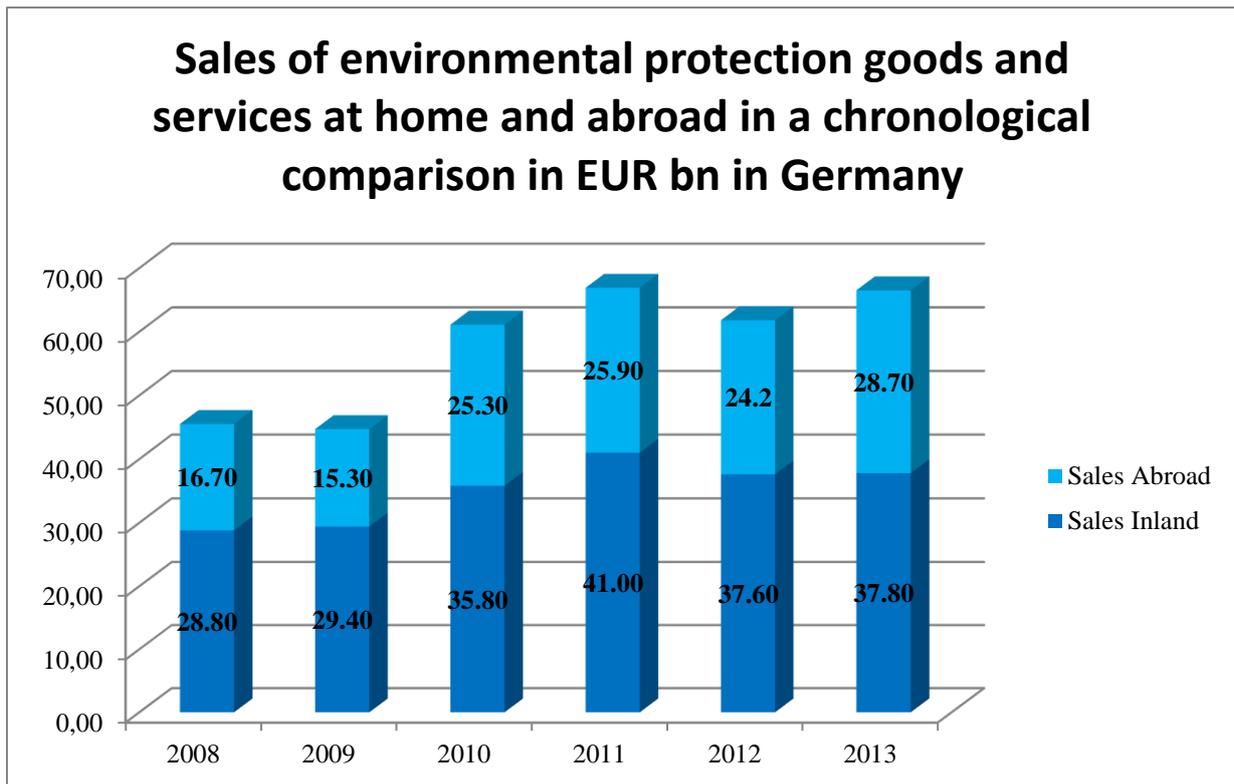
Figure 1: Sales of environmental protection goods and services at home and abroad in a chronological comparison in EUR bn in Germany
Source: Statistisches Bundesamt (2015)

The figure shows, that the sales of environmental goods and services stagnate since several years. Considering the high environment objectives, it is surprising that the sales remained almost constant.
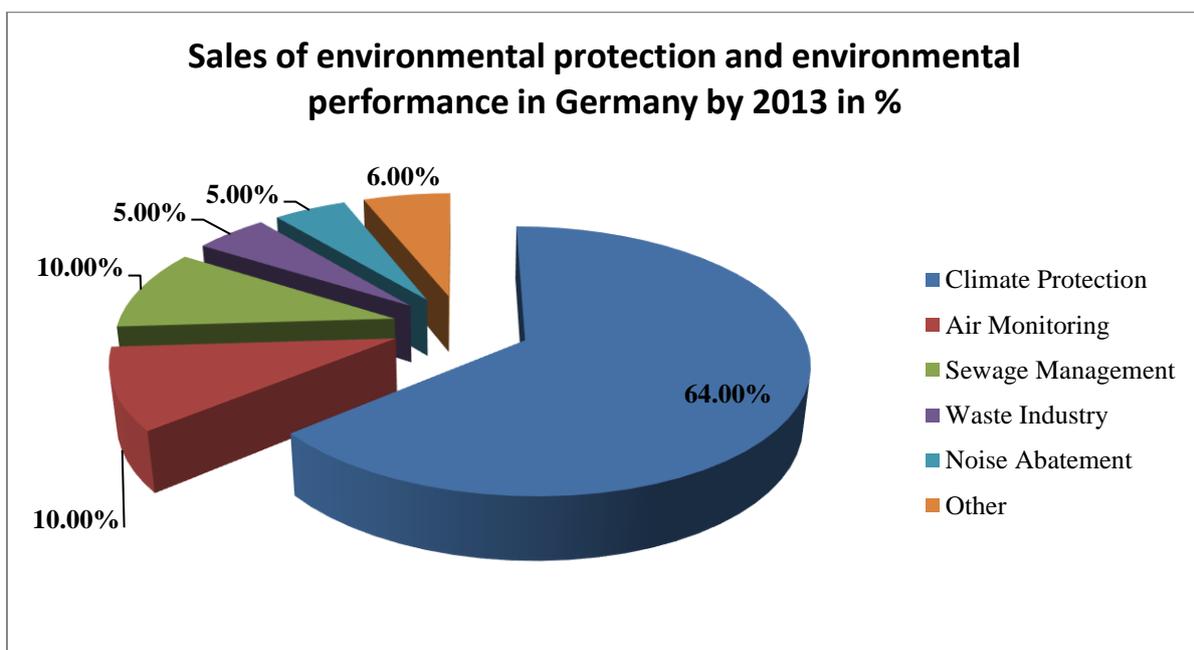
Figure 2: Sales of environmental protection and environmental performance in Germany by 2013 in %
Source: Statistisches Bundesamt (2015)

These figures illustrate the urgency and the need for environmental management instruments in companies. Companies are responsible for dealing with the environment as well as government agencies, organizations and stakeholders.
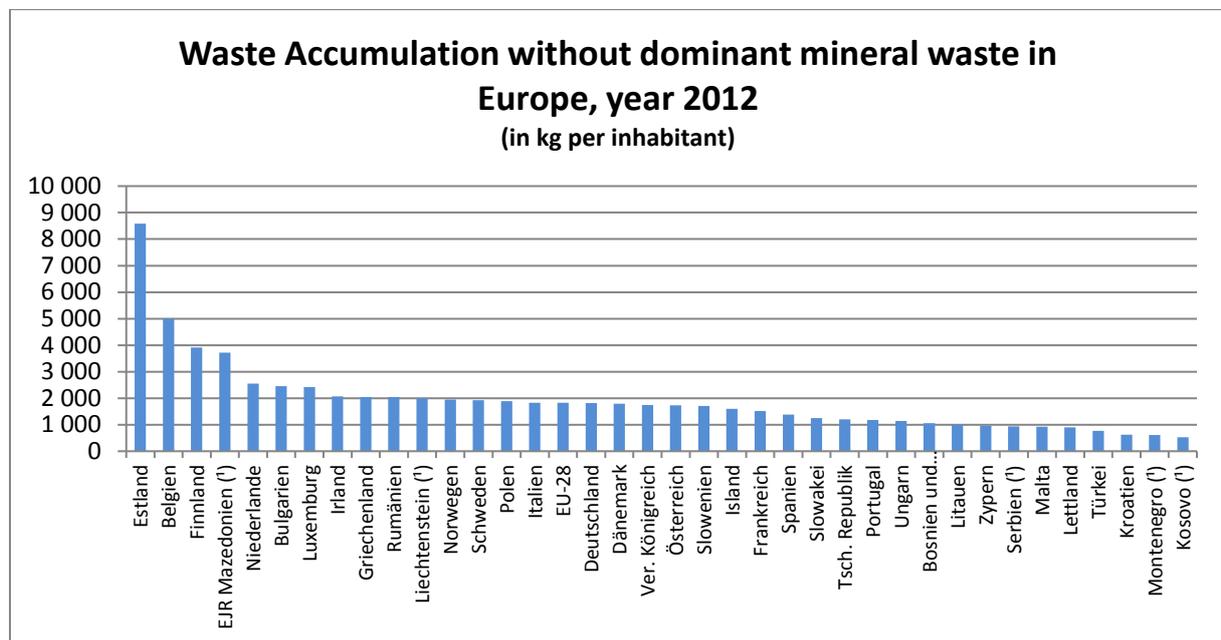
Figure 3: Waste Accumulation without dominant mineral waste in Europe, year 2012
Source: European Union (2017)

The figure illustrates that Germany doesn't have a leading position in the waste accumulation and therefore in the reduction of waste. To further analyze the current state of the environment in Germany, the total number of ISO 14001 certifications in Europe was used.
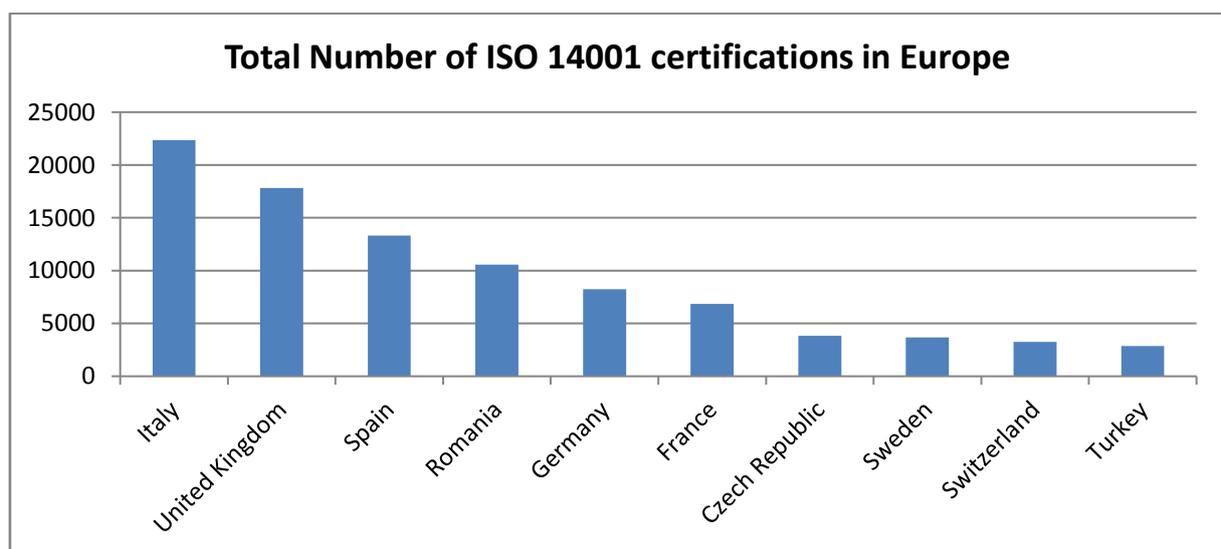
Figure 4: Total Number of ISO 14001 certifications in Europe
Source: International Organization for Standardization (2017)

The illustration shows that Germany is only the 5th place in Europe, comparing the total number of ISO 14001 certification. It can be noted that Germany don't has a leadership role in Europe in the field of environment.

4. Discussion and Conclusion

The figures illustrated that the sales of environmental goods in Germany stagnate. Germany also has no leading position in the waste accumulation and the reduction of waste. In the total number of ISO 14001 certifications, Germany is only on the 5th place. In terms of environmental protection, Germany always wanted to take a leading role in Europe. The data indicate that this is not the case.

Because of this, appropriate, systems must be implemented within the company in order to be able to influence the environmental effects in a targeted way. This can be done with the implementation of an environmental management system. The German state must demand and support the introduction of environmental management systems.

The implementation of an environmental management system should also be more strongly focussed from the company's point of view, since it leads to advantages for the company. These advantages are shown below:

- The company can highlight the implementation of an environmental management system in its communication policy and thus create a positive brand value (Hennecke, 1999). A positive image leads to the strengthening of the brand, which allows for faster sales increases by the company (Haas, 2010). Hardly any company can do without such a positive image in relation to environmentally relevant issues (Hennecke, 1999).
- The analyzes conducted within the framework of the environmental management system can identify potentials for resource and energy saving that lead to a reduction in costs within the company. This aspect shows that an environmental management system can lead to cost savings in the short term. In the context of the "ceteris paribus" view, these cost savings also lead to an increase in corporate returns (Hennecke, 1999).
- The implementation of an environmental management system creates organizational and technological standards, which are a quality feature and thus lead to competitive advantages when investing abroad (Hennecke, 1999).
- The cost-cutting potential and the competitive advantages of environmental management reduce the pressure on wage and personnel costs and can thus secure the existence of companies as well as jobs and employment (Becke et al., 2000).
- The strategic use of environmental management can increase the company's ability to innovate and develop new business segments (Becke et al., 2000).
- Environmental management leads to effective discharge in the areas of waste, water, energy and emissions. A study by the University of Paderborn University shows that 65% of small and medium-sized enterprises surveyed significantly reduced or avoided their production waste through a systematic environmental management system. On average, 42 tons of waste per company could be avoided and the waste can be reduced by 37 tons by waste separation (Becke et al., 2000).

- With the help of an environmental management, the companies can record the environmental norms they apply. This avoids inconsistencies, liability and environmental risks, and increases the legal certainty for companies (Becke et al., 2000).

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Influence of the industrial structure of economy on the risk component of regions' tax system: case of Russia

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Abstract

The aim of this research is to determine the influence of industrial structure of regional economy on its tax system risk level. Our study embraces the data of 83 Russian regions in 2006–2014. For assessment of the tax system risk level we employed the portfolio approach by H. Markowitz, suggesting that regional "portfolio" consists of main economic activities. It allowed us to decompose the Russian regions' tax systems risks, to evaluate the contribution of various activities to it and to determine the critical zones of instability. We evaluated the level of diversification of regional economies using a range of indices. Finally, we established positive correlation between the regions tax systems risk and return as well as positive impact of economy diversification on stability of the tax systems of Russian regions. But both dependencies demonstrate some heterogeneity due to regional peculiarities. Our results may be applicable in management of tax system risks at the regional level.

Keywords: region, industries, tax system, risk, portfolio, decomposition, diversification

JEL Code: G32, H20, R12

1. Introduction

The researchers studying tax systems usually examine influence of economic growth (Fricke, Süssmuth, 2014; Cornia, Nelson, 2010), economic cyclicality (Kodrzycki, 2014) or different factors (Karagöz, 2013) on tax revenue and its volatility. Among these factors much less attention is paid to industrial structure of economy.

Nevertheless, the industries composing some economy demonstrate different profitability and volatility and respond to external shocks in different manner. Their tax yield rates may directly or inversely covariate, thereby reinforcing or offsetting total tax system risk. It means that both industrial structure of economy and the level of its diversity significantly affect tax system performance.

The authors, who study diversification and specialization of economy, generally examine their advantages and disadvantages from the standpoint of economic growth and stability. Thus (Pirasteh, Sayadi, Saghafi, 2009) points out that more diversified economies may better mitigate the risks arising in various industries. Such economies easier adapt their trends of development, may benefit from integration of technologies and less dependent on imported goods. Some study confirm positive influence of diversification on economic growth (Pede, 2013), others reject it, but prove its contribution to growth rate stability (Essletzbichler, 2002) or reduction in employment volatility (Brown, 2012). At the same time other authors stress, that more specialized economies can benefit from the so called comparative advantages and positive returns to scale. Under favorable market conditions such economies usually grow faster. Finally, (Hong, Xiao, 2016) argue that the greatest benefits economy may derive from combination of two strategies.

The researches of Russian regions also found some evidence in favor of their economies diversification. Thus (Ankudinov, Belyaeva, Lebedev, 2012) revealed its positive influence on decline in the level of unemployment and its volatility. At the same time (Mikheeva, 2013) established that more diversified regional economies in Russia on average demonstrate more stable economic growth, whereas specialized regions show the higher rates of growth. On the contrary, research on the regions of Siberian Federal District conducted by (Kravchenko, 2016) witnesses in favor of specialization. According to it, the regions with more share of population employed in manufacturing activity and more specialized export on average demonstrate lower level of unemployment.

However, we have not found any complex research examining directly the effects of industrial structure on fiscal risks. It encouraged us to make up for this issue. The importance of this study is substantiated with influence of tax revenues on public goods and services provision in regions and on well-being of population. Obviously, the volatility of tax revenues are resulted both from instability of industrial revenues and changes in their tax rates in periods of ups and down.

In this study we employ the "portfolio approach" by H. Markowitz to assess the tax system risk. The suitability of this technique to tax system was earlier argued by researchers (Seegert, 2015; Malkina, Balakin, 2015; Malkina, Balakin, 2016). The novelty of our recent paper consists in composing tax portfolio directly from main economic activities, which are considered as aggregated taxpayers demonstrating similar reactions to the shocks.

Now we can formulate our *research hypothesis*. In this study we suppose that both industrial structure and level of diversification of economy influence on tax system return and risk, but their contributions are different in Russian regions.

2. Methodology and Data

Our study is based on the official information on 83 Russian regions in 2006–2014, provided by (Russian Federation State Statistics Service, 2017) and (Federal Tax Service of Russia, 2017). The data embraces GRP and tax revenues disaggregated by 14 main economic activities, according to the All-Russian Classifier of Types of Economic Activity.

The methodic of our research includes following calculations.

1. *Calculation of tax yield rates of main economic activities in all estimated regions in each year* as the ratio of tax revenues of correspondent activity to total GRP of the region in relative year:

$$t_{ijk} = T_{ijk} / Y_{ij},\qquad(1)$$

where T_{ijk} – the total tax revenue from "*k*" activity of the "*i*" region in the "*j*" year;

Y_i – the gross domestic product of the "*i*" region in the "*j*" year, and $i = \overrightarrow{1, m}$, $j = \overrightarrow{1, n}$,

$k = \overrightarrow{1, K}$.

2. *Assessment of tax system risk level generated in each economic activity* in all regions. According to the H. Markowitz portfolio approach, the total risk is formed from two sources: weighted inter-temporal variance of tax yield rate in each activity and the sum of its inter-temporal covariances with tax yield rates in all other activities. Generally total tax system risk is calculated by means of the formula:

$$\sigma_i = \sqrt{\sum_{l=1}^{L}\sum_{k=1}^{K} Cov(t_{ik}; t_{il}) s_{ik} s_{il}},\qquad(2)$$

where $t_{ik} = \sum_{j=1}^{n} t_{ijk} / n$ – inter-temporal arithmetic mean of tax yield rate of "*k*" activity in "*i*" region. The same is true for each "*l*" activity. Taking into account that we incorporated the relative scale of economic activities into formula 1, we have to omit in formula 2 the shares of industries in GRP, s_{ik} and s_{il}, thereby assuming them equal to 1.

Note, that each covariance in our case may be written as follows:

$$Cov(t_{ik}; t_{il}) = \sum_{j=1}^{n} (t_{ijk} - t_{ik}) \cdot (t_{ijl} - t_{il}).\qquad(3)$$

Alternatively, the tax system risk may be calculated based on the A. Shorrocks technique initially proposed for inequality decomposition by sources (Shorrocks, 1982):

$$\sigma_i = \sqrt{\sum_{k=1}^{K} Cov(t_{ik}; t_i)},\qquad(4)$$

where $t_i = \sum_{k=1}^{K} t_{ik}$ – total tax yield rate generated by all activities in the region. The σ_i^2 represented in additive form now allows to decompose total risk in each region by economic activities.

3. *Assessment of the level of economy diversification* may be made with use of a range of methods. (Wagner, 2000) grouped them into equiproportional, type of industries, portfolio, and input-output and evaluated their strengths and weaknesses. Hereinafter we chose some of them, similar by construction:

– Mean deviation of regional structure from country structure:

$$MD_i = \sum_{k=1}^{K} |s_{ik} - s_k|,\qquad(5)$$

where s_{ik} – the share of "*k*" activity in total GRP of "*i*" region, s_k – the share of "*k*" activity in total GRP of the country;

– Standard deviation of regional structure from country structure, which is referred as base or standard:

$$SD_i = \sqrt{\frac{1}{K}\sum_{k=1}^{K}(s_{ik} - s_k)^2} \; . \tag{6}$$

– National averages index (NAI):

$$\mathrm{NAI}_i = \sum_{i=1}^{k}\frac{(s_{ik} - s_k)^2}{s_k^2} \; . \tag{7}$$

– F. Hachman index:

$$\mathrm{HI}_i = 1/\left(\sum_{k=1}^{K}\frac{s_{ik}}{s_k}\cdot s_{ik}\right) \; . \tag{8}$$

The latter measure has advantage in rationing of diversity to scale (0;1). Simultaneously it has shortcoming: in case of small share referred, especially close to zero, and big share compared it significantly overestimates the difference.

4. For determination of dependency between the tax systems risk, return and the level of diversification of regional economies we employ the correlation and regression analysis.

3. Results

The results of evaluation of Russian regions tax system risk level assessed with formulas 1–4 are represented on the figure 1 in the form of geographic map.

According to the results obtained, the largest tax system risk level is observed in Zabaykalsky Krai (No. 75 in the map[1]), which is the border territory located in the south-eastern part of the Siberian Federal District neighboring with China. In this region the tax yield rate may deviate from its mean value reaching 15% by 9.7% in both directions. Our detailed analysis shows disproportionately high risk of mining and quarrying activity in this region, which share in total tax risk assessment exceeds its share in GRP for 13.2%. Besides, increased tax system risk in this region was provided by other relatively risky activities: Transport and telecommunication and Electricity, gas and water.

Aside from Zabaykalsky Krai, the most risky tax systems are observed, on the one hand, in several predominantly mining regions, extracting gas and oil (e.g. Nenets Autonomous District (83), Khanty-Mansi Autonomous District (86), Tyumen Oblast (72) and Komi Republic (11) and, on the other hand, in some backward agrarian territories: Republic of Kalmykia (08) and Altai Republic (04). In the last two the largest part of tax risk originates in trade industry (159.7% and 63.49% of total risk value), while agriculture actually plays a smoothing role.

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[1] Hereinafter, all the regions are accompanied by their administrative codes corresponding to the Figure 1.
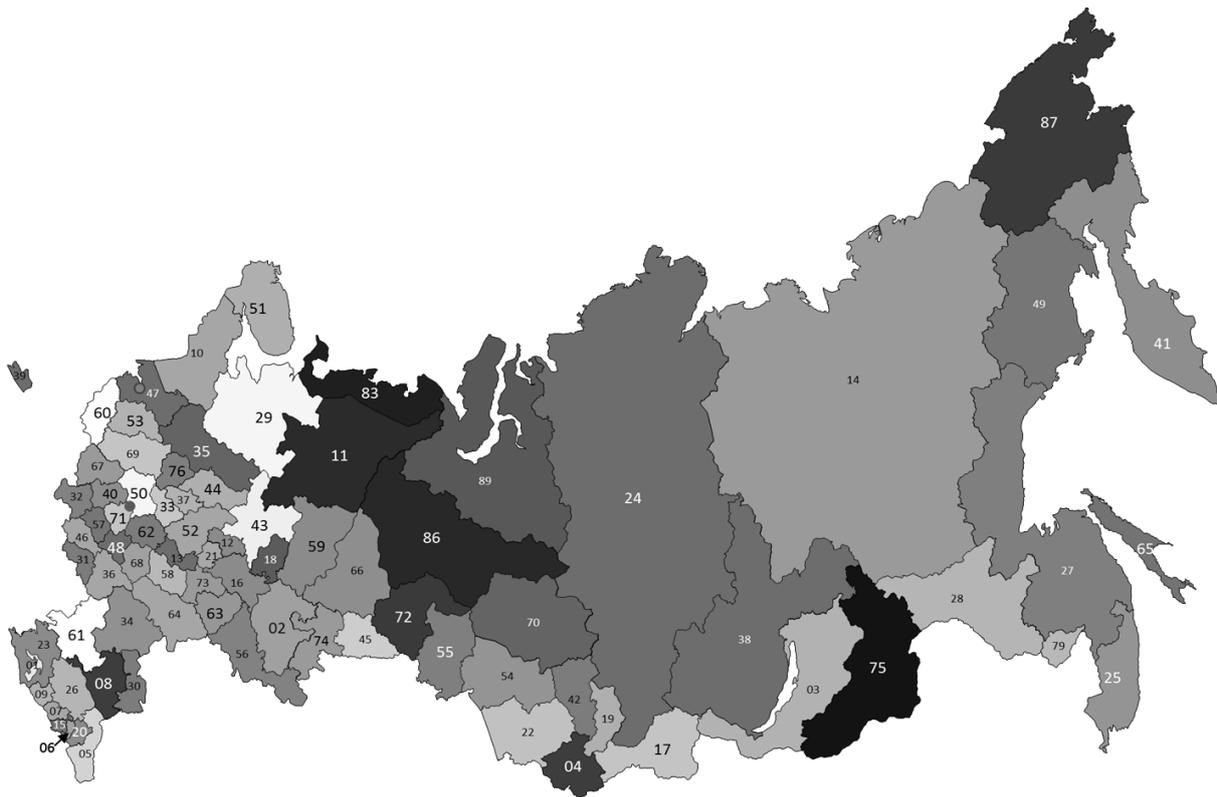
Figure 1: The risk level of tax systems of Russian regions (logarithmic scale)
Note: The subjects of Russian Federation are designated by administrative codes explained in the text

The lowest risk appeared in the tax system of Rostov Oblast (61), the subject of Southern Federal District. In this region high share of agricultural production in GRP (11.58%) is combined with average share of manufacturing and trade industry (amounting 18.84% and 19.81% compared to 18.12% and 19.83% on average in Russia). Rostov Oblast is followed by Pskov (60), Moscow (50), Arkhangelsk (29) and Kirov (43) Oblasts. All of them have enough diversified economies, as indicated by various measures (formulas 5–8). The risk/return ratio in these regions tax systems is the lowest among all regions, it is less than 0.05. Other 27 regions (from 83 total number) as well demonstrate low risk/return ratio of tax systems limited to 0.10. Some of them have highly diversified economies (the case of Samara Oblast (63) and Republic of Bashkortostan (02), both in the Volga Federal District). Others are distinguished with increased share of manufacturing in GRP. Except two aforementioned regions, we can find among the moderately risky the most industrialized Russian territories: Tula (71), Kaluga (40), Vladimir (33), Yaroslavl (76), Ryazan (62) and Kostroma (44) Oblasts, located in the Central Federal District; Perm Krai (59), Nizhni Novgorod Oblast (52) and Chuvash Republic (21), the subjects of the Volga Federal District; and Novgorod oblast (53), belonging to the Northwestern Federal District.

However, other highly industrial regions with even larger share of manufacture in GRP controversially demonstrate higher risk of tax systems. They are: Lipetsk Oblast (48), where the share of manufacturing activity in GRP reaches 43.48%, but the risk/return ratio of tax system is high enough, i.e. 3.04%/10.19%; Vologda oblast (35), 40.31% – share in GRP and 3.35%/14.85% – risk/return ratio; Krasnoyarsk Krai (24), 36.97% and 3.01%/19.63%; Chelyabinsk oblast (74), 36.31% and 1.71%/14.89%; Omsk oblast (55), 37.6% and 2.38%/21.29%. What is remarkable for these regions? Firstly, in all of them, except Vologda oblast, ferrous and nonferrous metallurgy prevails. Evidently, by risks metallurgy is closer to mining production, because of its high dependence on

the global metals market conditions. Secondly, two regions named first show high level of their economies specialization. Thirdly, in all considered regions the return of tax system is under average. In our opinion, it may be explained by insufficient level of taxation of metallurgical industry in Russia, which unlikely the mining industry is not the subject to special taxation.

The table 1 represents the results of decomposition of total tax return and risk by economic activities. The inherent risk here is assessed by tax yield rate variance, and total risk is calculated by addition of all covariances to it. The unweighted approach to calculation of regional averages only catches inter-regional differences while weighted approach takes into account the scale of regional economies and describes the nation-wide position.

Both approaches allow to establish relatively higher tax risk in Mining & Quarrying and Manufacturing industries compared to their tax return. Based on regional average estimations, these activities together create 62.3% of inherent risk and 67.39% of total risk, providing only 26.6% of the tax system total return. Nation-wide, the contribution of mining industry to tax system risk and return is even higher, while the contribution of manufacturing industry to tax system risk is lower compared to the first approach.

Table 1: Industrial structure of total return and risk of Russian regions' tax systems (%)

	Unweighted approach			GRP-weighted approach		
	return	inherent risk	total risk	return	inherent risk	total risk
Agriculture, hunting and forestry	8.19	1.16	2.03	4.61	0.54	0.67
Fishing, fish farming	0.57	0.97	1.23	0.24	0.27	0.40
Mining and quarrying	8.87	26.77	27.38	10.63	44.46	51.30
Manufacturing	17.73	35.53	40.01	18.10	27.07	28.65
Electricity, gas and water	4.63	5.39	6.00	3.91	2.47	1.59
Construction	8.01	3.57	4.16	6.83	1.82	1.95
Wholesale and retail trade; repair	14.40	11.16	9.22	19.78	10.51	7.61
Accommodation and food service activities	1.03	0.10	−0.41	1.05	0.31	−1.78
Transport and telecommunications	10.55	9.20	9.73	10.15	7.21	7.18
Real estate, leasing and services	7.47	3.35	1.99	11.05	4.14	3.52
Public administration and defense	8.09	1.91	−1.67	5.12	0.66	−1.06
Education	4.25	0.44	−0.41	3.09	0.22	−0.46
Health and social services	4.91	0.22	−0.39	3.86	0.12	−0.39
Public utilities	1.31	0.23	1.13	1.56	0.19	0.82
Total	100.00	100.00	100.00	100.00	100.00	100.00

An increased level of tax risk/return ratio is also observed in the Russian fishing industry, where 72.2% of total production is provided by four regions: Primorsky Krai (25), 22.0%; Murmansk Oblast (51), 20.4%; Kamchatka Krai (41), 17.3%; Sakhalin Oblast (65), 12.5%. However, only in Kamchatka Krai fishing industry demonstrates excessive volatility, contributing 65.75% to inherent risk and 61.1% to total risk of the regional tax system compared to 17.3% of its contribution to total tax revenues.

At the same time both unweighted and weighted approaches witness for smoothing role of Public Administration & Defense and the entire social sphere (Education, Health & Social Services, Public Utilities) in total tax yield rate volatility. Their contribution to tax system risk is considerably small and sometimes negative because of prevailing inverse covariances of their tax yield rates with rates in other industries. Thereby, four mentioned industries altogether ensure 19.89% positive difference between tax system return and tax system risk, when evaluated as regional average, and 14.73% difference –

based on the national average. However, this is an average pattern which in certain regions may differ.

Thus, the share of Public Administration in GRP is usually higher in underdeveloped territories appreciably subsidized from the federal budget. In Republic of Ingushetia (06) its share amounts to 25.72%, in Chechen Republic (20) – 23.21%, in Republic of Tyva (17) – 21.93%. Respectively, tax systems risks stemming from this industry is relatively higher here. To a greater extent it depends on instability of the level of inter-budgetary transfers supporting their activity. Thus, in Republic of Ingushetia we observe the highest contribution of public administration activity to tax system risk – 26.61% (the inherent part of which is 22.64%).

Based on one of the main laws of economic theory establishing positive dependency between profitability and risk we attempted to assess their inter-regional correlations in tax sphere for main economic activities. The results are presented in the table 2. Only fishing and mining industry show strong direct dependency. For manufacturing, construction, transport and telecommunications it is medium by strength and for the first two enhancing when moving from inherent to total risk. For many other activities it is weakening because of negative interdependencies with tax returns from other activities. For agriculture this dependency, also medium by strength, changes sign to the opposite when passing to total risk for the same reason.

Table 2: Correlation between tax risk and return in main economic activities (the Pearson coefficient)

Economic activity	Return/Inherent risk	Return/Total risk
Agriculture, hunting and forestry	0.447	−0.365
Fishing, fish farming	0.889	0.894
Mining and quarrying	0.766	0.680
Manufacturing	0.474	0.581
Electricity, gas and water	0.311	0.084
Construction	0.255	0.400
Wholesale and retail trade; repair	−0.095	0.100
Accommodation and food service activities	0.145	0.069
Transport and telecommunications	0.441	0.397
Real estate, leasing and services	0.088	0.277
Public administration and defense	0.401	−0.070
Education	0.358	0.079
Health and social services	0.291	0.127
Public utilities	0.210	0.142

The figure 2 displays dependency between total tax system risk and return in Russian regions. Apparently, it is positive by direction, although weak and unstable. The splashes in the upper left portion of the graph are presented by higher risky regions: Zabaykalsky Krai (75), Nenets Autonomous District (83) and Komi Republic (11).

The figure 3 demonstrates the positive but average by strength dependency between the level of economy specialization assessed by standard deviation (formula 6) and the tax system risk level. The inter-regional correlations of other indices of specialization and diversification of economy with tax system risk level are noticeably lower. For mean deviation (evaluated by formula 5) the Pearson coefficient equals 0.484, for the National Averages Index (formula 7) it is only 0.231, and for the Hachman index, measuring diversification (formula 8), it is −0.344.
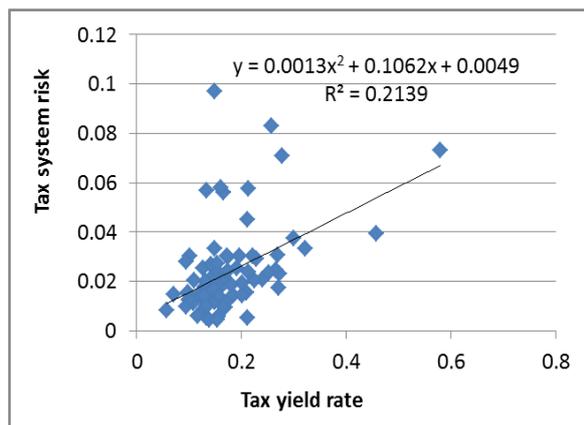
Figure 2: Correlation field of tax system return and tax system risk for Russian regions
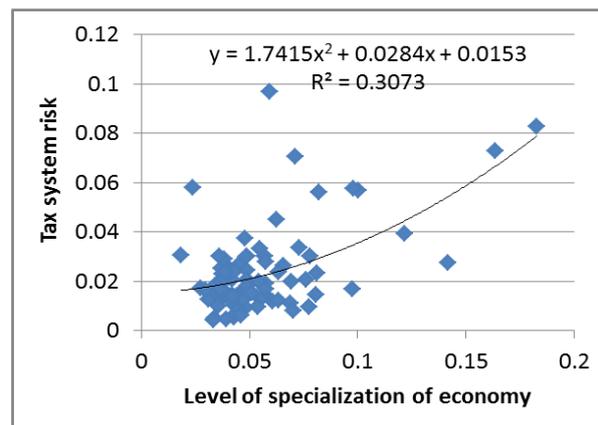
Figure 3: Correlation field of tax system specialization and tax system risk for Russian regions

4. Discussion

The results obtained here in general are consistent with our previous research, revealed positive dependency between economy diversification and unstructured tax system risk (Malkina, 2017). Moreover, the conclusions about positive relation of diversification to stability and its negative relation to return of tax system evidently support results earlier obtained by (Ankudinov, Belyaeva, Lebedev, 2012) and (Mikheeva, 2013) for main indicators of regional economies including growth and employment. But our results apparently contradict to (Kravchenko, 2016), who examined other indicators and measured diversification by means of Herfindahl-Hirschman index, thereby using uniform distribution among industries as a benchmark.

Meanwhile, we perceive some limitations to the analysis conducted.

First of all, we considered aggregated groups of industries. And even at this level we revealed that influence of different branches within manufacturing activity on tax yield rate and its volatility is quite different. In future we intend to deepen the specification of structure of our industrial portfolio in order to achieve more precise results.

Secondly, we assessed tax yield rate as the ratio of tax revenues from each industry to total regional GRP, whereas it may seem more substantiated to relate them to the gross value added in correspondent industry. However, such approach for Russian regional data could cause some substantial distortions, because the legal addresses of enterprises, where they really pay taxes, do not always coincide with their spatial locations. This is precisely the case of mining industry.

Thirdly, measuring the level of economy diversification by the indices of two structures similarity, we refer to the aggregated structure of Russian economy as a benchmark, which in itself requires rationale as a model of perfect diversity.

Finally, in future it is desirable to analyze data on all taxpayers or their clusters belonging to the same branch and grouped by similar reactions to economic shocks.

5. Conclusions

In this paper we studied the interrelation between industrial structure of economy and tax system risk based on panel data of Russian regions in 2006–2014. We employed

portfolio approach by H. Markowitz for assessment of regional tax systems risk and composed Russian regions tax portfolio directly from economic activities. It allowed us to evaluate total tax system risks of 83 Russian regions, divide risk into internal (inherent) and external in each economic activity and explain inter-regional differences in tax system risk level by industrial structure of the regional economies.

We found that industries' contributions to risk may vastly deviate from their contributions to tax system profitability. Thus, mining industry is relatively more risky on average, while Public Administration and social sphere are relatively less risky. The risk of manufacturing industry depends on its certain branches located in the region.

Constructed interrelationships between tax systems characteristics and regional industrial structure allowed us to make some statements. On the one hand, the evidence of negative correlation between tax system risk and the level of economy diversity favors the diversification as a possible strategy of avoiding excessive fiscal fluctuations. On the other hand, positive correlation between tax system risk and return may argue for specialization. Besides, tax system risk management on regional level should take into account industries' tax yield rates covariances indicating the direction of effective combination of industries.

Acknowledgements

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Present situation and forecasts for Polish hard coal market and Poland's energy Policy

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Abstract

Many of the established principles of energy sector is now a subject to change. Significant exporters become importers, countries that has long been recognized as major exporters become recipients and simultaneously leading centers of global demand growth. The proper connection of strategy and technology shows that the relationship between economic growth, energy demand and emissions of carbon dioxide (CO_2) from the energy sector can be relaxed. The growing importance of oil and gas from unconventional sources and renewable energy sources (RES) changes the current understanding of the balance of energy resources in the world. Awareness of the dynamics of energy markets is crucial for policymakers trying to reconcile economic, energy and environmental issues. Those who correctly predict the development of the global energy sector can get an advantage while those who did not manage to run the risk of taking the wrong strategic decisions and investment (according to the World Energy Outlook (WEO-2014). Additionally, large differences in regional energy prices caused the debate about the role of energy in stimulating or inhibiting of economic growth.

Keywords: sale of coal, forecasting, profitability threshold, the model of Winters

JEL Code: O2

1. Introduction

Much attention is paid to the energy security of the country, which in Poland is based mainly on coal. Poland has one of the largest resources of coal in Europe. However, producers of this raw material are struggling with many problems including overproduction, falling coal prices, rising imports. It seems important to use prognostic methods to estimate the future of the Polish mining sector.

According to the authors, these are the fundamental causes of changes in the energy sector. The manifestations of this are the new investments not only in the area of tax havens but also where cheap labor, abundant in quantity and quality raw material resources are located. Occurring changes that we are witnessing and which we analyze, force us to gather information about what to expect in the future. This article includes methods and techniques of environmental signals transformation (political, economic, social) into information about the mining companies future.

The objectives included in Polish Energy Policy to 2030 are focused primarily on securing energy supply, energy effectiveness and legislation processes shaping sector's operations. An important priority of energy policy is improvement of energy effectiveness. For this purpose, EU and state resources have been used, which were supplied under the project of supporting multiple thermal modernization and renovation ventures as well as high performance cogeneration energy production. In 2012 to reduce the impact of energy sector on the environment, implementation of EU regulations about industrial emission and development of derogation of permits to emit CO_2 took place. Moreover, Poland opposed the actions that led to reduction of assigned amount of emissions permitted under EU ETS (EU Emission Trading System). At first, European Commission presumed that the primary method of permit distribution will be an auction system. This requirement will be introduced gradually, however, thanks to negotiations 90% of permits will be granted free of charge, through multiple routes and based on different criteria, depending on the industry sector.

Hard coal will remain cheaper alternative to natural gas or crude oil in terms of energy production in many regions, however, in longer perspective, strategies that improve effectivity, locally reduce air pollution or mitigate results of climate change will be the key to prevent its future. Considering the fact that China consumes as much coal as the rest of the world especially important will be strategies introduced in Beijing. They present plans of coal share reduction in total energy consumption. Between 2016 and 2020, The Middle Kingdom wants to support development of water power plants and plants powered by gas and oil. On the other hand, development of coal and chemical sectors as well as steel and iron production will be significantly reduced (Reuters, consus.eu). Market conditions will be notably different in certain world regions, but taking care of its versatility and smaller impact on the environment, in comparison to other fossil fuels, will guarantee that hard coal, according to the authors, will take privileged position in the long run. Current structure of resource consumption, by continents, is presented in fig. 1, which shows that leading countries are located in West Pacific region.

Currently, The Ministry of Economic Affairs prepares update of "Poland Energy Policy to 2050". The new document will take into consideration the most important elements in regard to energy sector such as: use of gas from unconventional sources, climate issues, construction of common energy market in European Union or use of European funds from new financial perspective for 2014-2020. Forecasting and defining of hard coal role plays significant part in this case (Ministry of Economic Affairs 2009) (Majchrzak, 2012).
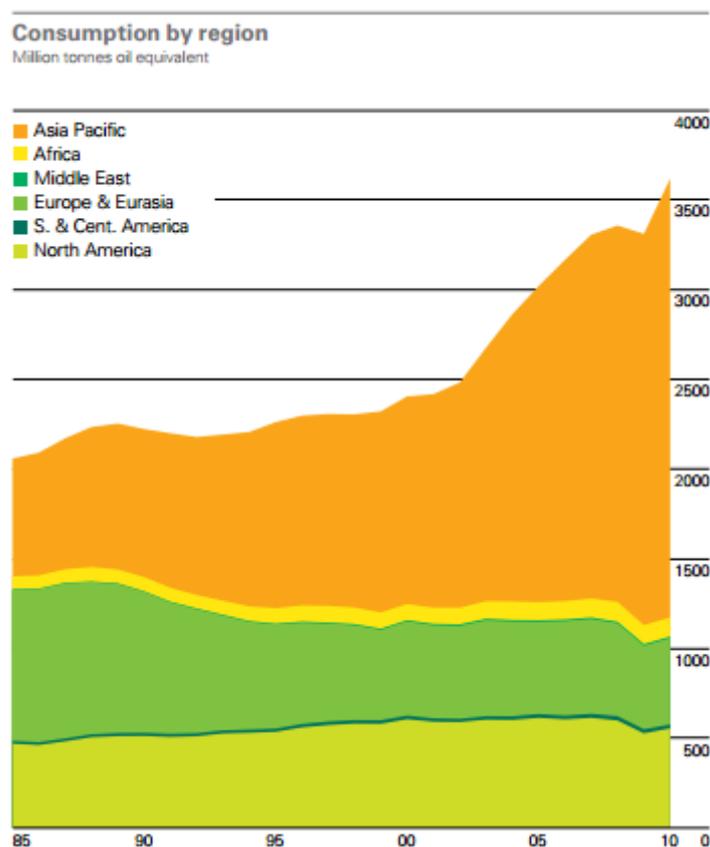
Figure 1: Consumption of coal by continents
Source: Weglowodory, 2016

The ability and the necessity to use prediction methods for mining purpose has already been signalized by several authors, both in journals and monographies (Kamiński 2014, Ramosz 2013, Kamiński Saługa 2013, Okulski 2013, Lorenz 2014, Grudziński 2014, Suwała 2011, EC 2010, Suzuki and others 2016, Bullard and other 2013). Thus, for example, N.W. Melnikó006w in "Przegląd Górniczy" article 79, states: "To properly manage mining production it is necessary to possess information not only from the past and present, but also to predict future in current conditions, forecasting is one of the main scientific components of management" (Czaplicki, 1979).

2. Material and Data

The determination of theoretical hard coal sales model started with the statistical analysis of the monthly hard coal sales amount between 1995 and 2015. Empirical study begun with verification of hypothesis H_0 assuming that the series of observations is not dependent on time. The authors also conducted a comparison to alternative hypothesis, which is the negation of null hypothesis. Stationarity test that uses Spearman's rank correlation coefficient, value of empirical statistic has been designated. It was compared with critical value (Manowska A., 2010) (Czaplicki J. 2014):

$$r_S = 1 - \frac{6\sum_{t=1}^{n}[t-d(e_t)]^2}{n(n^2-1)} = 1 - \frac{6 \times 3713689}{228(228^2-1)} = -0.8801 \tag{1}$$

$$r_S = \frac{u_{1-\alpha}}{\sqrt{n-1}} = r_S(\alpha = 0.05; n = 228) = \frac{u_{1-\alpha}}{\sqrt{n-1}} = \frac{1.645}{\sqrt{227}} = 0.1092 \tag{2}$$

where:
$d(e_t)$ – rank of e_t value, i.e. its position in ordered, non-decreasing time series ($1 \le d(e_t) \le n$),
n – number of observations (length of time series),

Absolute empirical value exceeds critical value, thus it should be assumed that the amount of hard coal sales on the national market is a nonstationary process. As a result, further analysis was performed using random fields. To show variation of the coal sales process, variation coefficient can be used, which has been calculated for each year. The results have been shown in figure 2.
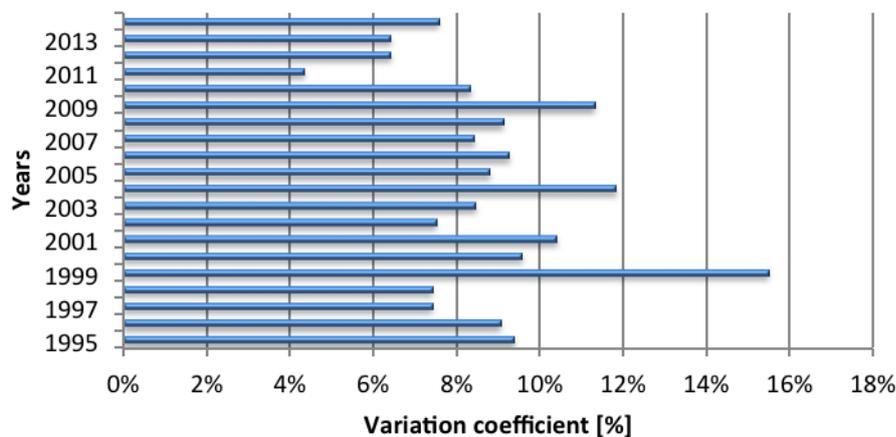
Figure 2: Coefficient of variation
Source: own

3. Concept of theoretical model of hard coal sales

Sales of energetic hard coal is tightly connected to its use in energy sector, where demand is dictated by seasonal needs. Globally, almost 65% of coal is used to produce electric power. Thus, sales of this resource is characterized by clear seasonal nature (Manowska A., 2010). Effective forecasting of the amount of hard coal sales, requires taking seasonal fluctuations into consideration. The model, which was proposed for predicting sales value of hard coal is based on designation of seasonality indicators for specific cycle stages. The analysis of seasonal fluctuations consists of four stages:
- Separation of linear trend,
- Elimination of trend from analyzed time series,
- Elimination of random variation,
- Calculation of seasonal indicators.

The model used in case of time series with trend, seasonal and random variation is called Winter's model. For building of the model authors used data from 1995-2010. The rest of obtained data was used for model's verification.

Forecast is calculated based on equation (Zielaś, 2013):

$$y_T^P = \hat{y}_n + hc_n + d_{n-l+l(h)} \tag{3}$$

Structural parameters have been evaluated using least squares method. H_0 hypothesis assumed that there is no linear trend while alternative hypothesis H_1 assumed that such trend occurs. The amount of hard coal sales can be described using linear equation, which goes as follows:

$$y = -23.76\,x + 10\,802 \tag{4}$$

It should be checked, if the found reference is statistically significant. To verify the hypothesis, telling that variable is correctly described by the theoretical model, Pearson's parametric test of rank coefficient has been used. Critical value was taken from Student's t-distribution tables for n-2 degrees of freedom (n=191), statistical significance α=0,05 and it equal to:

$$t_\alpha = 1{,}9704 \tag{5}$$

If:

$$|t| \le t_\alpha \tag{6}$$

there would be no basis to reject H_0 hypothesis, which would mean that significant linear trend cannot be statistically proven. If:

$$|t| \ge t_\alpha \tag{7}$$

Then hypothesis H_0 can be rejected in favor of alternative hypothesis H_1, which would mean that significant linear trend can be statistically proven in the considered time series.

Hypothesis check is performed using empirical statistics t described by the equation:

$$t = \frac{r \cdot \sqrt{n-2}}{\sqrt{1-r^2}} \tag{8}$$

Statistics for studying significance of model's parameters were designated from the obtained calculations:

$$t(a) = \frac{|-23{,}76|}{0{,}94} = 25{,}36 - significant\ parameter \tag{9}$$

$$t(b) = \frac{|10801{,}78|}{123{,}71} = 87{,}32 - significant\ parameter \tag{10}$$

Significance evaluation of determination coefficient of R^2 has also been performed. Using Fischer-Snedecor test, where critical value $F\alpha$ has been read for: $m_1=1$ and $m_2=192-1-1=1906$. This value equals $F\alpha=0{,}8233$ for significance level α=0,05. Comparison between empirical statistic F=643,29 with critical value $F\alpha$, leads to rejection of null hypothesis, which assumed lack of stochastic correlation of variables. This means that utilization of linear model is correct.

After elimination of time series trend, seasonality has been designated using additive indicators.

Initial values required for building the Winter's model have been determined as follows:

- $\hat{y}_{13}$ – first year average, i.e. 1995,
- c_{13} – difference between average in first and second year,

- $d_i\,(i = 1, 2, ..., 192)$ – determined based on whole time series, these are average differences of variable, predicted and smoothed value of the entire described linear trend.

The choice of smoothing parameters has been made using simplex optimization method. Minimal value of ex post root-mean square error for expired forecast.

The Winter's model of the coal sales amount uses following equation:

$$\hat{y}_{t-1} = 0{,}1(y_{t-1} - d_{t-1-l}) + (1 - 0{,}1)(\hat{y}_{t-2} + c_{t-2}) \tag{11}$$
$$c_{t-1} = 0{,}06(\hat{y}_{t-1} - \hat{y}_{t-2}) + (1 - 0{,}06)c_{t-2} \tag{12}$$
$$d_t = 1(y_{t-1} - \hat{y}_{t-1}) \tag{13}$$

Root-mean square error for expired forecasts amounts to 682 Mg. Answers given by the Winter's model has been shown in fig. 3.
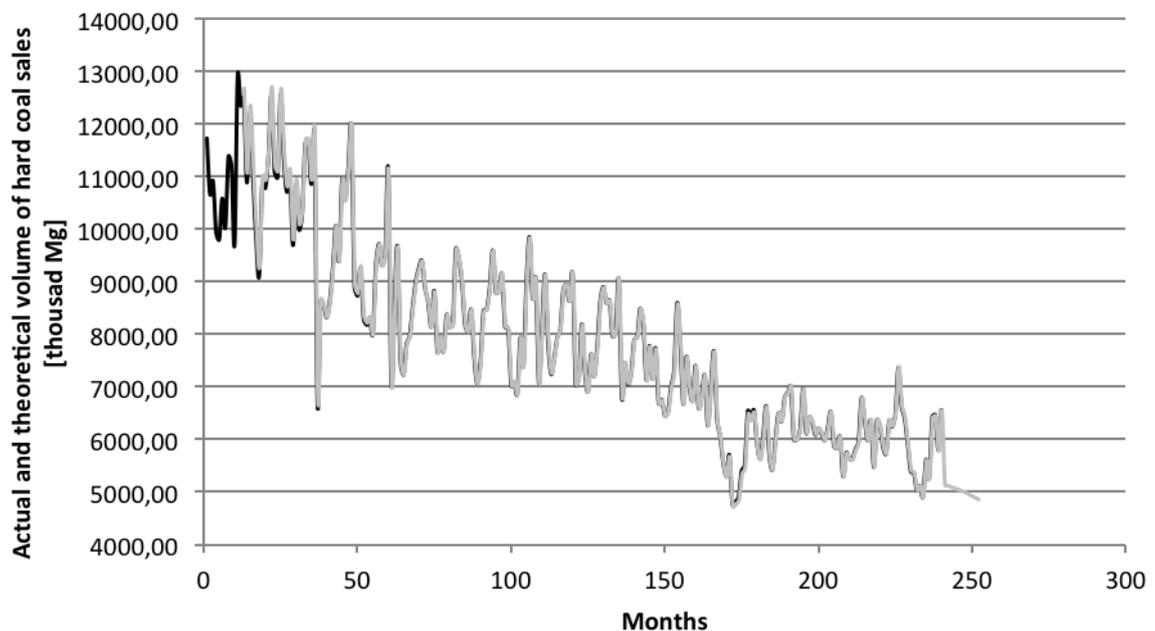
Figure 3: Actual and predicted coal sales volume
Source: own

Continuing the statistical analysis of the model built, research of random element $\xi(t)$. Characteristics of this element should be identified by using analysis of time series remainders. These remainders have been designated according to equation:

$$u(t) = y(t) - y_T^P \tag{14}$$

Remainder analysis that allows to determine correctness of the Winter's model, should proceed with accordance to algorithm shown in figure 4.

| Etap 1 | •Verification of hypothesis, which says that the observed remainder series is stationary and which can be verified using Spearman's rank correlation coefficient. |

| Etap 2 | •In case when there is no basis for rejection of the hypothesis that assumes stationarity of the remainders, calculation of the average value of the remainders should be performed. |

| Etap 3 | •If average value of the remainders will prove to be other than 0, the next step should be verification of the hypothesis, which assumes that the calculated average value is different from 0 in insignificant way; Student-t statistic can be used here. |

| Etap 4 | •the next stage should be verification of assumption that the dispersion of remainders is constant in time; It can be made by studying variance in first and second half of the sample and by veryfiying hypothesis, which assumes that value of both variances is the same using F-Snedecor statistic. |

| Etap 5 | •In case of positive results of the whole F-Snedecor test, standard deviation of remainders should be calculated for the entire sample. |

Figure 4: Block diagram of remainder analysis
Source: Czaplicki, 2014

Because empirical value is below the critical value is can be assumed that distribution $\xi : N(0;46)$ properly determines remainders distribution function.

4. Results

The Winter's model shows that hard coal sales volume on national market will reach the level of 60 mln Mg (59–61 mln Mg considering prediction error). Individual theoretical results of sales have been illustrated in figure 5.
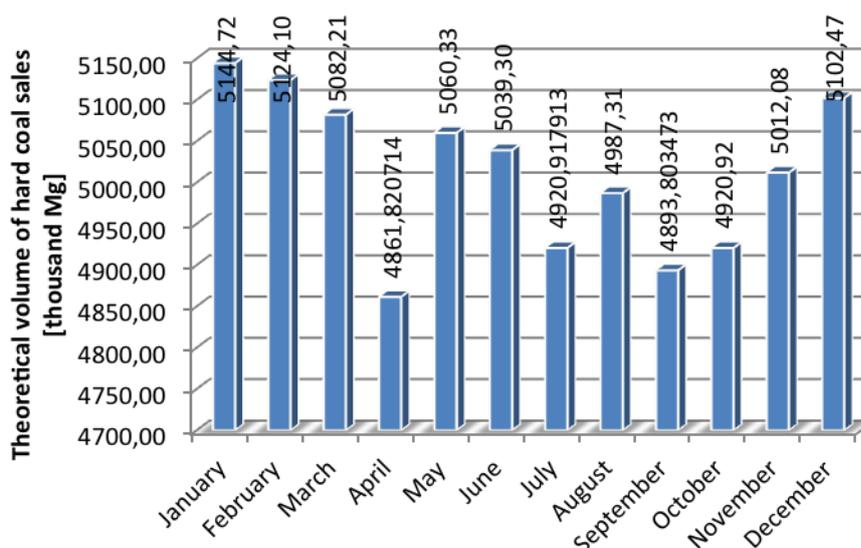
Figure 5: Theoretical coal sales volume for 2016
Source: own

In construction process of the Winter's model we put emphasis mainly on utilizing all, available technologies of energy production based on coal, considering that every one of these solutions can be adjusted to reduce CO_2 emission. During creation of the model, following conditions were assumed:

1. Coal reserves – Poland has multiple deposits of hard coal, which will provide energy security in future.
2. State policy, which relies on long term development programs for coal energy that will meet the needs of all energy receivers.
3. Condition of the environment – EU made significant changes in its energy policies, and final conclusions were published 8th of march 2006 in The Green Book. Member States, along with the need to provide energy security for EU countries and minimizing energy prices (when simultaneously ensuring conditions, so that the sector can finance itself) must also minimize consequences caused by energy technologies that are harmful to the environment. Because it is impossible for global industry to prosper with energy coming only from renewable sources, it is necessary to make an effort to find methods of greenhouse gases reduction. These can be methods such as so called clean coal technologies, as well as storage of CO_2 created during combustion of fossil fuels.
4. New technologies – rapid advancement of new energy technologies and their implementation, including development of material and information technologies.
5. National market – the main receiver of Polish coal is utility and industrial power plants. Considering global situation on oil and natural gas markets, the price of electric energy coming from coal (in comparison to other energy carriers) will still remain among the lowest. Similar situation relates to price of heating generated from coal.
6. Export – extension of ports in Gdynia, Gdańsk and Szczecin will allow for increase of export to EU countries. Attractiveness of Polish market in regards to coal import will decrease and properly restructured Polish mining industry will have a chance to gradually regain national market in the regions, where imported coal is currently cheaper than Polish.

7. Discussion and Conclusions

The model can be used for long and short term forecasting. In short term predictions obtained theoretical values can be used for mining services, especially for reopening of mining coal face, extraction intensity, renovation works or human resources management such as vacation planning, trainings, delegations. Model also allows to determine financial condition of the company. Having a reliable model of prediction allows an easy way to determine extraction output to address the current market demand. This removes the problem of coal staying on dumping grounds (short term planning). At every stage of company activity planning the model requires corrections to keep reliability, which is tightly connected to forecast horizon. There is a correlation: the wider the forecast horizon is, the lower will be the effectiveness of the constructed model. However, it has to be mentioned that in case of long term forecasting, making predictions is still justified by providing proper information for people planning future conditions of processes, especially in regards to used strategies. Answer to the questions can be provided:

1. Will continuing current strategies bring expected gains?
2. Can the changes be made in planned strategies?

At every stage of strategy implementation, corrections of long term forecast can be made. These amendments take changes into account and thus improve the reliability of the model. Addition to the forecasted values are the errors of the forecast, which size is reliant on person ordering a forecast, as well as building of variants for future company management conditions in form of scenarios (optimistic, pessimistic and the most probable scenarios).

Acknowledgements

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Key attributes of a regional product: Consumer perception

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Abstract

Despite the undeniable importance of the issues of regional products, further definition of a regional product has not yet been satisfactorily resolved in the literature. This research is therefore focused on extension of definition. The aim of the paper is to identify various attributes of regional products from the consumer perspective. The article presents the results of research conducted via questionnaire survey, whose respondents are residents as well as visitors of various micro regions in the Czech Republic. Research was conducted in seven micro-regions in the Czech Republic (Český ráj, Českosaské Švýcarsko, Hana, Jeseníky, Krušnohoří, Orlické hory and Poohří) and was attended by more than 700 respondents. The semantic differential was used to determine the characteristics of the regional product. Examined attributes were divided into three thematic units – basic characteristics of a regional product, manufacturing of regional product and characteristics associated with social responsibility. The main outcome of this article is determination of specific characteristics which are the most intensely associated with regional products by consumers.

Keywords: Region, regional product, marketing management, regional branding, consumer

JEL Code: M31

1. Introduction

In the Czech environment, the topic of a regional product is reflected in various scientific disciplines. Studies on this topic appear in geography and regional development (Semian, Chromý and Kučera, 2016; Kašková and Chromý, 2014), rural development (Lošťák and Kučerová, 2007), or in rural tourism (Spilková and Fialová, 2013). Despite the undeniable importance of regional product for the development of individual areas, further identification of these products is lacking.

A regional product can be understood as a product associated with a certain relatively bounded territory and with the place of origin (Kašková and Chromý, 2014), and which also represents the specifics of this territory (Kirchgeorg in Kaufmann and Durst, 2008). The uniqueness of a region is part of product quality. Data about the origin and quality of products are communicated in a simplified form using brands or trademarks.

The main objective of this designation is to promote rural regions and support the development of a socially, culturally and environmentally oriented economy in areas that are interesting due to their natural and cultural heritage (Čadilová, 2011). The regional designation concept should thus contribute to the economic recovery of regions with respect to all three pillars of sustainable development. Designation should help manufacturers, farmers and other entrepreneurs with the promotion and sale of local products, and to increase the prestige of products through the reputation of the region. Regional brands also contribute to the development of tourism. The offer of tourist regions for visitors is differentiated through the brands. With regard to local residents, a brand can strengthen solidarity with the region and encourage public participation in developments in the region and mediate contacts between producers and other local participants (Kažmiersky, 2013).

2. Methodology and Data

The aim of this paper is to define the individual attributes of regional products from the point of view of consumers.

The data used in this paper was collected within a research project focused on regional designation of products in the Czech Republic. Respondents were contacted via an electronic questionnaire created using the Google Forms application. Snowball sampling method was used. Substantive questions were designed as a polarity profile. Respondents were given contradictory attributes standing against each other on a 5-point scale, with the median value, i.e. 3, reflecting the fact that the relevant attribute is not important for defining a regional product. A total of 22 pairs were used that were divided into three thematic units. The first thematic unit was focused on the basic characteristics of a regional product and consisted of a total of 10 pairs. Another block consisting of 5 pairs of opposing variations focused on the production of a regional product. The last block of 7 pairs was focused on the relationship of a regional product to the environment, including parameters of social responsibility. For some of the pairs, the sides of the concepts were exchanged in order to avoid stereotypical responses.

The spontaneous evaluation of individual items by respondents was quantified, and the resulting average of individual pairs was graphically interconnected via a vertical connecting line. On the basis of the ascertained values, intervals were determined for evaluation of importance: not important (2.5; 3.5); less important ⟨3.5; 4.0), or (2.0; 2.5); important ⟨4.0; 4.5), or (1.5; 2.0); very important ⟨4.5; 5.0⟩, or ⟨1.0; 1.5⟩.

A total of 743 respondents took part in the questionnaire survey. Data was collected in selected regions: Českosaské Švýcarsko (8.2%), Český ráj (3.1%), Haná (12.4%), Jeseníky (35.7%), Krušné hory (14.9%), Orlické hory (13.7%) and Poohří (12%). Women were predominant in the sample (71.2%), and about one third of the sample was men (28.8%). The age structure of respondents is as follows: up the age of 24 (12.4%), ages 25–39 (42.5%), ages 40–54 (33%) and age 50 and higher (12.1%). In terms of education structure, university students and high school students with graduation have a balanced representation in the sample (41.1%). The rest of the sample was high school students with graduation (41.1%), without graduation (11%), and respondents with higher vocational and basic education have a minority representation of 3.8% or 3.1%. Finally, the status of specific respondents toward specific regions was ascertained – local residents (45.1%), visitors (49.1%) and unknown (5.8%).

3. Results

The results are presented for the entire sample in individual thematic units. All 22 items are then represented in one graph for easier comparison of importance of attributes across the monitored thematic units.

3.1. Attributes of a regional product – overall result

3.1.1. Basic characteristics of a regional product

In terms of basic characteristics of a regional product, only the characteristic relating to the price of the product (inexpensive / expensive) was labelled as an inimportant attribute.

The following characteristics proved to be of little importance: service / product, unknown / renowned, without a label / certified.

The following characteristics were important: common / unique, high-quality / low-quality, modern / traditional, widely available / in selected establishments.

The highest values, i.e. very important, were achieved by the following characteristics: global / local, does not represent point of origin / represents point of origin.

Table 1: Basic characteristics of a regional product

Attribute	Average	Attribute
service	3.8	product
common	4.0	unique
high-quality	4.3	low-quality
unknown	3.6	renowned
modern	4.1	traditional
inexpensive	3.3	expensive
global	4.5	local
without a label	3.9	certified
widely available	3.9	in selected establishments
not represent point of origin	4.5	represents point of origin

Source: Author (2017)

3.1.2. Manufacture of regional product

It ensues from the analysis of secondary data of the Association of Regional Brands that most of the certified products have tangible character. For this reason an independent section concerning manufacture was created. On the basis of the set intervals (see chapter Materials and methods) the respondents did not indicate any of the attributes as entirely inimportant. Craft / agricultural product and serial product / each product as an original were classified in the class of characteristics with low importance. Other attributes, i.e. industrial production / manual production, mass production / small-scale production and corporation product / family company product, were indicated as important.

Table 2: Manufacture of regional product

Attribute	Average	Attribute
industrial production	4.0	manual production
craft	3.5	agricultural product
mass production	4.2	small-scale production
serial product	3.7	each product as an original
corporation product	4.0	family company product

Source: Author (2017)

3.1.3. Relation between regional products and their environment

The third thematic issue is built on the concept of Corporate Social Responsibility – CSR according to Elkington (1994), i.e. orientation on the social (SOC), environmental (ENV) and economic (EC) area. It tests whether the respondents align a product with socially responsible behaviour of the producers.

Compared to the preceding thematic issues, the greatest number of inimportant characteristics appear here – common operations / sheltered workshops (SOC), energy and water-demanding production / production not demanding energy and water (ENV). On the other hand, characteristics with the highest importance value also appear in this area – made of imported materials / made of local materials (EC / ENV). The following characteristics – from non-renewable resources / from renewable resources (ENV) – were identified as not a very important factor. The following characteristics – unrelated to tradition / tradition champion (SOC), without any economic benefit for the region / with an economic benefit for the region (EC), and without any impact on employment / creates jobs in the region (SOC) – were indicated as important by the respondents.

Table 3: Relation between regional products and their environment

Attribute	Average	Attribute
made of imported materials	4.7	made of local materials
common operations	3.3	sheltered workshops
unrelated to tradition	4.3	tradition champion
production demanding energy and water	3.3	production not demanding energy and water
non-renewable resources	3.6	from renewable resources
without any economic benefit for the region	4.2	with an economic benefit for the region
without any impact on employment in the region	3.8	creates jobs in the region

Source: Author (2017)

The following Graph 1 clearly shows the results across all sections described above.
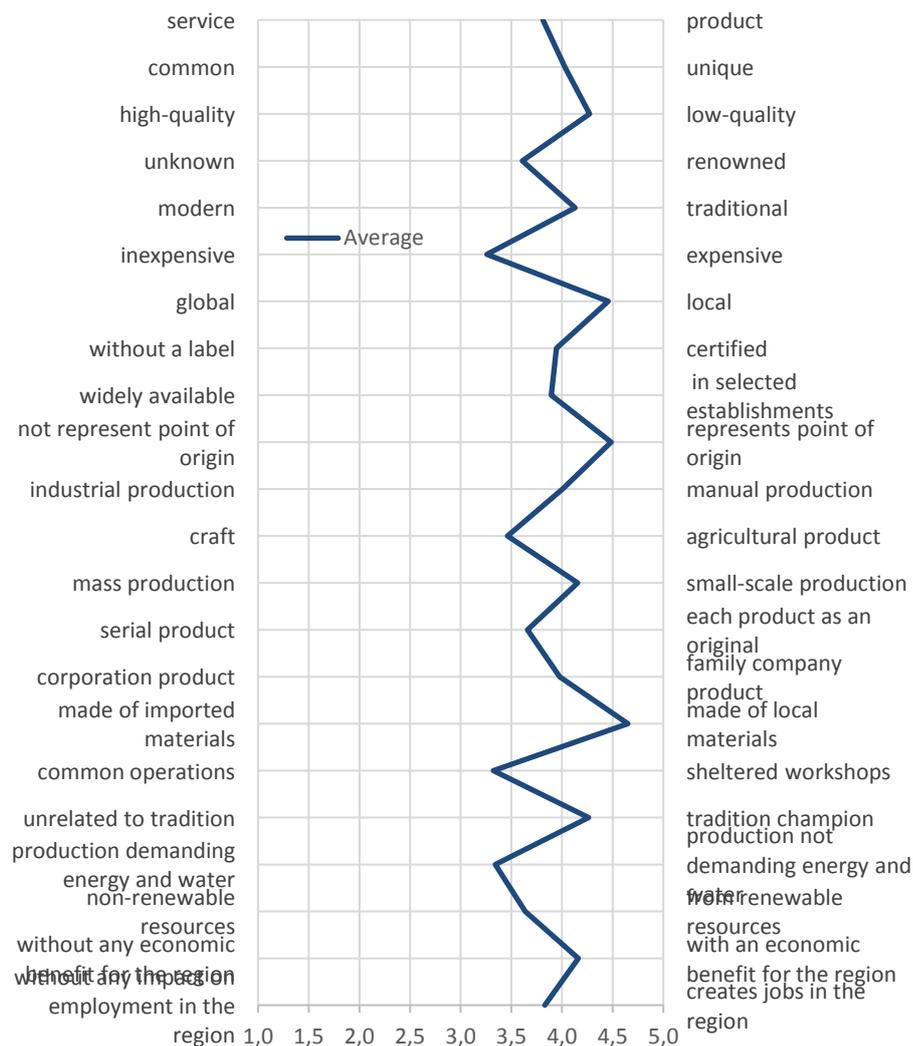
Graph 1: Attributes of a regional product – overall result
Source: Author (2017)

4. Discussion and Conclusions

According to the expectations, the term "regional product" should be connected with the idea of the "place". It is represented for example by the following attributes: made of local materials, representing the place of origin or local, that were evaluated as the most important. This result corresponds to the current trend of the consumers' increased interest concerning the product origin (mainly as regards the purchase of food), which is proven for example by the study specialized in the regional food marks present in the Vysočina Region (Chalupová, Prokop, Rojík, 2012).

When comparing the investigation results with the concept of regional products, as it is understood by the Association of Regional Brands, we can come to the conclusion that from the certification criteria determined by the Association the respondents clearly prefer uniqueness in relation to the region. As concerns the attributes, it is represented for example by: made of local materials, representing the place of origin, tradition champion or manual production. To similar extent the criteria of the place of origin and product

quality appeared in the understanding of regional products. The place of origin is represented by the following characteristics: local product, an economic benefit for the region and creates jobs in the region. Quality is represented by the expectation of a good-quality product and certification.

Unlike the certification criteria (Association of Regional Brands, 2016) and works of most of the quoted authors (e.g. Čadilová, 2011; Tregear, 2003), according to the results of this investigation the customer does not accent the environmental area. None of the attributes related with the environmental impact was indicated as rather or very important. The respondents indicated the attribute related to the energy intensity of manufacture as inimportant and the attribute taking into account renewable resources used for the regional product manufacturing was indicated as not very important.

As ensues from the historical context of regional marking (Tregear, 2003; Kažmierski, 2013; Association of Regional Brands, 2016), most of the certified products belong to the category of agricultural products, food or craft products. According to the investigation results the consumers do not assign must importance to this characteristic, even though they slightly prefer the tangible product option.

The aim of this paper was to define the important attributes of regional products from the point of view of consumers. When considering the important and very important attributes, regional product may be defined by means of the following characteristics: unique, good-quality, traditional, representing the place of origin, small-scale production, family company product, made of local materials, tradition champion, with an economic benefit for the region.

The determined key characteristics may be further used to set the communication strategy of the individual regional producers or the provider/coordinator of regional marking.

Acknowledgements

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Ownership concentration as a determinant of the convertible debt financing

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Abstract

The analysis of financial decisions of convertible bonds issuers was done in this article. We investigated the relationship between the degree of ownership concentration and the structure of the offered bonds. The aim of this study was to verify the hypothesis about the impact of ownership concentration on the borrowing policy of companies. The study was conducted on a group of non-financial US companies which have issued convertible bonds from 2002 to 2014. Using the main descriptive statistics, measures of correlation and linear regression analysis we demonstrated that there was a weak correlation between the degree of ownership concentration and selected features of the issued convertible bonds. Issuers with more concentrated shareholding offered bonds with shorter maturities and lower conversion time. They offered lower conversion premium as well. Therefore it can be seen that the increase in the ownership concentration is conducive to financing with bonds with lower probability of conversion. This means that shareholders tend to maintain long-term ownership structure and the current impact on the company. The obtained results do not confirm therefore the previous observations on the effect of ownership concentration on the capital structure choices. They are, however, consistent with the main concepts explaining the premises of convertible bond issue.

Keywords: ownership concentration, convertible debt, financing, shareholders

JEL Code: G32, G34, M21

1. Introduction

Studies on the premises of corporate financial decisions have been carried out for several decades. Their effect is several important findings, among them an important place is occupied by research about managerial determinants of capital structure. Within this trend we analyze the influence of the degree of ownership concentration of the company in the context of financial decision-making – especially the degree of debt taken. The objective of this article is to widen knowledge in this area. However, in contrast to the numerous

hitherto achievements devoted to the leverage ownership determinants, this article refers to the specialized form of financing – hybrid capital. The conversion into shares option, built in the convertible bond, the most common type of hybrid debt, may determine changes in debt level. Moreover, the issuer through the appropriate determination of the conversion conditions may largely determine the probability, and hence to shape of the target capital structure. The thesis of the paper is based on the belief that conversion conditions set by the company determine its willingness to use a debt. So if there is an effect of ownership concentration on the level of debt, it should also be reflected in the issued hybrid debt.

This article analyzes the existing achievements devoted to the impact of ownership concentration of the company on the level of its leverage. Then, the analysis was extended by the results of rare studies on the use of convertible bonds in the context of issuers' ownership concentration. In the empirical part of the paper there is a research conducted, focused on relationships between the degree of ownership concentration and used features of the issued convertible bonds. Then, we analyzed the obtained results in the context of issuers' ability to incur debt. The results make a contribution to the research devoted to determinants of companies' financial decisions, in particular they enrich our knowledge about hybrid financing.

2. Literature review

The impact of company ownership structure on its functioning was analysed many times, but the research results are not always conclusive. Most of the researchers make references to the agency theory, according to which, managers support all expenses related to company's investment projects, but they are not able to maintain the entire profit obtained from these projects. Therefore, they seek to get hold of part of this capital in private benefits such as higher wages or additional earnings. Shareholders can oversee managers' behaviour through a variety of monitoring and control mechanisms but it leads to the agency costs. For this reason, financial policy of the company should be considered from the internal control mechanism point of view (Jensen, 1976). It can reduce the agency conflict between owners and managers, which will be especially important in the case of concentrated ownership structures. The solution preventing from unwanted managers' behaviour is to increase the debt, because it will reduce the amount of money available to managers. Companies with more concentrated ownership can better control the management and therefore they have lower agency costs (Ang, Cole, Lin, 2000). This means they will also incur less debt. Similar opinions are discussed in (Jensen, Meckling, 1976). Such behaviour may also be caused by the unwillingness to be monitored by lenders and, in the extreme case, even to the loss of control over the company. Therefore such companies usually prefer more expensive equity as a guarantee for maintaining full control over the company. Research confirming negative correlation between the degree of ownership concentration and debt level were also presented by (Friend, Lang, 1988; Firth, 1995; Kocenda and Svejnar, 2003; Nivorozhkin, 2005, Sun et al. 2016).

On the other hand, other studies show positive correlation of debt and ownership concentration (Cepedes, Gonzales and Molina, 2010; Huang and Song, 2006). It is related with the lack of protection of minority shareholders. More concentrated companies will be more willingly use debt, because financing through issuing new shares will reduce their influence on the company. In the case of less concentrated ownership this condition

is not so important, because shares issuance will not significantly change the impact on the company if shareholding is sufficiently dispersed.

Type of ownership – private or public – is another important factor influencing the examined relationship. State-controlled company may more willingly incur debt. This is particularly evident in the countries where the involvement of the state in the economy is significant. Research on the Chinese market indicates that companies controlled by the state are more indebted than the private ones (Liu, Tianb, Wang, 2011). This situation is determined mainly by specific and privileged position of state-controlled companies. Their decisions are often politically motivated. Such enterprises are more likely to get government guarantees so they also have better access to debt financing. This is a very important factor determining positive relationship with the degree of ownership concentration (Li et al. 2009). Often, even a minority state-owner favours debt acquisition (Firth et al. 2009).

When examining decisions taken by the company with respect to capital structure from the managerial perspective, it can be observed that decisions about the debt to equity ratio include goals and preferences of managers (Brailsford, Oliver, Pua, 2002). Low level of managers' ownership interest in a company is positively associated with the debt ratio, while high stakes in company's equity reduce debt.

Ownership concentration can also be treated as a factor stimulating capital decisions in the company (Pindado, de la Torre, 2011). Studies indicate that controlling managers with the debt level may be ineffective if it is conducted outside of the company. Therefore the debt can be used as a way of forcing managers to achieve the rate of return equal, at least, to the cost of debt. According to the authors, the increase in concentration enhances the possibility to control managers, so they will be more often stimulated by increased debt.

Another problem is the role of the degree of concentration in decisions concerning the time of maturity of the debt. Conducted research indicates that strong ownership concentration is accompanied by a growing maturity time of issued debt (Arslan, Karan, 2006). This follows from the strength of the dominant shareholder, who usually wants this way postpone further negotiations with the debt opponents. In less concentrated companies time of maturity of the issued debt is generally shorter.

There are very few studies on the role of ownership concentration in hybrid financing and they do not address the problem posed in this article directly. It is indicated that convertible bonds are especially preferred to be issued in countries with greater minority shareholders protection (Lee, Lee, Yeo, 2009). It also pointed out that in such circumstances the probability of conversion is higher. However, the more leveraged issuers are, the more likely they are to issue debt-like bonds rather than equity-like ones. Convertible bonds issuers have also significantly less concentrated shareholder structure in comparison to the ordinary bonds and shares issuers (Dutordoir, Strong, Ziegan, 2014). Moreover, it has been shown that the increase of ownership concentration is accompanied by the decrease of convertible bond issuance probability.

In addition, there are plenty of writings that indirectly relate to the problem of ownership concentration. Most of the studies devoted to the premises of convertible bonds issuances indicate they are used to reduce agency costs. Examples of such concepts may be: asset substitution hypothesis (Green, 1984), risk estimation hypothesis (Essig, 1991) and backdoor equity financing hypothesis (Stein, 1992). If, therefore, in the light of the foregoing inferences, agency costs rises along with the ownership fragmentation of the company and it is accompanied generally by higher leverage, so convertible bonds should

be issued especially under such circumstances. Especially, when potential conversion increases the possibility of incurring more debt, which may be difficult in an already indebted company using standard debt instruments. If so, less concentrated companies should issue equity-like bonds. In turn, higher concentration should reduce the probability of conversion. However, research in this field has not been carried out so far. The ambition of this article is to fill this gap.

3. Data and Methodology

In order to examine the relationship between the degree of ownership concentration of the company and the structure of the issued hybrid debt we analyzed the American market, the largest market for such instruments . We analyzed 2564 cases of convertible bond issuances held by non-financial companies between 2002-2014. From this group we eventually separated 544 issues provided by 330 companies that allowed to analyze all the necessary dependencies. The data was obtained from the Bloomberg database. Data about the degree of ownership concentration was taken from the most recent annual report, which the company released before the moment of the issuance. From the same source we took data, which helped assess the [debt ability of the surveyed enterprises: assets value, fixed assets value, long-term debt value, long-term debt interest expense and EBITDA.

The degree of concentration was calculated using the Herfindahl-Hirschman Index (HHI). Its high level means high degree of ownership concentration and high influence on the management of the company. This measure is the sum of squares of the individual interests of all shareholders:

$$HHI = \sum_{i=1}^{n} S_i^2 \tag{1}$$

where: S_i – the percentage of the i-th shareholder in the shareholder structure, n – the number of shareholders.

Information about the convertible bonds characteristics were obtained from the prospectus and offering documents. We analyzed time to conversion, time to maturity and conversion period to determine the time for which companies incur liabilities and how fast they tend to possibly convert them into shares. In the study the effective time to maturity, which includes the option of early bond redemption, was used. This variable was taken from the Bloomberg database. In addition, offered conversion premiums and conversion ratios were taken into consideration. The independent variables included in the study are intended to determine the probability of conversion. This way it was possible to indicate the probable purpose of convertible bonds issuing with certain characteristics. The analysis assumes that the probability of conversion is higher when the issuer intends to use equity capital. It therefore agrees to a smaller shareholding. This should be accompanied by a longer conversion time, higher conversion premium, and higher conversion ratio. The statistical characteristic of taken variables is shown in Table 1.

We may notice that dependent explanatory variables are characterized by strong differentiation. The standard deviation is generally greater than the mean and median. The least varied values can be observed in degree of concentration, but this variable is naturally limited to the range (0-1). The explanatory variables do not have such limitations. We can also notice that issuers often allow immediate conversion – this applies to half of

the observed cases. If the early redemption option is used, such situation is no longer practiced. The greatest variation is observed in the values of the conversion premium. Strongly negative values of the conversion premium , which indicate non-financial motives behind convertible bond issuance, seem to be very interesting. Generally, we may notice that surveyed companies have generally moderately concentrated shareholding. Issued convertible bonds have approx. 10-year maturity period, the possibility of immediate conversion and they enable to achieve several dozen percent of the conversion premium.

Table 1: Sample characteristics.

	n	Minimum	Maximum	Mean	Median	Standard deviation
Concentration(HHI)	362	0.18	0.80	0.41	0.16	0.16
Time to conversion	458	0	6138	72.61	0.00	416.135
Time to maturity	543	614	14611	4651.75	2564	3313.34
Conversion period	543	0	14611	4627.57	2562	3332.877
Effective time to maturity (in years)	539	0.03	34.106	2.988	1.733	4.694
Conversion premium (in %)	280	−99.985	966.462	81.783	5.999	199.292
Conversion ratio	532	0.171	25000	278.888	38.704	1483.46

Source: own studies based on Bloomberg.

Examination of the relationship between ownership concentration and the structure of hybrid financing was carried out using two methods: correlation analysis and linear regression. We used Spearman rank correlation coefficient, which is used to assess monotonic relationship between two variables. In the case of tied ranks (which occurred in the study), we use the following formula (Szymczak, 2010):

$$S = \frac{\frac{n^3 - n}{6} - T_X - T_Y - \sum_{i=1}^{n} d_i^2}{\sqrt{\left(\frac{n^3 - n}{6} - 2T_X\right) \cdot \left(\frac{n^3 - n}{6} - 2T_Y\right)}} \qquad (2)$$

where: d_i – difference between the ranks of variables x_i and y_i for i-unit, T_x, T_y – adjustments for tied ranks, determined according to the formula: $T = \frac{\sum_{j=1}^{k}\left(t_j^3 - t_j\right)}{12}$. The significance assessment of both factors was carried out using the t-test where the following hypothesis was verified: H$_0$: $\rho = 0$ considering H$_1$: ~ H$_0$. The test can be validated by the t-statistic determined according to the formula:

$$t = \frac{r_S}{\sqrt{\frac{1}{n - 1}}} \qquad (3)$$

This statistic has a t-distribution with df = n – 2 degrees of freedom. The correlation between the variables was considered as statistically significant when the probability of the test was lower than the level of significance $\alpha = 0.05$.

Multiple regression (multivariate, which takes into account more than one explanatory variable) allows describing the quantitative variable formation (Y), taking into account two or more variables (X$_j$). Linear regression takes the form of (Goryl, Jędrzejczyk, Kukuła, 1996):

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \ldots + \beta_k X_{ki} + \varepsilon_i \qquad (4)$$

where: β_j – the structural parameter (regression coefficient), ε_i – random component.

To estimate the parameters of the regression equation we used the least squares method (OLS). The assessment of the estimated regression model included: the assessment of how well the model fits empirical data, i.e., the ANOVA-based assessment of the significance of the coefficient of determination, the assessment of how well the coefficient of determination (R^2) explains the variation of the dependent variable with the variation of explanatory variables, assessment of the significance of individual regression coefficients using the t-test, and the assessment of properties of the random component.. The comparison of the range of changes of Y caused by the unit change of X was conducted after the prior standardization of all variables has taken place – assessment in this area was conducted using standardized regression β coefficients. To estimate structural parameters of the model, the stepwise variable selection method was used.

4. Results

The conducted correlation study has shown a negative correlation between the degree of ownership concentration and the time to conversion, time to maturity, conversion period and the conversion premium (Table 2). A similar relationship occurs with effective time to maturity, but it is not statistically significant, as the positive correlation of the conversion ratio. Therefore it can be noted that issuers with more concentrated shareholding offered bonds with shorter maturities and lower conversion time. They offered lower conversion premium as well. Although the direction of correlation is the same, its strength may be different. The conversion premium is the most strongly correlated with the degree of ownership concentration. The obtained result must be considered as significant (0.65). In the case of variables related to the maturity and time to conversion the correlation is moderate (0.4) or poor (0.25).

Table 2: Spearman's correlation between ownership concentration and selected convertible financing variables.

		Time to conversion	Time to maturity	Conversion period	Effective time to maturity	Conversion ratio	Conversion premium
Concentration(HHI)	S	−0.405	−0.415	−0.252	−0.034	0.08	−0.645
	p	<0.001	<0.001	0.001	0.473	0.089	0.001
	n	362	362	362	312	362	238

Source: own studies based on Bloomberg.

The results of the regression analysis confirm trends observed in the correlation analysis. Issuers with more concentrated shareholding offered bonds with shorter maturities and shorter conversion time. The use of regression analysis allows estimating the strength of the examined relationships. Extending the time to conversion by one day means lower ownership concentration by 0.008. About 0.009 HHI index decreases if time to maturity and conversion period get extended by one day. This means that the increase in the concentration by 0.01 reduces time to conversion by 1.25 day and shortens time to maturity and conversion period by 1.11 day. The greatest sensitivity to the degree of concentration changes is again exhibited by the conversion premium . When this variable increases by 1%, it reduces the HHI index by 0.336. This indicates that the increase of concentration by 0.01 reduces the conversion premium by 0.03%. Regression models analyzed in this research, total of 4, are well-fitted (R^2 is not less than 0.84).

Table 3: Ownership concentration and selected convertible financing variables – regression results.

		Time to conversion	Time to maturity	Conversion period	Effective time to maturity	Conversion ratio	Conversion premium
Concentration (HHI)	β	−0.008	−0.009	−0.009	−2.904	0.113	−0.336
	p	0.001	0.001	<0.001	0.294	0.239	<0.001
	n	241	236	239	205	211	198

Source: own studies based on Bloomberg.

Analysis of correlation between the degree of concentration and selected financial indicators characterizing the debt level of surveyed convertible bonds issuers allows creating quite a consistent picture. The growing debt level accompanies smaller degree of concentration. The strength of this correlation can be described as moderate (0.44). Lower concentration of ownership is also accompanied by greater burden of interest on net operating income (Interest/EBITDA). We may also notice that more ownership concentrated companies are characterized by higher levels of operating profitability. However, the most strongly correlated with the ownership concentration is the degree of assets tangibility (0.68). Direction of this relationship indicates that more concentrated companies have greater share of fixed assets in total assets.

Table 4: Spearman's correlation between ownership concentration and selected debt related ratios.

		Long term debt Total assets	Fixed assets Total assets	Interest EBITDA	EBITDA Total assets
Concentration (HHI)	S	−0.442	0.681	−0.394	0.361
	p	<0.001	<0.001	0.001	<0.001
	n	362	362	362	362

Source: own studies based on Bloomberg.

All presented dependencies between the degree of concentration and financial relations referred to debt are statistically significant. The research of other financial ratios does not contradict the dependencies presented above or is statistically insignificant. The linear regression study was also performed. The results are consistent with the correlation results. Due to the fact that the problem of debt is not the main issue analyzed in the article, we decided not to publish the regression results because they did not provide additional knowledge about the examined relationship.

5. Discussion and Conclusions

The analysis of obtained results helps us draw quite a consistent picture of dependencies between the characteristics of the hybrid financing and the degree of ownership concentration of the issuer. Issuers with more concentrated shareholding offered bonds with shorter maturities and conversion time. It can be seen that the increase in the ownership concentration leads to the financing with bonds representing lower probability of conversion. This means, on one hand, that the increase of concentration is accompanied by a tendency to maintain the current level of debt, but above all, it seems that companies seek to avoid conversion in order to maintain the current ownership structure. In this context, the dependence of a conversion premium and concentration level observed in the research seem to be especially interesting. Strong and negative correlation means that more concentrated firms are less generous to investors. This may further discourage them from

purchasing bonds. On the other hand, lower conversion premium means smaller difference between the share price and the conversion price, which increases the possibility of conversion, because it is easier to execute it. Another important observation seems to be the shortening of the maturity of the debt by more concentrated companies. It seems that this is a natural consequence of short conversion time, which indicates again a willingness of maintaining the current ownership structure of a more concentrated company.

The desire to preserve the ownership structure represented by a more concentrated company can be justified by strategic and managerial reasons. More concentrated ownership facilitates the management and makes taking the company over more difficult. Under such circumstances, the conversion option from bond into share seems to be unattractive. It does not prejudge about the lack of convertible bonds attractiveness at all. Conversion option can serve as a kind of a "safety valve" in case of difficulties with the debt redemption. Convertible bonds can be fitted with the reset option, which allows changing the conversion rules when the bond is already issued. This may significantly change the probability of conversion. In addition, the cost of such financing may be lower than for conventional bonds, but it mainly depends on conversion conditions.

Interpretation of the issuers' decision in its part concerning the structure of convertible bonds should also take into account their ability to incur debt. The studies enable to note that companies with higher degree of ownership concentration have more possibilities of external financing: they are less indebted and less debt interest charges the operating result. They generate relatively higher EBITDA at the same time. Finally, they have higher share of fixed assets in total assets, which may help them incur liabilities. All these features taken together suggest that a company with a stronger ownership concentration has bigger debt potential . This may explain aversion to the conversion of convertible bonds. Issuers can afford not to convert and preserve the existing ownership structure. At this point, a question arises about the reasons of convertible bonds issuance instead of traditional bonds. It seems that this is dictated by the desire to use the conversion option in case of difficulties with debt redemption and reduction of the cost of capital.

There is another aspect that can be observed in a more concentrated company. The tendency of running reduced debt and parallel aversion to conversion, results in increased debt. This must be explained by the already mentioned need to maintain the impact on the company, i.e., by non-financial premises. It should also be noted that more concentrated companies issue bonds with shorter maturities. The impact of debt incurred on the financing structure is thus relatively smaller in terms of time.

In the context of hitherto achievements devoted to the role of ownership concentration in the companies' financial policy development our research results confirm most of the outcomes reported in the literature review. More concentrated companies use debt to a lesser extent. In contrast to previous research, however, time to maturity of issued debt was shorter for more concentrated companies. This should be explained by a general debt aversion of more concentrated firms. There is also relationship between the degree of ownership concentration and the probability of convertible bonds conversion, which is consistent with previous studies. The results also allow confirming the assumption, according to which the issue of convertible bonds is particularly justified when company has low ownership concentration and high leverage. Then conversion may give the company the greatest benefit – it reduces agency costs and enables financing. This article indicates that variables that determine the conversion of convertible bonds change when the degree of issuer's ownership concentration changes.

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20th International Scientific Conference
"Enterprise and Competitive Environment", March 9–10, 2017,
Brno, Czech Republic

Motives and barriers to mergers of companies and cooperatives

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Abstract

The issue of transformation of commercial companies and cooperatives (mergers, divisions, transfers of assets to a partner and change of legal form) represents one of the very complicated areas of theory and practice. Implementation process itself is a multidisciplinary problem. A frequent motif of transformations of companies and cooperatives is the economic motivation, the expected timing, e.g. increasing work efficiency, reduce administrative costs and creating greater profit potential tax optimization. Fusions are primarily suitable investment opportunity, most often it is a merger. Within the paper will be Identified the main motives and risks for their implementation. Subsequently will be examined developments of undertaken mergers in the Czech Republic. For the Czech Republic will be quantified their number and further investigated as well as the number of participating companies in the company conversion, including the conversion of their legal form. Secondly, it will also be examined the dependence of transformations effected in the form of mergers in connection with the development of GDP.

Keywords: mergers, acquisition, company transformation, motives, barriers

JEL Code: G34, K20, M21

1. Introduction

Economic globalization has intensified the process of linking manufacturers to markets in different countries and this has also become the main reason for company transformations. This is demonstrated by the fact that there has been a gradual increase in company transformations, especially since the year 2008 when the market stabilized after the economic crisis. (Vítek, Salachová, 2014). Business transformation can be a chance for companies to improve their position in the market and to increase their competi-

tiveness. Business transformation is a comprehensive process. The forms of transformation of business entities and cooperatives in the Czech Republic include mergers, demergers (corporate splits), changes of legal forms and transfer of ownership. One of the most common forms of business transformation is mergers which are the focus of this paper.

If we were to put the concept of mergers in the international context, we should not ignore the general basis of mergers, which are acquisitions generally understood as a broad process of acquiring or gaining possession. An acquisition is a general term which includes in itself not only mergers but also other forms of gaining possession (e.g. by purchase of a company or acquisition of equity stakes). An essential feature of acquisition is taking control of a new business (other assets).

In the modern business terminology in the international context the term mergers and acquisitions is used as a dual concept. It is mainly used by financial institutions, auditing and consulting companies that track, statistically process and regularly evaluate the development of activities on the world markets of mergers and acquisitions (Sedláček, 2013). The phrase "mergers and acquisitions" is a common, internationally recognized term and practically it refers to multiple forms of mergers. It is therefore a much broader term than the concept of mergers used in the Czech context.

It is possible to state that in mergers there is always at least one business entity that loses it corporate existence and mergers are also characterized by transfer of ownership. On the other hand, the nature of acquisition is gaining the right to control or dominate another company, which can be achieved mainly through capital acquisitions.

Another term, which is used internationally in connection with mergers, is business combinations. They are defined by IFRS 3, an international accounting standard, as a transaction or another event in which the acquirer gains control of one or more businesses. Business combinations are transactions which result in the formation of a single economic unit regardless of the method used (Skálová, 2015). At the same time, it must be true that the acquired net assets and liabilities assumed are unambiguously a company and also that one of the combining companies must be identified as an acquirer. According to the definition provided by the standard, business combinations include mergers, asset and capital acquisitions.

The first mention of mergers and acquisitions was at the end of the 19th century. Development of mergers and acquisitions was not uniform but rather in waves (Sedláček, 2013). According to Economy Watch (2010) the cause of individual waves is economic factors, namely macroeconomic factors such as GDP, interest rates and monetary policy. Various authors, e.g. Bobenič-Hintošova (2009), Gaughan (2011) or Martynova and Rennebook (2008) talk about a different number of waves, some talk about three, others about four, five or even six. They are not even in agreement on the time periods of waves. The main role in defining individual waves was played by the United States as the largest mergers and acquisitions occurred there, as stated in Economy Watch (2010). Their development was recorded predominantly in the first waves. In Europe, the importance of mergers started to grow only after the year 1984 (Hlaváč, 2010).

In the Czech Republic, mergers were incorporated into Act 125/2008 Coll, on transformation of companies and cooperatives, as amended in accordance with the Third Council Directive 78/855 EEC of 9 October 1978 on mergers of public limited liability companies. A merger is defined in § 61 – § 242 of this Act. This is an operation in which one or more companies lose their corporate existence and their assets are transferred to a legal successor that already exists or is newly created. Mergers may take two forms:

mergers through consolidation or mergers through absorption. The most common form of merger is consolidation. This form is associated with less administrative and legal burden, which means lower costs of performance (Salachová, 2014). There are domestic or cross-border corporate mergers.

The law also stipulates that the acquiring and merging companies must have the same legal form or there could be the so-called cross entity mergers, i.e. mergers of different legal forms. The rule is that it is not possible to merge a personal company with a capital company. The consequence of mergers is therefore to reduce the number of business companies. The Act on Transformations describes the procedure for merger, however, as Josková (2012) points out, for the proper completion of a merger it is necessary to carry out some more transactions, e.g. those related to state authorities and to inform other entities about a merger, e.g. banks, insurance companies, business partners. The process of company transformation imposes high demands on all stakeholders. Carrying out a merger is a complex process where legal, accounting and tax activities are interlinked

Drawing up a merger must be in accordance with several statutory provisions. One of the basic laws concerning carrying out mergers and transformations in general is Act 125/2008 Coll. on transformation of business entities and cooperatives. There are a number of other laws concerning mostly accounting and taxes, the most important being Act 563/1991 Coll. on accounting and Act 586/1992 Coll. on income taxes. The process of cross-border mergers is even more complicated even though the states are trying to implement the relevant directive into their national legislation. This process is, however, lengthy and does not always bring the desired result.

A merger can bring the company required results – improvement in its position in the market and among competitors. The underlying motive for a merger seems to be economic profit. It can only be achieved if the two merged companies have a higher value than if either of them operated separately (Kislingerová, 2010). As Sedláček reported (2013), a synergic effect is also called 2 + 2 = 5 effect, i.e. the effect of excessive growth in value. This is achieved through economies of scale, differential efficiency, financial savings, increased market share, concentration of skills, improvement in liquidity, etc. The merger is also affected by tax motives that mostly lead to tax savings, both at present and in the future. (Hlaváč, 2010).

2. Metodology and data

The aim of the paper is to identify the main motives and risks of mergers. It also examines the development of mergers carried out in the Czech Republic with respect to selected characteristics in the year 2015. As a result, a study is conducted of the dependence of the number of mergers on the development of GDP and the PX index in the years 2001–2015.

The way the project is run comes from the goals set. A prerequisite for project development is collection of information sources about the issue. The starting point for the investigations was the data about the mergers carried out in the year 2015. The information was obtained from the website of Public Administration, from the data published in the Collection of Documents by applying the criteria such as merger through consolidation, domestic merger and the date of merger registration in 2015.

The number of mergers in relation to the macroeconomic environment is processed by the method of correlation analysis, particularly by Pearson's correlation coefficient.

$$R_{XY} = R_{YX} = \frac{S_{XY}}{\sqrt{S_x^2 \cdot S_Y^2}}$$

where S_{XY} is distribution of residuals, S_x^2 is empirical distribution, and S_Y^2 is distribution of fitted values (Hindls, 2007).

At the same time a significance test of the correlation coefficient which is calculated from the data for the sample and represents only the estimate of the correlation coefficient (ρ), was used. For determination of the linear correlation relationship the 5% significance level of the correlation coefficient (r) was employed. The null hypothesis assumes that our estimated coefficient is equal to zero, i.e. the correlation coefficient is statistically insignificant at the 5% significance level. An alternative hypothesis says that our estimated coefficient is statistically significant again at our significance level. Using symbols, it can be written as follows:

$$H_0: \rho_{XY} = 0 \; ; \; H_1: \rho_{XY} \neq 0 \, .$$

A test criterion is

$$t = \frac{r_{XY}\sqrt{n-2}}{\sqrt{1-r_{XY}^2}}$$

where n is the sample size and R_{XY} is the correlation coefficient of the group (Hindls, 2007). The null hypothesis of independence of the variables (insignificant correlation coefficient) is rejected if the test criterion falls in the critical region or if the p-value of the coefficient is less than 5%, which is our significance level. The two-sided critical region can be expressed as follows:

$$W_\alpha = (-\infty; t_{\alpha/2}(n-2)\rangle \cup \langle t_{1-\alpha/2}(n-2); \infty)$$

In this paper, in addition to the basic scientific methods and correlation analysis, methods based on the principles of logical thinking, particularly method of deduction, were used. The results are shown in the tables and graphs below. For drawing conclusions synthesis method was applied.

3. Results and discussion

3.1. Mergers: motives and barriers

As mentioned in the introduction, mergers can take place for various reasons. But the most common reason is achieving greater efficiency and gaining a competitive advantage over the other competing companies or getting a larger market share. Other motives for mergers are tax motives, personal goals and ambitions of managers, business risk diversification or possibly state support, etc. On the basis of the study conducted by Konkolski (2011) it was confirmed that in the mergers completed in the Czech Republic the above-mentioned motives prevailed.

On the other hand, mergers are also associated with a number of problem areas, known as barriers. Barriers can be classified as legal, accounting and tax. Within all these aspects the common barrier is the choice of the registration date. Further, it is the

fragmentation of legislation and associated demands on a team of experts as the merger is a multidisciplinary process. The accounting barriers include valuation of assets of the acquired companies, preparation of financial statements and their audit. From the point of view of taxes a barrier can be the comparability of the tax periods of the companies involved and the restrictions on the conditions for claiming tax losses and other deductible items and tax refunds.

3.2. Analyses of mergers completed in the Czech Republic in 2015

The analysis used the data from the portal of Public Administration, the data published in the Collection of Documents. The following filter was used: year 2015 and domestic mergers through consolidation. Mergers through consolidation were chosen because the previous survey suggested that this form constitutes 98% of all mergers in the Czech Republic. After applying the restrictive criteria and data cleansing it was found out that in 2015 there were 438 mergers through consolidation completed in the Czech Republic. In analysis, the following factors were examined: number of merging companies, legal forms of merging companies, number of merger registrations with regional courts, date of merger registration in the register of companies, determination of appointed date, and date of merger project completion.

3.2.1. Mergers by the number of merging companies

In 2015, as shown in the graph below, the most common merger was between two companies, whereas one company was the successor and the other was the disappearing company. Mergers of three companies make up only 11%. The number of mergers decreases with an increase in the number of merging companies. The maximum number of entities involved in a merger in 2015 was eight. The average number of merging companies in 2015 was 2.33.
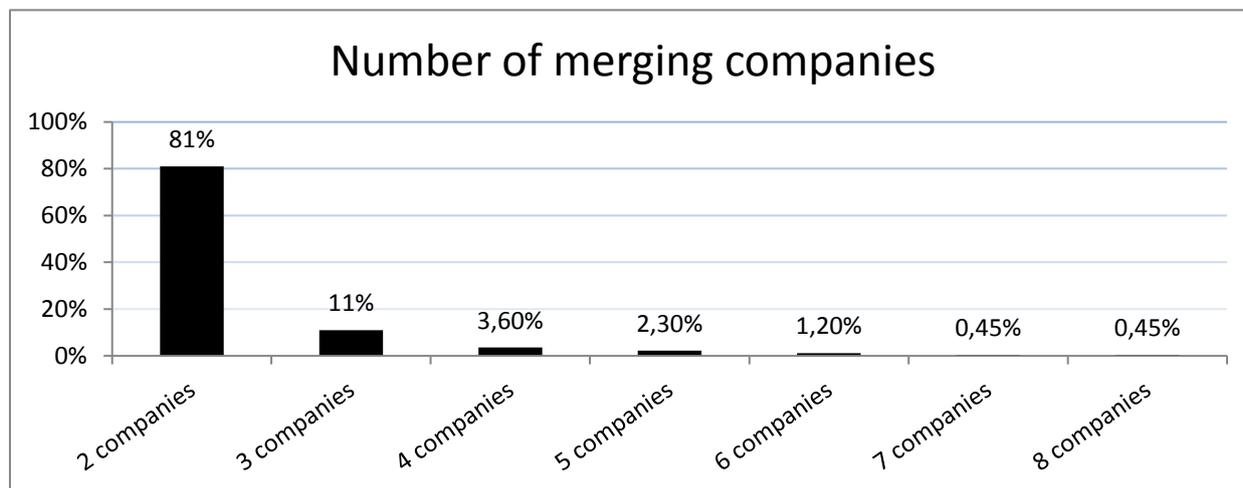
Figure 1: Number of merging companies

3.2.2. Mergers and the legal form of the company

In the Czech Republic, it is possible to perform mergers with respect to the legal form of the company in compliance with the Act on Company Transformations. The statistical data from the portal of Public Administration showed that in 2015 the most common merging type of company was a limited liability company (59%), followed by a joint

stock company (39%) and only a small percentage was constituted by a public company, a European company and a cooperative (2%).

3.2.3. Registration of mergers with regional courts

Analysis of the registration of successor companies with the regional courts showed that the largest number of registrations was with the Prague Regional Court (235 companies), followed by the Brno Regional Court (68), and the Ostrava and Plzeň Regional Courts (20 entities). This confirms the assumption that the number of registered entities is directly proportional to the size of the city.

3.2.4. Date of entry of the merger in the register of companies

Most entries are usually made in December, and this fact was also confirmed in 2015. Entries for particular months are shown in the graph below.
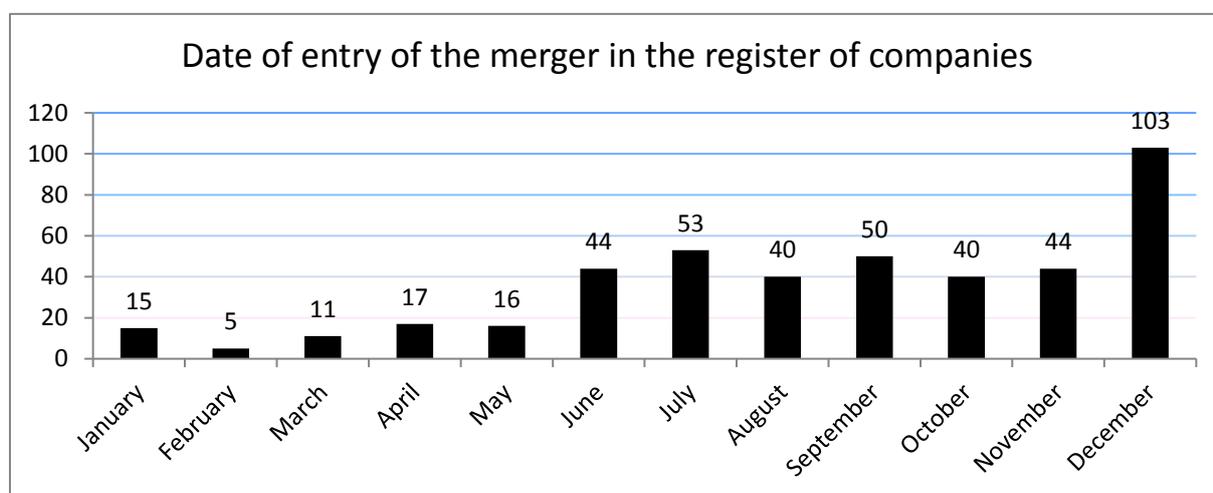
Figure 2: Number of mergers recorded in the register of companies by date

3.2.5. Determination of the appointed date of merger

The appointed date is mandatory and at the same time it is relevant information of every merger project. The appointed date is normally the first day of the calendar year. This tendency was also confirmed for the year 2015. In 2015 in almost 80% of mergers the appointed date was 1 January, 2015.
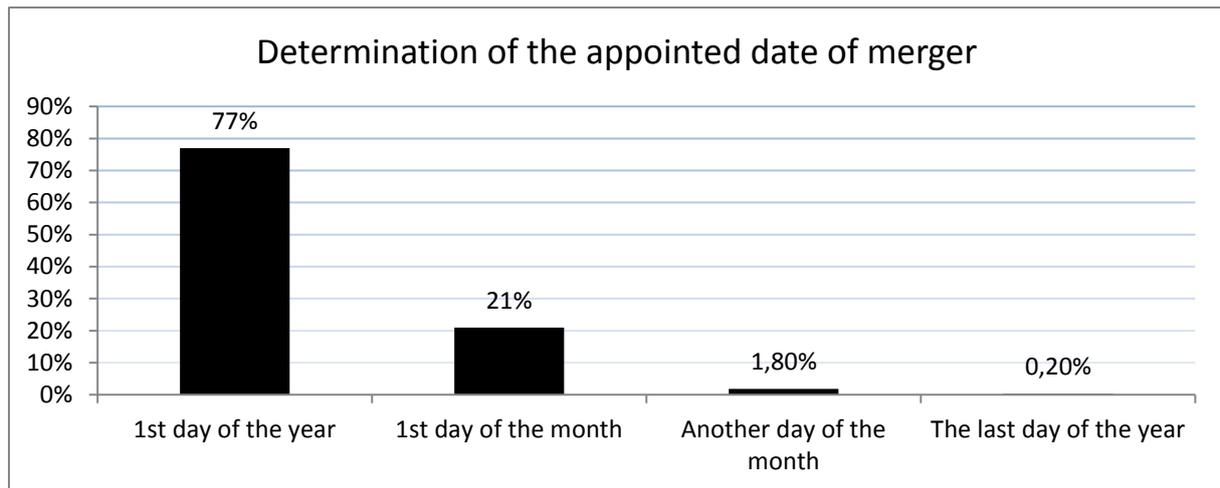
Figure 3: Number of mergers by appointed date

3.2.6. Date of completion of merger project

Merger projects, which were recorded in 2015, were mainly drawn up in 2015 and also in 2014. The following graph shows the number of projects drawn up in individual months of the years 2014 and 2015. It is apparent that a majority of projects were drawn up in June 2015, which is associated with the administrative requirements of project development. It can, therefore, be assumed that the work on it began as early as January.
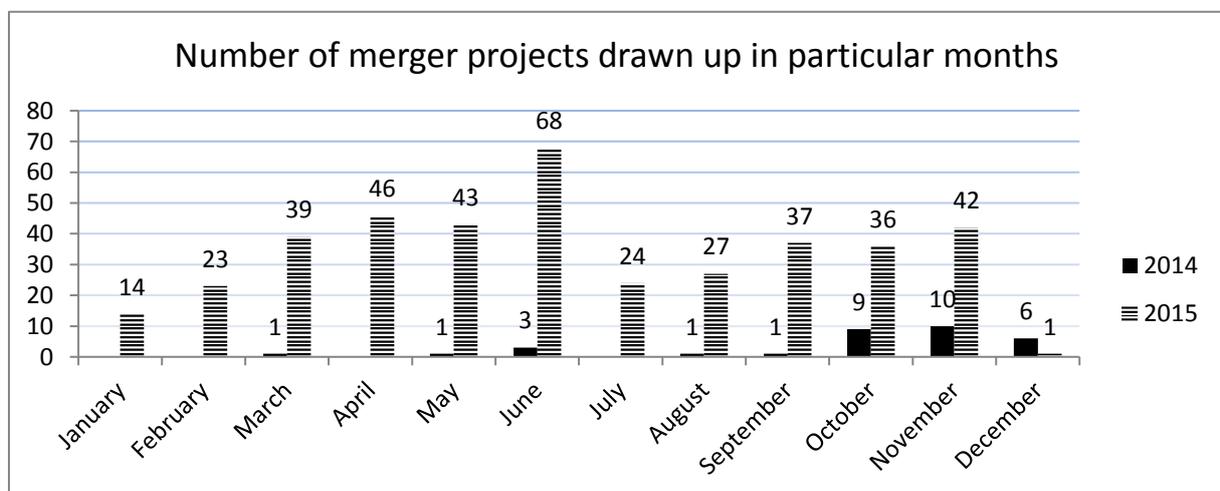
Figure 4: Number of merger projects drawn up in particular months

3.2.7. Number of mergers related to the macroeconomic environment

The connection between the number of mergers and the macroeconomic environment was examined using one macroeconomic variable, namely GDP. Two series of numbers containing annual values of the number of mergers and GDP for the period 2001–2005 are plotted on the following graph. There are two variables which were created using the formula $X_t - X_{t-1}$. These are year over year changes. If we compare the course of both curves, a similar pattern is not noticeable until the year 2008. After 2008, however,

there is a change, and the annual changes in the number of mergers and annual changes in GDP have a similar course. This is true only until 2013, then the curves diverge again.
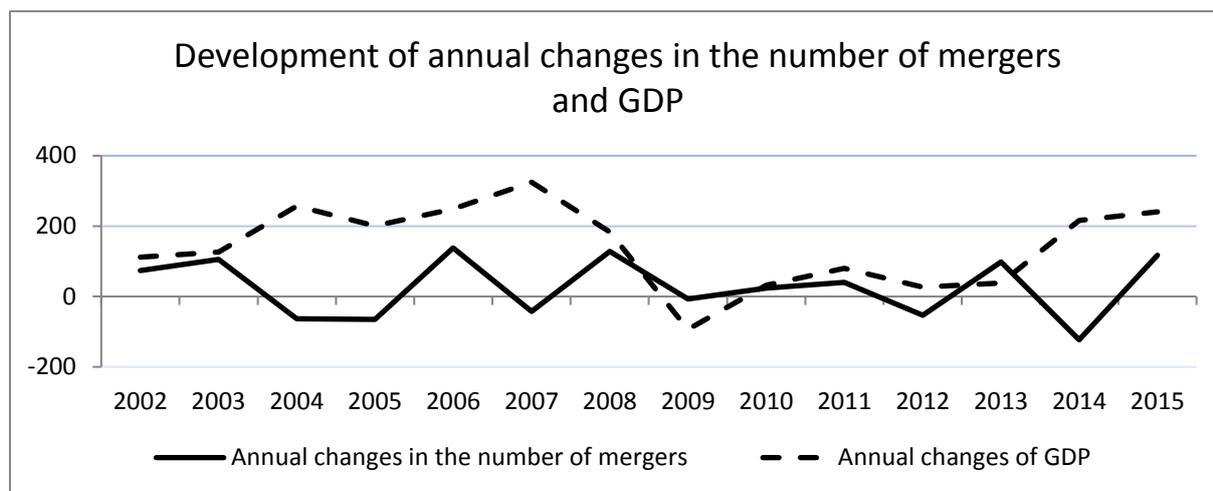
Figure 5: Development of annual changes in the number of mergers and GDP (in billions of CZK) in the Czech Republic

For further evaluation, the correlation coefficient between the variables was used. For this purpose, not annual changes but the absolute values of the amounts were used. The results can be seen in the table below. There are two variants of calculation. In the first variant, the crisis year of 2008 was not eliminated, whereas in the other it was.

Table 1: Relationship between the number of mergers and GDP

	With the year 2008	Without the year 2008
Correlation coefficient	0.8646	0.8615
P-value	0.0000	0.0001

As the table shows, it is possible to claim that both variants (with and without the year 2008) lead to almost the same results. It might be concluded that the number of mergers are strongly correlated with GDP. The table also shows that the correlation coefficients are statistically significant. Their p-value is less than 5%, which is the significance level set by us. These results are the same whether we consider the variant with the extreme year 2008 or not.

4. Conclusion

In this paper motives and barriers to mergers were defined. Analysis of the completed domestic mergers through consolidation in the Czech Republic in 2015 revealed that most mergers were performed between two companies, which is logical because the more companies are involved, the more complicated the entire process of merger becomes. The companies which were most often merged were limited liability companies followed by joint stock companies. Other legal forms of companies constituted a negligible part. The research also showed that a majority of successor companies, nearly two-thirds, were registered with the regional courts in Prague and Brno. The three most important data used in analysis revealed the most common procedure for merger. The ap-

pointed date is in the first month of the year, afterwards the project with all necessary formalities is prepared and it is usually finalized in June of that year. After all obligations are fulfilled, the company is entered into the Register of Companies. The company's registration most often takes place in December so that the company could start its business independently with all its rights in the following year. This procedure is the most suitable for companies. The correlation analysis of the relationship between the number of mergers and GDP in the years 2001–2015 showed that these two variables are positively correlated.

Acknowledgements

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Improvement Opportunities to Increase the Business Efficiency of Mechanical Engineering and Metalworking in Latvia

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Abstract

The enterprise competitiveness depends on the manager's skills, experience and the competence to take adequate decisions. A manager's decision can improve or deteriorate the economic and financial situation of the enterprise. Financial analysis is an important element of management that managers of enterprises use in taking significant decisions in relation to financial and investment issues. Mechanical engineering and metalworking sector is one of the leading industry in Latvia. In 2015, the sector produced 17 % of turnover out of total industry and 21% out of total export of goods. It is a sector with a high added value. The aim of the current research is to investigate financial indicators for mechanical engineering and metalworking enterprises activity's assessment and to offer proposals that would enable to improve their business efficiency. Efficiency and productivity of Latvian enterprises in Mechanical engineering and metalworking sector lag behind enterprises in other EU countries. Managers would focus more on financial indicators, labour and raw material costs, investment in the latest technologies and future research development.

Keywords: business activity, efficiency, profitability, financial position, management

JEL Code: D240, M110, O14

1. Introduction

Nowadays enterprises are increasingly independent both economically and judiciary. It increases the need to carry out the financial analysis of the enterprise in order to improve

its economic efficiency. In a saturated market with a high level of competition, it is essential for enterprises to plan their operational strategy in order to secure a sustainable work, keep job places and secure stability. Managers need information and knowledge about the enterprise's business activities and financial results of it in order to diversify internal and external resources in order to reach its goal, they need to set problem segments and modify the activity model. The sector of mechanical engineering and metalworking is a diverse sector encompassing many sub-branches and it is one of the leading industries in Latvia. The authors have applied the following methods: theoretical analysis and synthesis, statistical data summary and analysis, expert interviews in the sector and personal observations. In the course of the research the authors have drawn the conclusions that in order to increase business efficiency it is possible to apply various methods of financial analysis that could be diverse in terms of complexity and the volume of information.

2. Business analysis, its essence and tasks

To ensure successful activity of the enterprise, one of the main criteria is its financial solvency. Effective usage of the financial and other material resources is ensured by the management decisions based on information from financial analysis (Sneidere, 2009, Hudenko, 2014).

Main task of the analysis of development tendencies is to identify changes in economic growth indicators of the enterprise in recent years. Economic growth of the enterprise is evaluated from the net sales, profit, assets value and own capital and total capital changes. Long term analysis shows the dynamics of changes, whether it is positive, to identify main problems and forecast development strategy of the enterprise. (Saksonova, 2006)

Nevertheless, enterprises represent different industries and they have different strategic goals set, they may occur mainly three problems:

1. Low solvency;
2. Low capital profitability;
3. Decreasing financial independence.

(Koljcova I. &Rjabih, D, 2007)

Escalation of the solvency problems and deterioration of the indicators might be resulted from the business activity which is not sufficient enough to keep acceptable financial conditions. Enterprise has no potential possibility to keep acceptable solvency level or has no rational usage of the result of entrepreneurship or the profit.

One of the reasons why may deteriorate enterprise financial position is insufficient profit. Profit has influence on all indicators of financial results. Calculation of profit or losses, profitability and accrued capital ratios are used for the analysis of revenue and costs. Main factors influencing profit is the product price, costs and sales volume (see Figure 1).
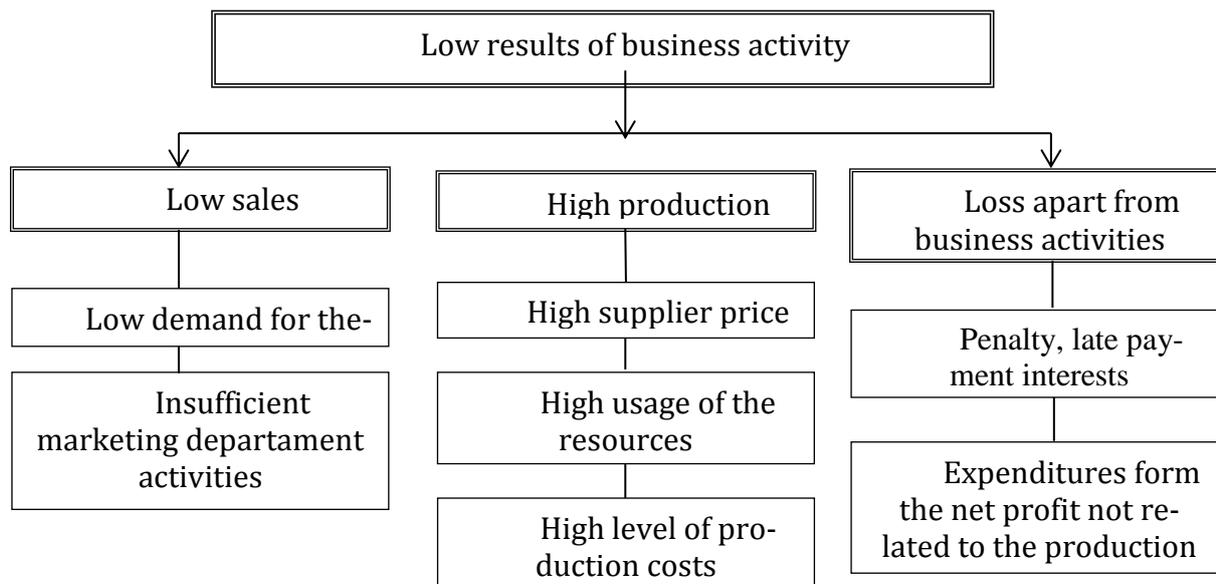
Figure 1: Low results of business activity and reasons causing it.

Source: Koljcova & Rjabih, 2007

Also, the company's investments may lead to liquidity, financial independence and profitability reduction. As one of the reasons what can be noted is irrational usage of current assets – not well considered stock management and debtor's policy.

Low return on capital does not provide the interests of the owners. Mainly it is influenced by the high price of the financial sources.

In order to ensure a company reasonable financial independence, it is important to choose a passive structure that increases its return on equity.

Nevertheless, decrease of financial performance ratio does not mean that there the enterprise is experiencing financial problems. Financial problems can be identified when amount of coefficient falls below the acceptable level.

3. Business analysis financial indicators

Financial analysis is based on absolute and relative terms. In practice, the financial analysis used in the following groups of indicators:
1. Asset utilization rates (the company's operating efficiency indicators that show the profitability and return on investment);
2. Solvency indicators (stability indicators for the company's degree of independence from external sources of financing, changes in interest rates).

In order to develop the company's business strategy should be provide a detailed financial analysis of the dynamics of multi-year time period. Express analysis it is enough to compare the data analysis, the beginning and the end. Financial analysis based on the balance sheet and income statement analysis, let's pay attention to the "narrow" places in enterprise's activities.

Strategic financial analysis differs from operational analysis not only with different goals and tasks, but also with various methodology of the analysis. In strategic analysis those indicators which describe possible perspectives of development of the enterprise are reviewed.

Evaluating dynamics of main financial indicators for production enterprises it is required to compare the speed of changes of those indicators. Optimal is the relation with mutual connection as follows:

$$Revenue > Capital > 0, \tag{1}$$

where,

Revenue – the speed of changes of realization volume,

Capital – the speed of changes of enterprise assets (capital) volume.

This means that the Revenue is rising faster than the company's assets (capital), namely the company's resources are used more efficiently. The enterprise's economic potential, in comparison with the previous period, increasing.

For Strategic financial analysis Financial Analysts Association (CFA Institute, 2008) recommends the use of financial ratios, as reflected in Table 1.

Table 1: Main financial indicators for strategic financial analysis

Indicators	Calculation
Return on equity, ROE	Net profit × 100 / Equity
Pretax margin, ROS	Pretax profit × 100 / Net turnover
Stock turnover	Net turnover/ Stock
Accounts receivable turnover	Net turnover / Debtors
Days of sales outstanding, DSO	Debtors × 360 / Net turnover
Fixed assets turnover	Net turnover/Long term investments
Total liquidity ratio	Current assets/ Current liabilities
Quick liquidity ratio	Cash + short term financial investments + Debtors/ Current liabilities
Debt liabilities towards capital (debt – to – capital, DR)	Liabilities / (Liabilities + Equity)
Interest payment coverage ratio (ISCR)	Profit before interest and taxes/ Interest payments

Source: Mavlutova I., 2011

The enterprise *equity return or profitability* considerably shows how effective are usage of owners invested capital to gain the profit. *Return on sales* shows remaining share of income which the enterprise can see as the profit from each euro received from the sales. Thereby this profitability ratio shows profitability of enterprise business activity.

Reasons for decrease of equity and total capital profitability are shown in the Figure 2.
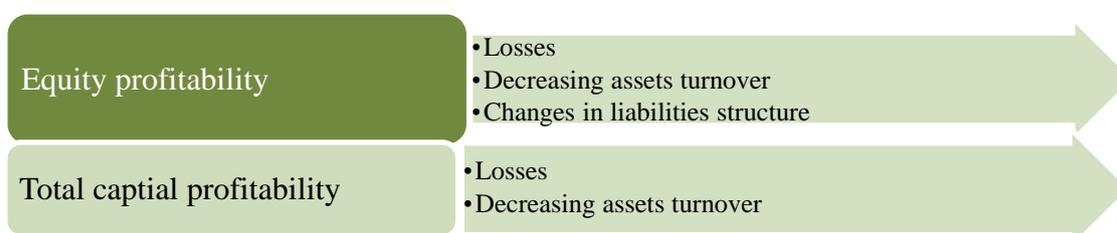
Figure 2: Reasons for decrease of equity and total capital profitability
Source: Koljcova I. & Rjabih, D, 2007

For analysis of the efficiency of working capital management in the enterprise the current assets and debtor's turnover ratios are used.

Calculating long term investment turnover ratio, information about the volume of revenues on invested long term investments is obtained. Most essential long term investments in production enterprises are fixed assets. To evaluate efficiency of the use of fixed assets turnover ratio is applicable.

The essence of liquidity ratio is to evaluate potential ability of the enterprise to make current liabilities settlements that are due, by using working capital. That can testify about unspent money, storage of needles goods/raw materials that are exceeding current needs, as well as that could point to irrational lending policy that may lead to existence of excessive lending and hopeless debts (Savcuk, 2002). Analysing dynamics of this ratio, factors that creates mentioned changes must be studied. For instance, if a growth of the different stage liquidity ratio was mainly connected with unreasonable accounts receivable, it cannot characterize enterprise business activity positively.

The goal of *liabilities indicators* is to identify the risk of possible insolvency by attracting borrowed capital. Liabilities indicators reflect enterprise dependence from borrowed capital and characterize relations between its owner and creditor.

Calculated ratios can be used for evaluating business activities of manufacturing enterprise, but they must be compared: firstly, with changes within the certain period of time that will help identify whether this activity has relatively improved or grew worse; secondly, ratios that characterize activities of one enterprise, must be compared with analogical ratios of another enterprise which operates in the same field, so that to evaluate productivity of the industry and market competitiveness level; thirdly calculated ratios must be compared with planned indicators, in order to evaluate compliance of enterprise activities towards defined strategic goals.

Business activity of the enterprise is characterized by the growth rate of the economic. The speed of economic development of manufacturing enterprise is mainly defined by the growth level of returned earnings. That depends on many factors reflecting efficiency of current business (profitability of operational activities, turnover of assets and stocks) and financial activities (dividend policy, financial strategy, choice of equity structure). In order to evaluate business activity of the enterprise more precise within the use of funds and capital perspective, ratios mentioned above must be supplemented (see Table 2).

Table 2: Additional indicators that can be used for strategic financial analysis

Indicators	Calculation
Total assets turnover	Net sales/Total assets
Average period of Stocks (per days)	Stocks × 360/costs of goods sold
Average period of Creditors (per days)	Suppliers of goods × 360/costs of goods sold
Gross profit margin	Gross profit × 100/net sales
Return on assets	Net profit × 100/Total assets

Source: compiled by the authors

Profitability indicators define how large profit the enterprise has gained from the management of different resources. The goal of business activity is to increase those indicators. *Gross profit margin* is the most essential indicator that shows efficiency of enterprise main activities. The return on assets shows how large profit the enterprise has gained from all the assets. Knowledge of these indicators help investors to evaluate of enterprise managers. Is believed that this factor is one of the more meaningful financial

analysis, despite the fact that the balance sheet building principles and reporting deadlines that affect the items in the amounts indicated, may distort the results of the analysis (Helfert, 1996).

Methodology of efficiency analysis of enterprise activities' described above, of course does not provide answers on all questions of analysts and investors about the analysed enterprise, in return it gives an insight on main realities of the enterprise that is analysed. So – it gives a possibility to compare achieved results of the enterprise with future expectations.

In order to evaluate an effect of factors, which reflect effectiveness of enterprise, modified DuPont model is usually used:

$$K = D/ NP \times NP/ S \times S/ BS \times BS/ E \times 100\% \qquad (2)$$

where
D – dividend
NP – net profit
S – sales
BS – balance sheet
E – equity

This model reflects an influence of enterprise business (second and third factor) and financial (first and forth factor) activities on the ratio of economic stability. In addition, the enterprise is able to use some economic leverage to influence this ratio increases: dividends to parts reduction, resource return increase, manufactured products profitability increase, the ability to search for profitable lending and borrowing receipt. The study offered financial performance analysis is suitable for mechanical engineering enterprises the operational efficiency of the determination and efficiency trends and determining factors.

4. Development opportunities of mechanical engineering and metalworking industry in Latvia

By the reference of European Economic and Social Committee conclusion, mechanical engineering and metalworking industry is one of the most valuable sectors, because it provides machinery, manufacturing systems, components and other services related to other economic sectors. Metalworking, mechanical engineering, mechanical science industry is diverse and consists of many sectors, covering wide range of different type of activities, including mechanical engineering, machinery science, metal production, production and installation of fabricated metal products, production of electrical equipment, production of vehicles, production of medical equipment, repair and installation of equipment, devices and other activities. Global economy creates both threats and opportunities for manufacturing sector. Competition from enterprises in Brazil, China and India is increasing. Also economic crisis has weakened Europe position. In order to increase a competitiveness, enterprises in Europe must develop new strategies, what include high qualified specialists, innovations and new technologies (McKinsey & Company, 2015).

In accordance with the Eurostat data from 2011 to 2013, a number of enterprises in Europe, that works in industry and produces fabricated metal products in particular, has decreased. To make correct comparison within this research, 6 countries were chosen–

Latvia, Lithuania, Estonia, Germany, France and Poland. Estonia and Lithuania were chosen because they are neighbouring countries, France is 4th largest representative of industrial production, and Poland is one of the fastest growing economies.

Table 3: Number of employees in mechanical engineering and metalworking industry in Germany, France, Latvia, Lithuania, Estonia and Poland, as a percentage of the overall number of the population in 2013

Countries	Number of population per country	C		C25	
		Number of employees	%	Number of employees	%
Germany	80523746	7220296	9.0%	876 965	1.1%
Estonia	1320174	104564	7.9%	12 324	0.9%
France	65600350	3005971	4.6%	321 356	0.5%
Latvia	2023825	120760	6.0%	10 425	0.5%
Lithuania	2971905	197923	6.7%	12 645	0.4%
Poland	38062535	2347504	6.2%	283 969	0.7%

Source: compiled by the authors using Eurostat (2016)

Analysing Table 3 in metalworking industry as a whole, the largest number of population who works for any of enterprises connected with manufacturing is in Germany, which makes 9%. Numerically this number is more than 3 times larger than taking all population in Latvia together. The lowest number has France – only 4.6%, despite on the fact that it is the largest representative of industrial production. Latvia has a second lowest ratio – 6.0%.

Table 4: Value of mechanical engineering and metalworking industry production in Germany, Estonia, France, Latvia, Lithuania and Poland from 2010 to 2014

Country	Value of production, million EUR				
	2010	2011	2012	2013	2014
DE	2405988.0	2716944.8	270771.8	2688414.0	2671308.0
EE	9322.0	12006.9	12160.5	12905.6	13653.3
FR	995932.8	1063449.3	1045738.8	1017549.4	997681.2
LV	7103.7	(...)	(...)	9220.9	8677.8
LT	15424.8	19728.1	20664.3	2119.5	20140.6
PL	286998.9	322945.0	327652.0	329231.5	341996.6

Source: compiled by the authors using Eurostat (2016)

Table 5: Changes of the value of production in mechanical engineering and metalworking industry in Germany, Estonia, France, Latvia, Lithuania and Poland from 2010 to 2014

Countries	Year 2011 in comparison with year 2010	Year 2012 in comparison with year 2011	Year 2013 in comparison with year 2012	Year 2014 in comparison with year 2013
Germany	12.92%	−0.34%	−0.71%	−0.64%
Estonia	28.80%	1.28%	6.13%	5.79%
France	6.78%	−1.67%	−2.70%	−1.95%
Latvia	(...)	(...)	(...)	−5.89%
Lithuania	27.90%	4.75%	2.55%	−4.96%
Poland	12.52%	1.46%	0.48%	3.88%

Source: compiled by the authors using Eurostat, 2016

From Table 4 it can be concluded how the value of production changes in different countries, as well as it can be seen that production volumes in Lithuania and Estonia are much larger than in Latvia.

Analysing Table 5 it can be seen positive and negative changes within the period of four years. In 2011 there was an increase of production in Germany, but in next three years decrease of production is observed. It is seen that in 2014 in comparison with 2013 the value of production decreased in all countries.

Mechanical engineering and metalworking industry is one of the most important sectors in Latvia economy. It represents fifth of manufacturing sector. Development of the industry depends on sales market and situation in international markets. Most important sales markets of Latvia mechanical engineering and metalworking industry are in the Europe Union, as well as potential development of Eastern markets, in Asia particularly (newspaper "Dienas Bizness/Business Today", 2013). Experts of the Association of Mechanical Engineering and Metalworking Industry (MASOC) consider that since the beginning of 2010, certain stabilization and restoring of growth after the crisis can be observed, in 2014 indicators were affected negatively by the economic and political situation in Russia that were followed by decrease of export volumes there, as well as decrease of metal prices.

A summary of the results of industry experts' interviews, conducted by the authors, indicates that mechanical engineering and metalworking industry is developing fast in Latvia. Furthermore, the Chairman of the Board of the MASOC V. Rantins points out that material resources (equipment, production premises, warehouses etc.) have remained from socialism period. After twenty years a lot of equipment has aged both technologically and moral. Therefore, equipment and tool modernization is being made in the industry. But it is important to mention, that comparing to Latvia neighbouring countries, development process is much slower, as analysed data of the Eurostat showed above.

Table 6: Distribution of total added value in different sectors of production industry from 2010 to 2013 in Latvia.

	2010	2011	2012	2013
	at current prices, thous. EUR	at current prices, thous. EUR	at current prices, thous. EUR	at current prices, thous. EUR
C Manufacturing	2 155 641	2 365 339	2 519 189	2 541 057
C25 Manufacturing of fabricated metal products, except machinery and equipment	133 534	183 222	202 297	217 848
C24 Manufacturing of metals	83 207	94 199	62 895	33 026
C27 Manufacturing of electrical equipment	36 794	54 354	63 894	75 993
C28 Manufacturing of n.e.c. equipment, devices and machinery	43 333	60 794	69 918	74 563
C29 Manufacturing of motor vehicles, trailers and semi-trailers	25 802	34 296	41 694	49 241
C30 Manufacturing of other transport equipment	23 239	30 416	28 877	26 301
C33 Repair and installation of machinery and equipment	129 249	135 111	174 402	143 448

Source: Central Statistics Bureau (2016)

Enterprises in Latvia export production to countries where there is a larger demand – to sell production and services abroad, where investments are made more active and demand is larger. Approximately 70% of manufactured production within the industry is

exported. Western Europe partners choose to cooperate with enterprises that are environment friendly. In order to ensure reputation in this field, it is necessary to renew an infrastructure – warehouse, IT resources and energy efficiency. For small enterprises it is hard to be competitive in this situation.

Most important partners in Europe are Scandinavian countries that draw up around 50% of the whole export in Europe, because enterprises in Latvia may offer competitive prices that can be ensured by lowest labour costs and logistic.

Table 6 shows that the added value in manufacturing sector increased from 2010 to 2013. Positive changes have emerged in sub-sector of fabricated metal products (C25) and in whole manufacturing industry. There is a sharp fall in the sector of manufacturing of metals (C24) starting from 2011, which continued for the next years.

According to the survey of participants of explored sector, one of the problems is the lack of highly qualified professionals. It is related to education and emigration. The deficit of professionals in sector will increase an average of 2 times during next 5 years. (MASOC 2016)

There are also the problems associated with the business environment: legal framework, total economic processes in the country and demand. The solution of these problems can also give impetus to the further development and performance increase.

The manufacturing is digitized during the third industrial revolution – all processes are conducted with few specialized programs – just some "mouse clicks to complete". (The Economist, 2012). But it is considered that in the near future the fourth industrial revolution will begin – cyber physical system will be created, which will cover the automation, data exchange and production technologies. (McKinsey & Company, 2015) It is described as the next phase of the digitisation of the manufacturing sector. (Encyclopaedia Britannica, 2016).

Traditional manufacturing business models are changing; new models are appearing. Enterprises must be able recognize these new challenges quickly. Competition will increase in the future because new competitive enterprises will emerge. Therefore, existing enterprises should try to collect more information that can help improve the quality of work and increase operational efficiency.

Experts predict that over the next two decades' technology, environmental, economic and political factors will determine the future of the industry in Europe. Many competitive enterprises will be created and developed in Europe. The pressure from industry to be globally competitive will create the necessity for enterprises to pay more attention to constantly changing business environment. (McKinsey & Company; 2015).

By analysing the present situation in industry in Latvia, the facts which reflect the global market and influence all metalworking enterprises cannot be ignored. By analysing information from the last years, it can be concluded that there is an output decreasing trend at present. It is affected by slowdown in development of natural resource extraction sector and a fall in prices in 2015. Low prices also remained in 2016. It should be noted as a positive fact that the development of construction – the total urbanization – creates a need for metal structures and their elements.

Taking into consideration the GDP forecasts, the authors have concluded that China is the main sales market over the last 5 years. Although there are some major problems at present, however, China shows the growth trend. There is a small but stable growth in Europe, also. The countries that continue to develop industry may become potential partners or competitors. The future of the industrial sector holds many challenges. Pressure from global competition will force enterprises to create new, individual products that will be made faster and cheaper. The main tasks for industrial enterprises in Latvia will be to

create new job places. Growth framework conditions will be increasing the efficiency and innovation in the sector.

5. Discussion and Conclusions

The authors came to the conclusion during the research, that different methods of financial analysis can be used for the evaluation of effectiveness of business activity which are designed for different user groups. These methods differ taking into account complexity and amount of information. The model of analysis should be based on the following financial indicators – liquidity, profitability, turnover ratios as well as working capital and liability ratios. The aim is to assess the level of business efficiency. The results should be compared with average ratios of the industry, with ratios of competitors, as well as with the data from previous periods in order to determine their dynamics.

Since the period of crisis in Latvia the positive dynamics of net turnover in manufacturing is observed, mechanical engineering and metal working industry is highly export-oriented, on average, around 70% of its production is exported. But business efficiency and productivity of Latvian enterprises lagging behind the main competitors, the pressure of global competition will encourage enterprises create new, customized products which will be produced faster and cheaper.

It is recommended to find opportunities to reduce costs for profitability increase, to investigate and to consider the possibility to enter the most profitable export markets. It is necessary to analyse the pricing policy. Enterprises have to pay more attention to asset structure in order to improve stock sales, they have to reduce stock levels, which will reduce the stock holding costs and increase profit. It is recommended for enterprises more active attract European funds and to pay special attention to Structural Fund and Education Fund.

Executives of Enterprise's have to pay attention for applying the modern financial management methods, financial modelling and forecasting, cash flow planning, they have to carry out analysis and evaluation of investment projects to evaluate commercial attractiveness, they have to assess and analyse the risks, they have to analyse and to calculate the cost of capital. Particular attention should be paid to the business and financial risk management.

Considering the current political situation in the Eastern markets the authors recommend managers to try to expand their business activities towards the Western European markets such as Germany, Italy, France and the Scandinavian countries where the metalworking industry is particularly developed. Alternative markets could allow the mechanical engineering and metal working enterprises to prevent the narrowing its activities in case of rapid market decline in demand. As possible options could be offered to make marketing researches, to open of subsidiaries and to attract innovative technologies and resources.

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20th International Scientific Conference
"Enterprise and Competitive Environment", March 9–10, 2017,
Brno, Czech Republic

Decomposing Sovereign Debt Yields in the New Euro Area Member Countries into Inflation Expectations and Expected Real Interest Rates

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Abstract

Recent deflationary pressures and ultra-low interest rate environment in the Euro Area revealed fundamentally specific implications for the evaluation of monetary policy effectiveness. Redefinition of traditional views on price stability and the role of inflation expectations under near zero level inflation environment draws attention of increasing number of empirical studies. Changing contribution of inflation expectations and expected real interest rates to the long-term interest rates determination (Kim and Orphanides, 2012) are one of the most important implications of the recent deflationary periods in the Euro Area. In the paper we employ SVAR methodology to identify inflation expectations and expected real interest rates shocks and calculate variance decomposition and impulse-response functions of long-term nominal interest rates in the new Euro Area member countries. Our research revealed considerable differences in the role of inflation expectations and expected real interest rates shocks in determining long-term interest rates among individual new Euro Area member countries. The crisis period even intensified this trend.

Keywords: interest rates, inflation expectations, economic crisis, SVAR, variance decomposition, impulse-response function

JEL Code: C32, E43, F41

1. Introduction

Euro Area member countries suffering an economic downturn are no longer able to improve their competitiveness by devaluating national currencies. While internal devaluation may improve price competitiveness and boost both internal and external demand, risk of deflationary pressures substantially reduce vital growth incentives (Hetzel,

2015). Moreover, ECB by inflating its monetary base fueled by another wave of quantitative easing does not primarily follow idea of economic recovery (Krishnamurthy and Vissing-Jorgensen, 2011); Christensen and Gillan, 2016). Low interest rate environment may be followed by euro depreciation improving competitiveness of European producers on the foreign markets (Archick, 2015). However, as the most of transactions on the EU single market are conducted in euro among its member countries, Euro Area seeks common reasonable automatic mechanisms that would help to improve its internal competitiveness (Peersman, 2011).

There are still many opened issues according to the suitability of the common monetary policy in the Euro Area provided a relative heterogeneity of the single market (Micossi, 2015; Von Ondarza, 2013). Risks of deflationary spiral in the Euro Area together with low nominal interest rates policy conducted by European Central Bank (ECB) are drawing attention of increasing number of empirical studies. Changes in the relative importance of inflation expectations (Taylor, 1982; Tobias and Wu, 2010) and expected real interest rates in determining nominal interest rates are generally induced implications of the zero inflation environment (Labadie, 1994; Evans, 1998; Den Haan, 1995). Moreover, deflationary pressures and tightened financial conditions provided contradictory effects on the determination of long-term interest rates and even emphasized changed market fundamentals during the crisis period (Christensen, Lopez and Rudebusch, 2008).

Nominal interest rates in the Euro Area member countries followed generally criticized decreasing and mutually converging trend since the beginning of the Euro Area establishment (Acharya and Steffen, 2015; Booth and Ciner, (2000). Introduction of single currency on a very heterogeneous group of countries induced undesirable convergence especially in the long-term interest rates on the government bonds (Christensen, Lopez and Rudebusch, 2012). Reduction of differences among interest rates of the Euro Area member countries resulted from decreased expected risk premium (Cochrane and Piazzesi, (2005) recognized by financial markets being supported by (un)conventional operations of ECB that many economists criticized and indicated as one of the key design failures of the Euro Area (De Grauwe, 2013).

In the paper we examine influence of inflation expectations and expected real interest rates on the long-term nominal interest rates of government bonds with 10-year maturity in the new Euro Area member countries by employing SVAR (structural vector autoregression) methodology. We also decompose nominal interest rates on government bonds into inflation expectations and expected real interest rates components. Our results indicate that both components significantly determined main trends in the development of interest rates on government bonds since 2000. At the same time, the role of both types of shocks in determining sovereign debt yields differs when comparing our results for individual new Euro Area member countries.

2. Interest Rates Determination in Empirical Literature

Gerlach-Kristen and Rudolf (2010) compared three monetary operating procedures by examining optimal policy reaction functions, impulse responses and simulated volatilities of inflation, the output gap and the yield curve to examine volatility of interest rates and other main macroeconomic variables. Their results suggest that volatilities in key variables under different monetary-policy framework (commitment vs. discretion) are strongly dependent on general preconditions (normal times vs. financial distress).

Eiffinger, Schaling and Vehagen (2000) analyzed the relevancy of the term structure of interest rates for the transmission process of the monetary policy. Authors identified and empirically tested the long-term interest rates as a crucial indicator for monetary policy discretionary changes. Emiris (2006) decomposed long-term interest rates into term premium and inflation premium to investigate the sources of average premium on 10-year government bonds variability. Author also examined responses of the term premia to the different shocks. Fendel (2009) intended to support the empirical findings on the information content of the term structure of interest rates for monetary policy. Kulish (2007) analyzed two roles (first, as a key determinant in the reaction function of the monetary authority; second, as instruments of policies) that long-term nominal interest rates can play in the conduct of the monetary policy. McGough, Rudebusch and Williams (2005) investigated the problem of short-term versus long-term interest rates suitability to operate as a monetary policy instrument. Authors highlight and discuss a crucial role of inflation expectations and real interest rate for selecting the most appropriate interest rate as a key pillar of a monetary policy framework. Michaud and Upper (2008) identified the origins of interbank interest rates volatility by examining the possible determinants of the risk premium contained in the money market interest rates. Rudebusch, Sack and Swanson (2006) examined the origins and implications of changes in bond term premiums for economic activity to analyze the stability of long-term interest rates. Authors also analyzed empirical relationship between short-term and long-term interest rates.

St-Amant (St-Amant, 1996) employed bivariate SVAR model to analyze the impact of expected inflation and ex-ante real interest rates on the nominal interest rates volatility of government bonds with maturity one year and ten years in the U.S.A. Following author's results we may conclude that inflation expectations seems to prevailing determinant of nominal interest rate volatility since the beginning of 1970s till the middle of 1980s, whereas shifts in expected real interest rates substantially contributed to the nominal interest rates volatility during the first half of the 1990s. Deacon and Derry (Deacon a Derry, 1994) provided a variety of methods for identification of market interest rate and inflation premium from the interest rates associated with government bonds. Engsted (Engsted, 1995) implemented cointegration analysis and VAR methodology to examine properties of interest rates and inflation time series. Neely and Rapach (Neely and Rapach, 2008) analyzed time series for real interest rates employing growth equilibrium model. Authors dedicated extra effort to investigate a presence of persistence patterns especially in medium and long time period. Ragan (Ragan, 1995) analyzed time structure of nominal interest rates to estimate inflation expectations of agents. Results of his empirical investigation provided interpretation of the real interest rate volatility over time. Crowder and Hoffman (Crowder and Hoffman, 1996) analyzed mutual interconnections between inflation and interest rates. Implemented SVAR methodology helped authors to isolate permanent and temporary sources of volatility for nominal interest rates and inflation time series. Lai (Lai, 2004) examined properties of time series for real interest rates. Author investigated conditions to maintain a time series stacionarity under changing length of base period. Garcia and Perron (Garcia and Perron, 1996) analyzed long-run features of time series for real interest rates in the U.S.A. Lanne (Lanne, 2002) verified a validity of Fisher effect following the results of long-run interconnections testing between inflation and nominal interest rates in the U.S.A.

3. Econometric Model

In the paper we employ methodology introduced by Blanchard a Quah (Blanchard, Quah, 1988) who estimated bivariate model with two types of exogenous shocks. To identify structural shocks authors implemented identification scheme based on decomposing effects of the shocks into permanent and transitory components. Long-run identifying restrictions were applied on the variance-covariance matrix of reduced form VAR residuals.

Following our objective we estimate a model consisting of the vector of endogenous variables X_t and the same number of primitive (structural) shocks. Unrestricted true form of the model is represented by the following infinite moving average representation:

$$X_t = A_0 \varepsilon_t + A_1 \varepsilon_{t-1} + A_2 \varepsilon_{t-2} + \ldots = \sum_{i=0}^{\infty} A_i \varepsilon_{t-i} = \sum_{i=0}^{\infty} A_i L^i \varepsilon_t \tag{1}$$

or

$$\begin{bmatrix} ir_{n,t} \\ p_t \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} \varepsilon_{p^e,t} \\ \varepsilon_{ir_r^e,t} \end{bmatrix} \tag{2}$$

where $X_t = \begin{bmatrix} ir_{n,t}, p_t \end{bmatrix}$ is n x 1 vector of the endogenous macroeconomic variables ($ir_{n,t}$ – long-term nominal interest rate, p_t – rate of inflation), $A(L)$ is a n x n polynomial consisting of the matrices of coefficients to be estimated in the lag operator L representing the relationship among variables on the lagged values, ε_t is n x 1 $\left(\varepsilon_t = \begin{bmatrix} \varepsilon_{p^e,t}, \varepsilon_{ir_r^e,t} \end{bmatrix} \right)$ vector of identically normally distributed, serially uncorrelated and mutually orthogonal errors (white noise disturbances that represent the unexplained movements in the variables, reflecting the influence of exogenous shocks):

$$E(\varepsilon_t) = 0, \quad E(\varepsilon_t \varepsilon_t') = \Sigma_\varepsilon = I, \quad E(\varepsilon_t \varepsilon_s') = [0] \quad \forall t \neq s \tag{3}$$

we assume two exogenous shocks that contemporaneously affects endogenous variables – inflation expectations shock $\left(\varepsilon_{p^e,t} \right)$ and expected real interest rates shock $\left(\varepsilon_{ir_r,t} \right)$.

Residuals of vector ε_t represent unexplained movements in variables (the effects of exogenous shocks hitting the model); however as functions of structural shocks effects they have no economic interpretation and cannot be directly observed due to the complexity of information that are included in the true form VAR residuals. At the same time, the shocks in the reduced form are likely to be correlated so they cannot be considered as true structural shocks. As a result, structural shocks cannot by correctly identified. However, structural shocks can be still recovered using a transformation of the true form representation into the reduced-form by imposing a number of identifying restrictions. The applied restrictions should reflect some general assumptions about the underlying structure of the economy and they are obviously derived from the economic theory (Faust and Leeper, 1994). However, the restrictions based on theoretical assumptions should be empirically tested to avoid shocks identification bias and imprecisions associated with the endogenous variables responses to the shocks.

It is than necessary to transform true model into following reduced form:

$$X_t = u_t + C_1 u_{t-1} + C_2 u_{t-2} + \dots = \sum_{i=0}^{\infty} C_i u_{t-i} = \sum_{i=0}^{\infty} C_i L^i u_t \tag{4}$$

or

$$\begin{bmatrix} ir_{n,t} \\ p_t \end{bmatrix} = \begin{bmatrix} c_{11} & c_{12} \\ c_{21} & c_{22} \end{bmatrix} \begin{bmatrix} u_{i^e,t} \\ u_{ir_r^e,t} \end{bmatrix} \tag{5}$$

where $C(L)$ is a $n \times n$ polynomial of matrices with coefficients representing the relationship among variables on the lagged values and u_t is a $n \times 1$ vector of normally distributed errors (shocks in reduced form) that are serially uncorrelated but not necessarily orthogonal:

$$E(u_t) = 0, \quad \Sigma_u = E(u_t u_t') = A_0 E(u_t u_t') A_0' = A_0 A_0', \quad E(u_t u_s') = [0] \quad \forall t \neq s \tag{6}$$

Relationship between reduced-form VAR residuals (u_t) and structural shocks (ε_t) can be summarized from equations (1) and (4) as follows: $u_t = A_0 \varepsilon_t$. Matrices C_i we obtain from estimated equation (1). Considering $A_i = C_i A_0$, we can now identify matrix A_0. The identification of matrix A_0 requires a definition of n^2 elements (4 restrictions). We begin with $n(n+1)/2$ restrictions imposed on the covariance matrix (3 restrictions). Two restrictions are simple normalizations, which define the variance of the shocks $\varepsilon_{p^e,t}$ and $\varepsilon_{ir_r,t}$ (it follows the assumption that each of the disturbances has a unit variance, $\mathrm{var}(\varepsilon) = 1$). Third restriction comes from an assumption that identified shocks are mutually orthogonal (uncorrelated). Normalization together with an assumption of the orthogonality implies $A_0' A_0 = \Sigma$, where Σ is the variance covariance matrix of $\varepsilon_{p^e,t}$ and $\varepsilon_{ir_r,t}$. SVAR methodology decomposes the series into its permanent and temporary components. The final restriction, which allows the matrix A_0 to be uniquely defined, represents the long-run identifying restriction providing that a cumulative effect of expected real interest rate shock to the nominal interest rates variability is zero. Long-run identifying restrictions enable us to isolate temporary and permanent sources of nominal interest rates volatility and thus to distinguish effects of both structural shocks on endogenous variables of the model.

The equation (2) we can now rewrite to the following form:

$$\begin{bmatrix} ir_{n,t} \\ p_t \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ . & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{i^e,t} \\ \varepsilon_{ir_r^e,t} \end{bmatrix} \tag{7}$$

Correctly identified model can be finally estimated employing SVAR methodology as the system is now just-identified. Variance decomposition and impulse-response functions are computed to observe a relative contribution of inflation expectations and expected real interest rates shocks to the nominal interest rates conditional variance as

well as the overall responsiveness of nominal long-term interest rates to one standard deviation inflation expectations and expected real interest rates shocks.

4. Data and Results

We've estimated bi-variate SVAR model for each Euro Area member country to estimate variance decomposition and impulse-response functions for long-term nominal interest rates. In order to estimate the sources of conditional variability of long-term interest rates as well as their responsiveness to the identified structural shocks we have employed monthly data for the period of 2000M1–2007M12 (model A) consisting of 96 observations and for the period of 2000M1–2016M5 (model B) consisting of 197 observations were employed for the interest rates on government bonds with 10-year maturity and inflation based on consumer prices. Estimation of two models for each individual country should be helpful in examining crisis related effects on calculated results. Time series for inflation were seasonally adjusted. Time series for all endogenous variables were collected from IMF database (International Financial Statistics, August 2016).

4.1. Variance Decomposition

Instability of the correlation between long-term interest rates and inflation as well as changing patterns in the price level dynamics during the pre-crisis and crisis periods reveals questions associated with a stability of long-term inflations expectations (Chernov and Mueller, 2012; Vayanos and Vila, 2009). Moreover, the relative importance of inflation expectations in determining long-term interest rates requires rigorous investigation. Increasing importance of this objective is even highlighted considering that near zero inflation environment makes the relative importance of inflation expectations quite ambiguous. Moreover, expected real interest rates (Eijffinger, Schaling and Verhagen, 2000) do not seem to be the only (though still significant) driver of the nominal interest rates movements during the deflationary periods (Arouba, 2014). However, increased uncertainty on the financial markets, excessive liquidity fueled by the conduction of the unconventional monetary policy and time deformation of the yield curves (Campbell and Shiller, 1991) provide mixed suggestions on the relative importance of expected real interest rates in determining long-term nominal interest rates (Bindseil and Winkler, 2012; Borio and Disyatat, (2009).

Table 1 summarizes relative contributions of the inflation expectations and expected real interest rates shocks to the conditional variance of long-term nominal interest rates on 10-year government bonds in the new Euro Area member countries during pre-crisis (model A) and extended (model B) periods. Variance decomposition enables us to examine the relative importance of both structural shocks in explaining long-term nominal interest rates fluctuations over different time horizons (Gürkaynak, Sack and Wright, 2007; Haubrich, Pennacchi and Ritchken, 2012). Because we have employed bi-variate VAR model and employed scheme to identify just two (mutually uncorrelated) structural shocks the sum of both shocks in each particular horizon in both models for all countries is equal to 100 per cent. Moreover, following our identification scheme considering that shock of expected real interest rates is neutral in determining nominal interest rates in the long-run, the contribution of this shock to the variance of nominal interest rates gradually approaches zero percent.

Our results indicate that expected real interest rate clearly dominates in explaining immediate and short-term fluctuations of the long-term nominal interest rate in models for both pre-crisis and extended period in all countries. However, over increasing time horizon its contribution the variability in nominal interest rate clearly decreases and is equal to zero in long run as we have assumed. It also implies that the role of inflation expectations in explaining short-term movements of nominal interest rate is quite low thought their importance continuously raises with increasing time horizon and dominates in the long run.

Table 1 Variance Decomposition of Long-term Nominal Interest Rates (in per cent)

Estonia					Lithuania					Latvia				
Horizon (months)	Expected real interest rates		Expected inflation		Horizon (months)	Expected real interest rates		Expected inflation		Horizon (months)	Expected real interest rates		Expected inflation	
	A	B	A	B		A	B	A	B		A	B	A	B
1	78.71	60.03	21.29	39.97	1	77.21	64.18	22.79	35.82	1	74.29	67.29	25.71	32.71
6	69.38	53.56	30.62	46.44	6	70.44	60.37	29.56	39.63	6	68.98	59.21	31.02	40.79
12	59.45	48.21	40.55	51.79	12	56.22	45.29	43.78	54.71	12	51.14	48.61	48.86	51.39
24	40.49	35.69	59.51	64.31	24	32.74	31.36	67.26	68.64	24	31.05	29.40	68.95	58.60
48	21.86	20.54	78.14	79.46	48	18.16	16.22	81.84	83.78	48	22.45	23.26	77.55	76.74
long-term	0.00	0.00	100.00	100.00	long-term	0.00	0.00	100.00	100.00	long-term	0.00	0.00	100.00	100.00

Slovenia					Slovak republic				
Horizon (months)	Expected real interest rates		Expected inflation		Horizon (months)	Expected real interest rates		Expected inflation	
	A	B	A	B		A	B	A	B
1	71.49	68.11	28.51	31.89	1	73.15	71.23	26.85	28.77
6	65.24	61.27	34.76	38.73	6	69.53	65.67	30.47	34.33
12	58.56	50.14	41.44	49.86	12	62.67	56.22	37.33	43.78
24	39.16	35.05	60.84	64.95	24	43.18	38.12	56.82	61.88
48	15.17	14.77	84.83	85.23	48	17.97	16.95	82.03	83.05
long-term	0.00	0.00	100.00	100.00	long-term	0.00	0.00	100.00	100.00

Note: Relative contributions of structural shocks to the conditional variance of long-term nominal interest rates on 10-year government bonds in models A (2000M1–2007M12) and B (2000M1–2016M5).
Source: Author's calculations.

While the response patterns of the long-term nominal interest rates followed quite similar scenario in all new Euro Area member countries we have observed some differences in the relative contributions of both shocks to the nominal interest rates determination in individual countries. Results seem to be also sensitive to the underlying period as the contribution of both shocks to the nominal interest rates determination has slightly changed when comparing models for pre-crisis and extended period. However, differences between both models are less considerable because the model for the extended period includes time series for the pre-crisis period.

Relative importance of expected real interest rates during the first year since the shock in explaining unexpected movements in nominal interest rates clearly dominated during the pre-crisis period in all countries. However, the role of inflation expectations continuously increased and generally dominated since the sixteenth month since the shock. It seems that inflation expectations are more persistent and sudden changes in inflation expectations requires more time to induce changes in the long-term interest rates. While the relative contribution of both shocks to the unexplained fluctuations in the nominal interest rates followed a rather similar pattern in all countries from the group, crisis period brought some changes to the determination of nominal interest

rates. Results for the extended period indicate more significant increase in the relative importance of inflation expectations in determining long-term nominal interest rate in the Baltic countries in comparison with the Slovak republic and Slovenia. Estonia, Latvia and Lithuania experienced the most significant drop in the dynamics of the price level during the early stage of the crisis period that is why the more significant increase in the role of inflation expectations seems to be reasonable.

4.2. Impulse-Response Functions

Figure 2 summarizes responses of nominal interest rates on 10-year government bonds to the positive one standard deviation shocks of inflation expectations and expected real interest rates in the new Euro Area member countries during pre-crisis (model A) and extended (model B) periods.
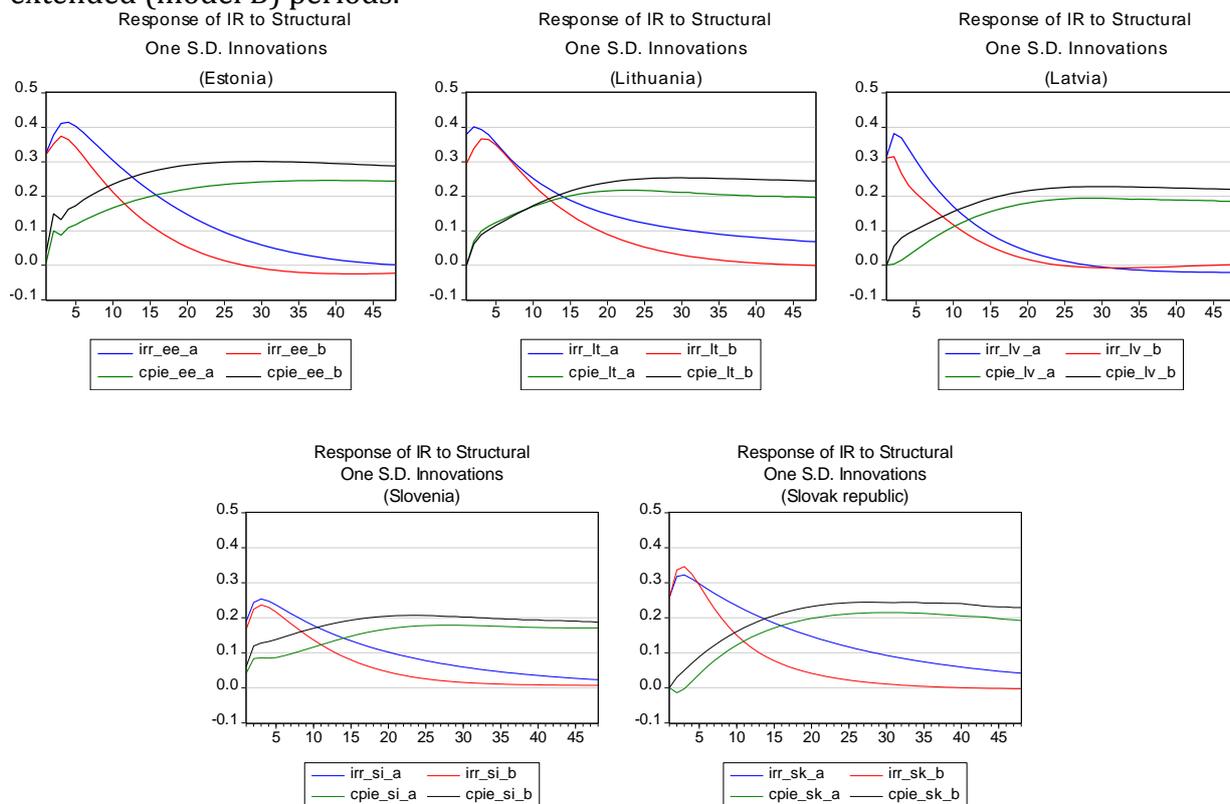
Figure 2 Responses of Long-term Interest Rates to Shocks of Inflation Expectations and Expected Real Interest Rates
Note: Curves represent responses of long-term nominal interest rates (IR) to the positive one standard deviation inflation expectations shock (CPIE) and expected real interest rates shock (IRR) in models A (2000M1–2007M12) and B (2000M1–2016M5).
Source: Author's calculations.

Impulse-response functions of long-term nominal interest rates revealed mostly similar response patterns of interest rates on 10-year government bonds to the underlying shocks across all countries though we have observed some differences between Baltic economies and the Slovak republic and Slovenia.

Expected real interest rates dominated in determining long-term interest rates during almost whole first year since the shock in all new Euro Area member countries. Nominal interest rates immediately increased after the positive expected real interest rate shock. However, responsiveness of nominal interest rates to the shock of expected

real interest rates was slightly higher in the Baltic countries. Effect of the shock culminated within first three months and then steadily died out during subsequent two years since the shock in the whole group of countries. Nominal interest rates in the Baltic countries seem to be more responsive to the expected real interest rate shock in comparison with the Slovak republic and Slovenia.

Effects of the expected real interest rates shock on the long-term nominal interest rates gradually decreased with increasing time horizon and completely died out in the horizon of 2 to 4 years since the shock in the respective country. As a result, effect of this shock is neutral in the long run that corresponds to our assumptions in the model specification and structural shocks definition. However, expected real interest rates remain a significant driver of the long-term nominal interest rates movements in the short run.

Immediate responsiveness of long-term interest rates to the positive inflation expectations shock was generally negligible (in comparison with expected real interest rates shock) though the intensity of the shock continuously increased over time. As a result, effects of inflation expectations on long-term nominal interest rates are much stable with increasing time horizon in all new Euro Area member countries. While short-term (within first twelve months since the shock) response of interest rates to the shock of inflation expectations was generally lower than in case of expected real interest rates, it remained positive and stable with increasing time horizon and even permanent in the long run. Positive effect of the shock culminated till the end of the second year since the shock. The shock of inflation expectations clearly dominated in the medium term in determining long-term nominal interest rates and our results confirm its permanent effect on interest rates in the long run (though with reduced intensity in all countries).

Crises period affected responsiveness of interest rate on 10-year government bonds to the shock of inflations expectations in all five countries. Vulnerability of long-term nominal interest rates to the shock of inflation expectations in all countries increased.

Examined differences in the responsiveness of the long-term interest rates to the inflation expectations shocks in the new Euro Area reveals many opened questions associated with suitability of monetary policy conducted by ECB in the single currency area consisting of significantly heterogeneous countries. Implications of quantitative easing accompanied by near zero levels of the key interest rates aiming to boost the inflation may be biased due to existing differences in the role of inflation expectations among individual new Euro Area member countries.

5. Conclusion

Examination of the relative importance of inflation expectations and expected real interest rates in determining long-term nominal interest rates on 10-year government bonds in the new Euro Area revealed interesting implications. Increased contributions of expected real interest rates (short-term period) and inflation expectations (long-term period) to the development of long-term nominal interest rates represent clear signal of markets to policy makers and possible scenarios of boosting inflation (ECB) and economic growth (national governments) in the new Euro Area member countries.

Acknowledgements

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Email marketing and generation Z: eye-tracking experiment

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Abstract

The massive expansion of the internet has brought fundamental changes in communication in the form of a variety of communication tools. One of the most widespread and most used tool is email. This tool also became very popular for direct marketing; it represents channel that allows companies to communicate with their customers. Proposed paper presents outputs of eye-tracking experiment conducted with 53 participants of generation Z. The experiment was designed as A/B testing of 12 selected newsletters with the aim to test layout changes: change of the position of elements, removal or shortening of the text, removal of the element announcing discount, mirror reflection. Within the experiment the in-depth interviews were conducted together with a method of reaction cards.

Keywords: eye-tracking, email marketing, newsletter, A/B testing, consumer behavior

JEL Code: M37, M31

1. Introduction

During past two decades the evolution of marketing and marketing communication has experienced an earthquake of traditional paradigms caused by the internet and its commercialization. One of the services offered by the internet which had a significant impact on communication is email. In the context of marketing communication, email offered a new instrument for direct marketing. This advertising activity creates and utilizes a direct

relation to the user or customer with the aim to deliver marketing message without an intermediary person in a customer-favorable format (Bird, 2007).

Waldow and Falls (2013) describe email marketing as a marketing channel that allows communication en masse with customers, prospects, fans and subscribers. This channel is used by companies and individuals to spread their message, which may serve to alert people to upcoming events, new business developments and new product and service announcements.

According to Email Statistics Report, 2016–2020 (Radicati Group, 2016) in 2016 there were 2.67 billion users of email with an expected 3% growth year on year. Thus by the end of 2020 this number will increase up to 3.04 billion email users. Regarding effectiveness of email marketing, 83% of B2C marketers in North America use email marketing and 67% of them rated it as the most effective tactic (B2C Content Marketing, 2016).

Its physical costs that are substantially less than those of direct mail belong among the main advantages of email marketing (Chaffey, 2013). Gao (2014) also mentions ability of tracking which brings the ability to track sales back to a source and thus generate clear, easily understandable metrics. Another advantage of email marketing is that it is easily accessible and shareable so it provides quick ability to share information via its forwarding (Gao, 2014). Among the disadvantages of email marketing Fariborzi and Zahedifard (2012) classify problem of deliverability, renderability and decay of e-mail response. Problem of deliverability is based on the inability to deliver email due to existence of junk-mail filters. Renderability is also problem caused by technological differences when within the in-box of different Email reading systems it is difficult to display the creative as it was intended.

There are many different approaches when delivering e-mail marketing messages. According to Ellis-Chadwick and Doherty (2010) who conducted content analysis over almost 1000 promotional emails sent over an 18-month period by twenty leading U.K. e-retailer, content of e-mail marketing messages can be based on different formats, such as web pages in the mail box, product catalogs or newsletters. In order to sustain customer's attention senders can include a broad range of interactive features and hyperlinks. Within their study Ellis-Chadwick and Doherty (2010) further report that 100% of marketing emails use a subject line and thus the content of subject line is critical for grabbing attention. Use of illustrations is another factor which was present in more than 90% of researched cases and therefore Ellis-Chadwick and Doherty (2010) justify pictures for their ability to help engage the readers and sustain attention.

Nielsen Group's report (2006) as well as Edisona's research report (2013) both conducted with eye-tracking technology, reveal that users read web pages in an F-shaped pattern: two horizontal stripes followed by a vertical stripe. According to Nielsen Group (2006) the predominant user behavior when reading newsletters is scanning. Participants fully read only 19% of newsletters and 35% of the time only skimmed a small part of the newsletter or glanced at the content.

Regarding email content Edisona (2013) suggests to concentrate on short paragraphs and proves the higher the text is placed, the higher the chance it gets read. According to Butler (2009) the text of marketing email should not exceed 4–6 paragraphs at any issue. The emailing elements that always draw eyesight first are faces (Edisonda, 2013). Kringelbach et al., (2008) stats that faces are elements which match closely in terms of attractiveness. According to Galfano et al. (2012), human beings have a natural tendency to follow the gaze of the others. So the pictures that are used in marketing emails should be chosen in a way that leads the readers' eyes to the promoted subject (Edisona, 2013).

2. Methodology and Data

The research was conducted in form of eye-tracking experiment with subsequent questioning in form of in depth interview in November 2015. There were 53 respondents taking part in the experiment aged from 19 to 25, selected as a relevant representative of Generation Z. The research was conducted as a part of master degree work written by Sukeníková (2016).

The experiment was carried out in form of A/B testing which is based on using of two groups of respondents. One half of respondents (A) was shown the original version of the stimulus and the second half (B) the modified stimulus. Within the A/B testing there were these adjustments on images used as stimuli applied: *removal or shortening of text*, *change of the position of elements*, *removal of the element announcing discount*, *mirror reflection*. These changes were made via graphic editors Zoner Photo Studio 17 and Adobe Photoshop CS 6.

For eye-tracking investigation the remote eye-tracker SMI RED 250 at a sampling frequency of 125 Hz was used. The eye-tracker was affixed to the bottom edge of a monitor having a screen size 22-inch and a 16:10 aspect ratio. Respondents were in viewing distance of about 60 centimetres from monitor. The initial step in the experiment was to calibrate the eye-tracker to the respondent's sight. This was carried out by using nine-point auto calibration with subsequent four-point verification. Afterwards, presentation of the stimuli in randomized order continued. The task of the respondents was to view each individual stimulus and then answer the questions concerning the stimulus shown.

The questioning had two parts. The first questioning was done immediately after the stimulus, whereby the respondents were asked whether they were interested in the displayed newsletter and whether they would like to visit its landing page. Within the second questioning which came after all the stimuli had been shown, the respondents were asked for their identification information.

After the eye-tracking investigation each session continued with in-depth interview about previously viewed stimuli and also about respondent's relation to the email marketing and his/her behaviour in this field. Within interview a method of reaction cards was used to obtain deeper insight about observed stimuli.

For processing the study results the SMI BeGaze software was used to analyse the eye-tracking data in more detail. The first step carried out was to cleanse the data of respondents with high signal losses or marked signal calibration deviations. Within this study there was a problem with one participant whose data were distorted with signal losses and thus were removed from most stimuli.

Subsequently, using the editor implemented in the BeGaze program, the Areas of Interest (AOI) were created. The Area of Interest (AOI) was created over such parts of the image that were the subject of changes between the A/B testing. The monitored metric for each area of interest was in particular the time spent observing the AOI, referred to as Dwell Time, measured in milliseconds. For illustrating the findings, we also generated 'heat maps' that display data by using the colour spectrum, whereby the greater the intensity of the observation of the image elements the more pronounced is the red colouration. For the analysis of the data obtained and the influence of individual stimuli, the statistical characteristics were supplemented with the independent-samples T-test, Chi-square test and the two-way ANOVA. The data was analysed using IBM SPSS software.

3. Results

The primary goal of our research was to analyse which changes in the layout can be perceived by respondents and whether this changes can turn out to be important for them at all. The first group of tested stimuli were stimuli with changed position of elements. As stimuli in this group there were used the newsletters of three different B2C companies: Mango (fashion), Drmax (health&beauty) and Vivantis (fashion). Company logo was moved from the top left corner (A) to the top right corner (B) in case of Mango stimulus. Horizontal position changes of elements were conducted in cases of Drmax and Vivantis stimulus. Element with a free shipping announcement was moved from upper part (A) to the bottom part (B) of Drmax stimulus. Inverse approach was used in case of Vivantis stimulus where a call to action element was moved from bottom part (A) to the upper part (B). To verify the influence of element position on observation Dwell Times we used statistical hypothesis testing. Hypothesis #1 assumes that the picture element does not [sic] exhibit a different value of the observation Dwell Time when positioned in a different part of newsletter. The results of the individual tests are summarized in Table 1.

Table 1: Results of hypothesis #1

Stimulus	Version	Test	Sig. Value	Hypothesis accepted
Mango	A: Avg. Dwell Time = 354.1756	Indep.-samples T-test	0.706	H0
	B: Avg. Dwell Time = 318.6304			
Drmax	A: Avg. Dwell Time = 1808.0756	Indep.-samples T-test	0.026	H1
	B: Avg. Dwell Time = 1041.9126			
Vivantis	A: Avg. Dwell Time = 225.7348	Indep.-samples T-test	0.046	H1
	B: Avg. Dwell Time = 548.9685			

According to α = 0.05 significance level, the null hypothesis cannot be rejected in a case of the first tested newsletter (Mango). Thus, the manipulation with the element in vertical position does not play significant role on its time of observation. Presumably, this is caused by position of element which was situated on the top of the screen.

In a case of Drmax stimulus the null hypothesis is rejected at α = 0.05 significance level and we adopt the alternative hypothesis, i.e. that there is a dependency between the position of element and its time of observation. Same situation is in case of Vivantis stimulus. In both cases the average Dwell Time indicates the apparently higher level of concentration of attention to the top part of stimulus.

Within the second group of stimuli, removal or reduction of the text was tested. This test was based on the results from Nielsen Norman Group (2007) according to which people read only very little the introductory text and skip their eyes to more actionable content. For this purpose there were used newsletters: Alza (electronics), Datart (electronics) and Martinus (education). In case of stimuli Alza and Datart the text block containing specifications of the products was removed. In both stimuli there were two products visualized. In case of stimulus Martinus, the introductory text was shortened and in this stimulus there was one product visualized. To verify the relationship between the presence or length of text and the Dwell Time of observation of product related to this text we used hypothesis #2. The AOIs for this testing were products visualised in presented newsletters. The results for each stimulus are summarized in Table 2. Similarly as in previous test, the original stimulus is represent in version A and the modified in version B.

Table 2: Results of hypothesis #2

Stimulus	Version	Test	Sig. Value	Hypothesis accepted
Alza	A: Avg. Dwell Time = 2802.2404 B: Avg. Dwell Time = 4663.5767	Indep.-samples T-test	0.045	H1
Datart	A: Avg. Dwell Time = 786.0752 B: Avg. Dwell Time = 1215.8026	Indep.-samples T-test	0.045	H1
Martinus	A: Avg. Dwell Time = 1269.6560 B: Avg. Dwell Time = 2168.8441	Indep.-samples T-test	0.004	H1

For all three cases, the p-value is smaller than the $\alpha = 0.05$ significance level. So, all three tests significantly indicates that presence of descriptive text (in case of stimuli Datart and Alza) or length of the introductory text (in the case of stimulus Martinus) have the impact on the time of observation of product itself. Absence of the product specification apparently gave people an opportunity to focus more on the visualization of the products as well as shortening of introductory text. These results are also supported by values of the average Dwell Times, see Table 2. During the experiment respondents tended to avoid reading of long texts or deeper product descriptions and they skipped this parts to different type of content which attracted their attention more.

The third adjustment was focused on testing of influence of elements announcing discount. In this case the initial assumption was that people spend less time viewing the product in the version of stimuli with removed elements announcing discount. For this testing next three stimuli were used: Elnino (health&beauty), Sportisimo (sports) and Tesco (groceries). For this purpose the hypothesis #3 was: *Existence of the element announcing discount does not any influence on the attention on the product*. The A group of respondents was working with original stimuli while the B group had set of modified stimuli. In case of Sportisimo and Tesco stimuli the announcements "Sale" was removed. In case of Elnino announcements "Special deal" together with "Sale" were removed.

Also in case of the hypothesis #3 the independent samples T-test was used. According to p-values for all-three stimuli 0.700 (Tesco), 0.847 (Sportisimo) and 0.693 (Elnino) the null hypothesis cannot be rejected on 5% significance level. Thus removal of the element announcing discount does not have any influence on the attention of the product.

Table 3: Test of impact of presence "sale" and "discount" elements

Stimulus	Q1: interested in the newsletter	Pearson Chi-Square Test Sig. Value	Q2: visit website	Pearson Chi-Square Test Sig. Value
Sportisimo	yes = 32 (A: 13) no = 21 (A: 13)	0.108	yes = 32 (A: 14) no = 21 (A: 12)	0.251
Tesco	yes = 19 (A: 11) no = 34 (A: 15)	0.250	yes = 12 (A: 6) no = 41 (A: 20)	0.599
Elnino	yes = 38 (A: 19) no = 15 (A: 7)	0.535	yes = 35 (A: 15) no = 18 (A: 11)	0.166

Additionally, within these stimuli the test of impact of presence of elements "sale" and "discount" on interest in newsletter and willingness to visit website was conducted. For this purpose the answers on questions *"Are you interested in the newsletter?"* and *"Would you visit the website based on the newsletter seen?"* which were asked after each

stimulus were used. In this case the Chi-square test was used. The results for each stimulus are summarized in Table 3.

The p-value in all cases indicates that presence of elements "sale" and "discount" does not have any influence on interest in newsletter and willingness to visit website. So, the answers of both groups of respondents were not significantly different. Regarding individual evaluation of studied stimuli, the most interested newsletter was Elnino followed by Sportisimo. Due to fact that within the research there were more female respondents, the explanation of higher preference of newsletter with content oriented to women is offered. On the contrary respondents from Z generation were not interested in stimulus with the grocery topic (Tesco) so in this case respondents were either not keen on the topic or not interested in the portfolio of the products presented.

Another test, which was conducted as part of our experiment was focused on mirror reflections. Within this test the newsletters Student Agency (travel) and Lekarna (health&beauty) were used, where the text blocks, brand logo and headlines were mirror exchanged see fig. 1.

Figure 1: Mirror reflection

Intention of this test was to figure out which element – AOI (image or text) will gain higher eye attention in context of left-to-right reading order. To examine influence of category of element and its position within stimulus, two-way analysis of variance was used.

Table 4: Test of impact of presence "sale" and "discount" elements

Stimulus	Task	AOI Mean Dwell Time [ms]	Test	Sig. Value Task	Sig. Value AOI	Sig. Value Task*AOI
Student Agency	A	Picture = 2354.695	Two-way ANOVA	0.145	0.000	0.205
		Text = 22773.236				
	B	Picture = 2699.048				
		Text = 27933.205				
Lekarna	A	Picture = 2426.420	Two-way ANOVA	0.076	0.000	0.226
		Text = 5291.488				
	B	Picture = 2870.577				
		Text = 7624.269				

According to p-values for both stimuli, the "Task*AOI" interaction is not a statistically significant. Also, we can see from the table above that there was no statistically significant difference in mean Dwell Time between tasks A and B (p = 0.205), but there were statistically significant differences between AOI (p < 0.05).
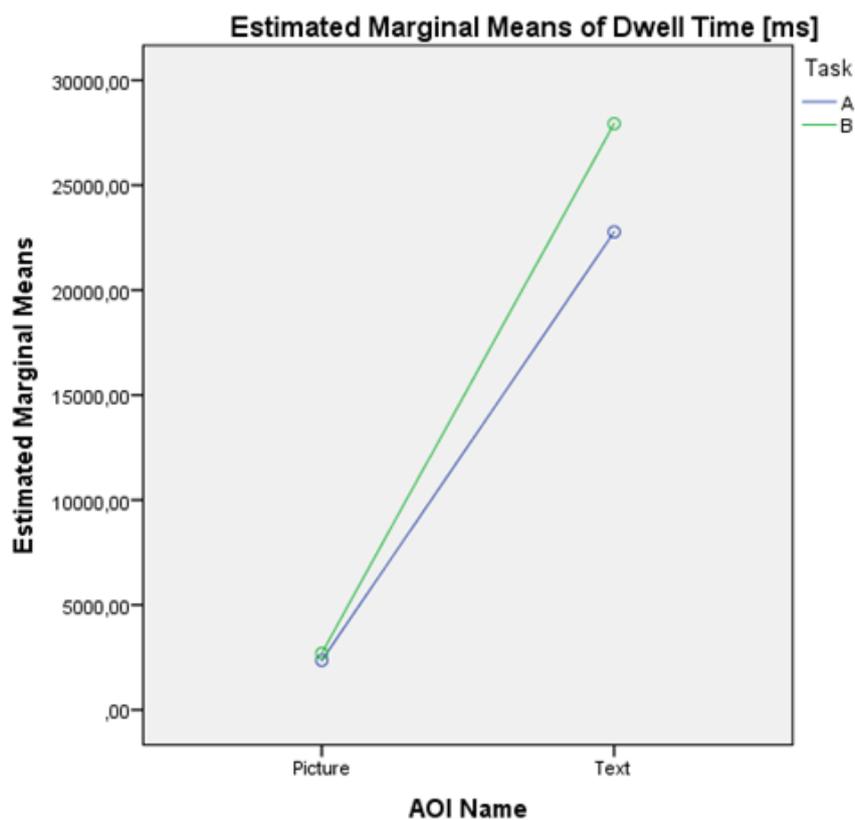
Figure 2: Estimated Marginal Means of Dwell Time – Student Agency stimulus

The difference between AOI is presumably caused by differences between observed elements. Reading of text will take more time than observing of image. This conclusion is also obvious from graph on Figure 2. According to our results, the elements gained respondents' attention slightly more in the modified element than in the original one.

4. Discussion and Conclusions

Several similarities were recognized in comparison to eye tracking results of Edisona's research report (2013). Edisona carried out an A/B testing experiment too and compared the gaze activity of both groups of participants. Alike in this study, an email design with a reduced introductory made people look at the products more intensively. The case study gave the conclusion that the introductory text should be used only when it is necessary and as short as possible. Regarding arrangement of the elements it recommends to place the most important information in the top of the list; the most important product should be placed in the top left corner of the product list. The own research confirmed this observation.

Future visual research on email marketing can employ eye-tracking in exploring how people allocate visual attention when navigating content with dynamic elements (videos or animations). Furthermore, this work only shows observational behaviour with respect to desktop email newsletters. With the prevalence of mobile devices allowing people to access email newsletters more conveniently, future studies may seek to investigate the gaze behaviour displayed on smartphones.

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A Proposal on EU reforms

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Abstract

The author analyses the wider framework of European Commission strategic decisions. For the analysis of the European Union status quo, the force field model is used. The inadequate EU performance in playing its global role, the inability to handle current affairs and the delays in decision-making and implementation processes are considered by the author to be the most probable obstacles of EU moving towards the desirable state of dynamic stability, which can be characterised by a well integrated political, legislative, economic and cultural environment. Within this context, the author recommends to facilitate the specific changes within the EU control and organisational systems in order to strengthen the effectiveness and efficiency of EU functioning.

Keywords: European Commission, strategic decision process, force field model, EU global player, EU control system, EU organisational system, specific changes.

JEL Code: M16, F22, H11

1. Introduction

In the course of 2016 the European Union found itself in a difficult stage of its political, economic and cultural development. Such a development has been due to different external and internal factors. The Global Risks Report (WEF-Global Risks, 2016) issued regularly at the beginning of each calendar year by the World Economic Forum confirms the key role of geopolitical factors as related to the economic and cultural development of mankind. A destabilising role in the sustainable development of the European project has been mainly due to the inability of the European Commission and eventually the Council of Europe to handle promptly the massive economic migration. The underestimation of this problem by the European elites from the viewpoint of both inner safety and external threats and the political implications resulted in overall strengthening of nationalistic sentiments and distrust in the ability of European Commission to take rational decisions. Consequently, the United Kingdom citizens voted for Brexit in a referendum. It was the Conservative government that unwillingly influenced the process as well as the following events connected with negotiating about the future relationships with EU (Kroll, Leuffen, 2016) Political discussions centre on the issues of the common market and the future relationship between UK and EU. (Grauwe, 2016). Special atten-

tion is paid to the global strategy of EU and its defense policy after Brexit (Biscop, 2016) and (Whitman, 2016).

Globalisalition generated a permanently sustainable growth for generations. It made the world smaller and transformed it by interconnecting and strengthening the mutual dependence of national states and their economies. Nevertheless, the benefits resulting from globalisation were not equally divided – it can be said that a minority reaped too much of its fruit. Although the growth of emerging champions contributes to balancing the economic strength between countries, it is evident that on the world scale the economic disparity increases (WEF-Global Risks, 2011). The conclusions above were even more true during the following five years. Devastating in economic and political terms was the so called 'Arabic spring', not to mention the civil war in Syria supported from outside without taking into account the "functional Syrian government and the real Arabic national state with its historical roots" (Thatcher, 2002) and millions of refugees of whole families struggling along in refugee camps. This all leads to the largest exodus in the history of the modern world. In 2011 Syria ranked 111 in The Global Competitiveness Report (WEF-Global Competitiveness Report, 2011). As a memento, we should remember the outlook for world democracy outlined by Dahl (1989: 239).

Note. Six years ago, Syria was a dynamically developing country that in many branches overtook Turkey and Egypt. Tourism was starting to develop, with offered services at a higher level than at such destinations as e.g. Hurghada in Egypt. Medical care was at a high level. At the time when there were only three computed tomography detectors in the Czech Republic, this facility was available in each Syrian hospital. After export of Arabic spring the technology is far beyond the current level of development.

2. Methodology and Data

A basic model underlying research activities is the action research model – a data based, problem-solving model that replicates the steps involved in the scientific method of inquiry. The desired outcomes of the action research approach are solutions to the immediate organizational problems and a contribution to scientific knowledge and theory. The objective of this research is to assess the process of strategic decision-making of European Commission and propose elimination of revealed problems, which could negatively influence successful development of the European project. The basis for the audit is the strategic framework for decision-making of the European Commission created by Strategy 2020. To be able to objectively assess the complexity, changeability and ambivalence of EU internal and external factors, the author used the field force model whose adapted version known as Implementation Forces Analysis was used within the framework of the strategic management process for diagnosis of driving forces and forces of resistance to change. The proposed field force model characterising the EU status quo was preceded by content and comparative analysis of relevant data based on selected publications, journals and electronic sources. A synthetic inspiration source was 'The Global Risks Report 2016'(World Economic Forum, 2016). Consequently he formulates the hypothesis: "Fulfilling the global role of EU; Elimination of forced immigration to Europe; Transformation of EU to a political union – United States of Europe ".

3. Results and Discussion

3.1. Audit of the European Commission decision-making process

Let us analyse more closely the process of EC strategic decision-making, whose effectiveness substantially affects achievement of EU operational and strategic objectives including solution of crisis situations. First let us describe the role of EC: "European Commission defends the interests of EU in terms of international relations and is the 'guard' of agreements. The Commission also defends the unity of EU against individual interests of member states and fulfils the role of key moderator. Its impartiality and detached point of view should be stabilisation factors despite ideological differences of member states governments. **It can be seen as an executive body of EU with vast bureaucratic machine.** The strong political position of EC is supported by the fact that besides European civil initiative it is the only institution holding the right of legislative initiative in economic and currency union (secondary law). It controls compliance with European legislative and in case of infringement initiates bringing the case to the European Court of Justice. The institutional changes resulting from Lisbon Agreement, namely the new capacity of European Union 'President' (European Commission chairman) did not substantially affect the central political role of the Commission. European Commission is supervised by European Parliament, which can recall the Commission as a body"(Hodač et al., 2014). It should be noted that the decisive political strategy and priority objectives of European Commission should be clearly declared by the Council of Europe (Council of Europe President). The Council outlines, by consensus of prime ministers of individual member states, operational and strategic aims of European Commission. The progress to achievement of the set aims should be supervised by the European Parliament, and also by the Council of Europe President. Support for extension of management competences in favour of the Council of Europe President was clearly declared by Fabrini (2015). The incredibly slow handling of crises, e.g. involuntary large-scale immigration to Europe and the Ukrainian crisis on which some EU member states, Unites States and their allies participated in past years confirm this, and seriously harm the further positive development of the European project. The complexity and difficulty of strategic decision-making of European Commission, Council of Europe, European Parliament and European Central Bank are represented by the force field model depicting the forces acting toward the further development of European integration including resistance forces. Their subsequent acting defines the dynamic balance of EU, see Figure 1.
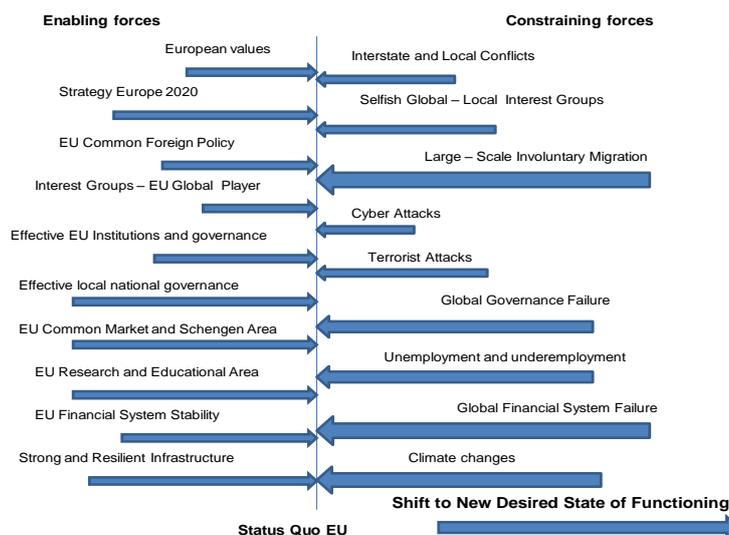
Figure 1: Force Field Analysis – Status Quo EU (Source: own processing)

The audit of strategic decision-making of EC comes from the force field model, see Figure 1 supplemented with a rough estimate of the magnitude of acting driving forces and restraining forces based on the probability of their occurrence and rate of impact. The values are taken from The Global Risks Report (**WEF, 2016**). The set of driving forces contains forces favourably affecting the political, economic and social stability of EU and contributing to its further development. The author includes the following forces:

European Values, rooted in Antic, Jewish and Christian tradition of European thinking.

Strategy Europe 2020 is creating the conceptual and system framework for medium and long-term strategic management of EU by the European Commission. The contemporary architecture of Strategy Europe 2020 does not integrate namely the common foreign policy.

EU Common Foreign Policy creating good to optimal conditions for supplying the European project with specific proactive activities for its development. It is the deficit of implementation of well formulated EU global strategy published 30 October 2015 that is currently the source of instability and uncertainty in the further heading of EU. Its effective implementation requires proactive and dynamic decision-making and implementation process on the level of EU bodies and member states.

Interest Groups – EU Global player especially the functioning of EC and its operational and legislative initiative are strongly influenced by professionally managed lobbyist groups. The need to strengthen the influence of interest groups focussing on increasing the significance of EU in approaching current global international political topics (civil war in Syria, increasing political and safety instability of Libya, Arabic spring and its consequences etc.) is evident and in the interest of the European project continuation.

Effective EU Institutions and Governance are crucial for the viability and further political, economic and cultural development of EU. Namely the effectiveness and efficiency of their operation in the context of current global and local problems are largely

discussed. The lengthy and hardly understandable way of dealing with the phenomenon of large-scale immigration in terms of its consequences and inefficient efforts to cope with its complexity and roots seriously endanger the further development of EU.

Effective local national governances are preconditions to efficient functioning of national economies. Stable pluralist political systems of member states create a solid basis for a further development of European integration toward European federation, shifting the role of EU to global political and economic powers.

EU Common Market and Schengen Area represent one of the driving forces of European prosperity. Effective functioning of EU Common Market requires permanently optimal conditions. Essential is appropriate protection of the Schengen Area, at least on the level of protection of Great Britain or United States. Without such protection, a reasonable immigration policy with appropriate level of solidarity can be formulated with difficulty.

EU Research and Educational Area is also among the driving forces of EU economic prosperity and helps to create conditions for economic approximation of EU regions and sustainable development of EU. Aims of Strategy Europe 2020 are being achieved in this area. Investment into education and research should become the chief priority of all EU member states, including support from EU structural funds.

EU Financial System Stability is an essential condition of EU economic growth. In regard to the global close interconnection of the financial sector, the sources of instability, real or psychological, represent the driving forces of undesirable failure of financial institutions. The risks connected with the failure of the financial mechanism and institutions are still of importance in terms of occurrence probability and potential impact on global scale. In this respect, it should be stated that the functioning and regulation of the financial system are a high priority of EU.

Strong and Resilient Infrastructure is an essential condition of sustainable economic growth based on entrepreneur activities in the private and the public sector. Its continuing modernisation and suitable diversification can be significant driving forces of economic growth in a local and also global context. The development of infrastructure is massively supported mainly in new member states by investment from EU structural funds.

There is a set of restraining forces acting against the above mentioned set of driving forces of EU sustainable development, important for its political, economic and cultural development. Some of them can completely block successful development of EU. These forces are called potential blockers and are plotted with the strongest and longest lines. Successful implementation of the broader framework of Strategy Europe 2020 requires elimination of the restraining forces and maximal strengthening of the set of driving forces. In the following, the set of restraining forces will be discussed in detail.

Interstate and Local conflicts-the probability of occurrence and impacts of these risks is considerably high. It is sufficient to consider the local conflict in Ukraine and its economic and social impacts. A plain example is the civil war in Syria supported by six countries. Unforeseeable consequences of forced migration of Syrian population to Europe and migration from the neighbouring countries document the failure of global governance and cooperation with negative effects on EU and its allies.

Selfish Global – Local Interest Group. The growing strength of highly selfish professional interest groups forwarding their interests by lobbying and influencing political elites may have unforeseeable political, economic and social consequences, not only on local scale. We can speak about erosion of pluralist democratic systems. An example is the dying away financial crisis that brought about significant national debts and vast

social impacts. Understanding and elimination of these forces within the scope of European Commission are of increasing importance in both theory and practice (Eising et al., 2015; Klüver et al. 2015). In formulating the title of this restraining force the author was also inspired by Handy's conclusions (Handy, 1997: 216).

Large – Scale Involuntary Migration is a very probable blocker of the next development stage of the European project in terms of occurrence probability and potential political and economic impacts on EU competitiveness. Millions of involuntary migrants from **Middle East** are prepared to enter Europe. This large-scale immigration posing the danger of infiltration of terrorist groups represents a real threat to the stability of pluralist democratic political systems in Europe, and implies unemployment growth, social polarisation resulting from increasing income disparity and nationalism including increase of risks connected with inner safety. Fast and efficient protection of the Schengen Area will not solve the problem. The only reasonable outcome is well handled short-term political and economic stabilisation of Syria, Iraq and consequently Libya under the auspices of UN supported by a coalition of USA, EU, Russia and China.

Cyber Attacks are a real threat for the control systems of developed economies on both local and global scale. In terms of occurrence probability and potential social impacts they are a significant risk i.e. serious social threat.

Terrorist Attacks. In terms of potential social impact they represent a high risk, and higher occurrence probability can be expected especially in connection with the large-scale involuntary immigration to EU and infiltration by terrorist groups.

Failure of global governance consisting in isolated activities of world powers, or institutions striving to maintain and strengthen global influence or even dominance, taking no account of allies, represent a significant hybrid risks based on Machiavelli's divide and rule, with no respect to fundamental civilisation values.

Unemployment and underemployment – not achieved strategic aims in employment related to implementation of Strategy Europe 2020 may become a blocker of the continuing political and economic integration of EU. There is a high probability of their occurrence and impact. Moreover, it can be strengthened by large-scale immigration.

Global Financial System Failure is not a negligible risk mainly because of its impacts. Let us be reminded of the fundamental economic axiom: *A permanently sustainable economic growth of national economies and global economy requires a stabilised and efficient global financial system.*

Climate changes besides the large-scale involuntary migration, climate changes may be another blocker of economic development of EU, mainly due to the failure of adaptation mechanisms and reduction of their effects. In a medium-term horizon we may see extreme climate changes, natural disasters, water and food shortage.

3.2. Action hypothesis

Based on the results of analysis, the author proposes three action hypotheses as successive steps to the strengthening of the global role of Europe as an equal partner to the biggest global players – United States, Russia and China. Global economic and geopolitical interests will have to be in agreement with mutually beneficial cooperation.

3.2.1. Action Hypothesis: Fulfilling the global role of EU
Aim: Consistent enforcement of the global role of EU – Europe the first.

Intervention: The responsibilities of the EU High Representative for Foreign Affairs and Safety Policy must be immediately divided as the extent of powers and responsibilities exercised by one position is not acceptable. As a result, one person, though having a team of excellent aides, cannot efficiently act. We recommend the European Council to appoint to the European Commission the EU High Representatives listed below:

A. EU High Representative for Foreign Affairs – an EU minister for foreign affairs (ex minister for foreign affairs/expert and manager in one /Italy)

B. EU High Representative for Safety Policy – an EU minister of the interior (ex minister of the Interior/expert and manager in one /Germany)

C. EU High Representative for Defence – an EU minister for defence (ex minister for defence/expert and manager in one/France)

Within three months, the above EU representatives with their teams will elaborate the strategy of foreign policy/safety policy/defence policy for the period of three years. They will chair meetings of appropriate EU expert groups and will take an active part in international negotiations with the objective to prevent critical situations that would negatively affect the functioning of EU. The required legislative amendments will be enforced in cooperation with the Council of Europe and European Parliament in a shorter legislative cycle.

Discussion

The multipolarity issue of the global governance system as a potential source of political and economic instability can be the driving force of hybrid risks, which gain importance in the European context. It is also the geo-strategic competition between leading political and power blocks that can become the source of local power conflicts for various 'noble' reasons including implicit fight for rare sources. To support our conclusions let us present Blagden's research results (Blagden, 2015). Let us quote:" The international system is returning to multipolarity-a situation of multiple Great Powers-drawing the post-Cold War 'unipolar moment' of comprehensive US political, economic and military dominance to an end. The rise of new Great Powers, namely 'BRIC's-Brazil, Russia, India and most importantly, China-and the return of multipolarity at the global level in turn carries security implications for western Europe".

3.2.2. Action hypothesis: Elimination of forced immigration to Europe

Aim: With immediate effect, EU will accept only those economic migrants that will contribute to its economy, with possible individual exceptions

Intervention: EU High representatives in cooperation with our allies USA and UK and in cooperation with Russia and representatives of neighbouring countries will agree and ensure immediate termination of the war in Syria, induced and supported by greedy interest groups under the cover of implementation of pluralist democratic system in a prospering Arab country with a different cultural tradition. At the same time, it is essential to provide economic and military support for the termination of the conflict in Iraq and political and economic stabilisation of the country. And finally, political and economic stability must be achieved in Libya where intervention caused political instability and economic decay, thus creating a background for terrorism.

Discussion

Support for the current Syrian government and economic aid in the reconstruction of Syria should be of prime interest for EU as this would eliminate the sources of forced

massive immigration. Libya and Iraq as well represent a high risk. The claim of President Donald Trump that USA will not force on anyone its model of political system must be supported by EU. The above mentioned political, economic and military initiatives are crucial for a continuation of the European project. Political and legislative support should be provided by European institutions without hesitation.

3.2.3. Action Hypothesis: United States of Europe

Aim: Transformation of EU to a political union – United States of Europe

Intervention: To be able to fulfil its mission and ensure political, economically sustainable and cultural development of Europe, EU needs to take the following step – the transformation of economic and monetary union to a political union i.e. United States of Europe. This is an essential step to the strengthening of the negotiating position of Europe in the global world and increased safety.

The new American administration, which is right in putting emphasis on the obligations of NATO European members in terms of modernisation of armies with allocation of the required 2% of G.D.P., indirectly forces Europe to take its defence and inner safety seriously. It is out of the question that the European common market can function smoothly as an isolated system in the global reality. On the other hand, it is an open system, highly vulnerable without protection of the Schengen Area and inner safety. It can be concluded that fast and sophisticated building of European army and police that would be able, in cooperation with national military and security bodies of member countries, protect the European environment.

Discussion

United States of Europe will be committed to respect the territorial integrity of independent countries, also outside the European environment, and restrain from interfering in other countries' internal affairs. Emphasis on economic and cultural cooperation including respect to different religious and cultural traditions will be essential for keeping peace and increasing the quality of life on earth.

4. Conclusion

The future role of EU on the global level is aptly discussed by Russer and Anheier (2014). Let us quote: "What role will the EU play on the global stage? The struggle of some of its members in the current economic crisis, its apparent inability to punch its political weight in international negotiations or play a dominant part in international crisis management (the Arabic Spring, Syria) cast no doubt on the capabilities of the EU as a global player. In order to regain its strength, the EU has to deal with pressing economic and political questions. It has to provide a credible and feasible road map for economic recovery and social cohesion. At the same time, it has to increase the effectiveness and efficiency of European governance without risking its legitimacy etc. Only the combination of a functioning and legitimate system of economic governance on the one hand and credible and feasible recovery on the other can convince member states to give 'Europe' sufficient autonomy that the EU can regain its authority and play a key role on the global stage".

Considering what has been said above, it can be stated that: The process of EC decision-making and subsequent implementation of decisions on key issues is slow and inefficient. A glaring example is the approach to the massive forced migration. It is legiti-

mate and logical that the Schengen Area and effective functioning of the common market require protection of borders and inner security. The Council of Europe and European Commission, however, deal with key problems ex-post rather than ex-ante. The EU expert think-tank incorporated in the Council of Europe is not well used to prepare prognoses of the development in and outside the European environment and anticipate threats and risks endangering the European project. The indifferent and inconsistent approach to the real causes of European problems creates a precedent that might result in disintegration of the European Union. Europe, despite Brexit, the second wedge driven between European nations (the first one being the international initiative destabilising Ukraine) has not lost its chance. It must start playing its global role and assert the rights of European nations as bearers of unique European tradition and culture.

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The role of forests in the bioeconomy

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Abstract

Bioeconomy has been much discussed topic recently. Expected environmental, economic and social impacts (creating jobs in rural areas, climate change mitigation, food security) are highlighting the importance that should be paid to this topic. Forestry might look as a small part of the bioeconomy, but with a significant role. The aim of this paper is to assess the importance of forestry in the bioeconomy and to point to some confusion. The role of forests can be found in de/recarbonisation that is important in context of energy and meeting climate objectives. Wood as a renewable source is further used for alternative products with a great potential in the future. Higher demand for wood emphasizes the role of good forest management, but there are some risks and doubts arising from certain ambiguities concerning the use of forests for the society in the best way.

Keywords: bioeconomy, forestry, wood, biomass, forest resources, climate change

JEL Code: Q57

1. Introduction

"The bioeconomy is the production of biomass and the conversion of biomass into value added products, such as food, feed, bio-based products and bioenergy. It includes the sectors of agriculture, forestry, fisheries, food and pulp and paper production, as well as parts of chemical, biotechnological and energy industries (Ronzon et al., 2015)." Renewable biomass encompasses any biological material to be used as raw material (EC, 2012).

Bioeconomy strategies and their implementation are very different in the European Union. Some countries don´t have this strategy, but some of them have a dedicated bioeconomy strategy (Spain, German, Finland). In 2017 an Action bioeconomy plan should be created. There are 17 million people employed in the field of bioeconomy within the European Union, the turnover reach more than 2 trillion Euros. Revenues from forestry in the bioeconomy reach only 2%, but what can´t be missed is that forestry creates in-

puts for other sectors – manufacturing of wood and wooden furniture and paper industry (with revenues of 8% and 9% respectively).

Nevertheless, in some countries, the bioeconomy sector is mostly dominated by forestry, which is also a consequence coming from spatial and local conditions. The revenues in bioeconomy coming primarily from forestry can be found in Finland, Sweden and Estonia – the share on revenues is more than 40% (Ronzon et al., 2015).

Forestry has the special advantage relative to other biomass sources – it has large production potential, which does not threaten food security (Ollikainen, M., 2014), the portion of forests is still increasing in EU (Parviainen, J., et al. 2000) and forestry also play a crucial role in low carbon economy, the issue which was set up as a long-term target for 2050 by the European Commission (Scarlat, 2015). Climate change and change in energy policies can have a big impact on the future of forest products industry (Brown, M., Baek, Y., 2010). *"Environmental values are one advantage that forest bioenergy can have over fossil fuels (Riala, M., Asikainen, A., 2012)."*

2. Methodology and Data

The paper was created as an overview based on the use of literature and other relevant sources. The main theses and facts are supported by agreement leading experts in this field, the main aim was also to refer to some confusion and disagreement in this area in the scientific debate to emerge.

3. Results

3.1. Bioeconomy and forests

Marchetti, M. et al., 2015 describe following critical issues in scientific research in the context of the bioeconomy applied to forest resources:

(i) the limited availability of spatial data on a national scale; (ii) the deficient multidisciplinarity in analyzing forest ecosystem services; (iii) the absence of widespread and consistent use of models, quantitative analysis and evaluation of ecological, economic, and socio-cultural indicators related to the provision of services delivered by forest ecosystems; (iv) the lack of implementation of EU policies at the local level.

In the frame of bioeconomy, research is called to provide scientific bases, models and decision support tools for implementing sustainable growth and local development, which have their roots on paradigms less anthropocentric and more focused on coupling human and natural systems (Marchetti, M. et al., 2015), but common academic literature on forest products or forest bioeconomy markets and employment, and especially their long-term outlook, is nearly non-existent (Hetemäki, L.; Hurmekoski, E., 2016) and the related science base is relatively undeveloped (Upham, P., et al. 2011).

3.2. Bioeconomy and its implications

According to the German Bioeconomy Strategy, five categories of key drivers for bio-based economy were set – climate change and resource efficiency, economic growth, food security, employment and regional development, innovation and technical change.

Bioeconomy does not have only internal impacts, but bio-based innovations can also provide impulses for other sectors to grow and develop. These sectors are for example – commodity and food trade, the IT sector, machinery and plant engineering, the automotive industry, environmental technology, construction and service industries (Federal Ministry of Education and Research, 2011).

More than 40% of people in the European Union live in rural areas. And, of course, these areas need to be revitalised. Relationship between bioeconomy and the regional development is clear. A European bioeconomy will offer a new perspective on high-value production in the regions, as well as creating new opportunities and jobs for farming, forestry and aquaculture. Europe´s cities and regions should play a key role in further developing the bioeconomy (European bioeconomy stakeholders manifesto, 2016).

Nevertheless, it is sometimes hard to judge how exactly the bioeconomy influence certain areas or how much help it brings to these areas. Some of the effects are easy to monitor – for example change in the unemployment rate and change in the land use. Some of the effects are indirect and they bring a complex attitude because they connect different sectors.

That confirms, that bioeconomy is not a separate entity, but it can be related to several sectors. Because of that, bioeconomy policies should use all available data for policy creation. Knowledge must be based not only on biological processes and systems, but it is also necessary to know what technical possibilities we have, how the ecosystem reacts and what social implications it brings (Federal Ministry of Education and Research, 2011).

Bioeconomy-related innovations create opportunity for new production processes, which can change a demand for bio-related products. In terms of energy, there could be a possible change in demand for fossil fuels and because of that also a change in commodity prices. Commodity prices could enhance pressure on other consumers (looking for the same commodities). And of course, all this is influencing the regional and national trade balances and at the end – also GDP. To sum it up, impacts coming from bioeconomy and bio-based innovations are as follows: change in GDP, change in trade balance, change in commodity prices (for example real wood and forest product prices), change in demand for biomass products (change in wood/wood fibre demand for forest products, change of biomass demand for energy use), change in public cost, change in farmers revenues (Ecologic Institute, 2016).

4. Discussion and Conclusions

Bioeconomy has been much discussed topic recently. Nevertheless, biomass has always been used for different purposes and because of that, we can say, that bioeconomy concept is as old as mankind. Nowadays, its role is increasing. Climate change and population growth are examples why we should try to find new ways of energy production and waste management. Forestry is always underestimated for its role in the economy, because its contribution to GDP is usually low and the number of people employed in this field has been decreasing. At the European level, we also don´t have a common forestry policy.

For the forest sector, the most important challenges are to find innovative approaches for managing forest resources, in a way that simultaneously increases wood and non-wood production, improves the food security and energy supply against poverty, and safeguards other environmental services and biodiversity (Alexandratos and

Bruinsma, 2012) but this goal is very hard to achieve, an increasing demand for wood for energy purposes increases environmental pressure on forests (Ollikainen, M., 2014) and safeguarding other environmental services and biodiversity will be more difficult as in the past. Finding new ways to increase production forests may help in those forests, where it is maintained production function within the EU, however, they announced a new protected area, where the production function is severely limited.

Pressure on the use of wood and possible changes in forest management must always be evaluated from the biodiversity angle in commercial forests (Scarlat, 2015).

The production of pulp and paper and lumber constitutes the core of the forest industry now, and it will have an important role in the future as well. The modern forest industry is based not only on the use of high-tech applications but it also sustains a number of industry-related services. Moreover, new innovative forest biomass based products, such as second generation biodiesel, nanopulp and lignin derivative products, and new wood-based construction systems, have been introduced to markets (Hetemäki, L.; Hurmekoski, E., 2016). A good example is the company Borregaard in Norway that produces vanilla from spruce for the pharmaceutical industry, or the starting nano-cellulose production in Canada, Sweden, and Finland (Ollikainen, M., 2014). The forest sector is experiencing a myriad structural changes (Hetemäki, L.; Kuuluvainen, J.; Toppinen, A., 2016), but many topics are controversial such as the benefits of biomass burning for carbon emissions which may be bogus, while its consequences for forest ecology are becoming all too evident according Pearce, F., 2015 and e.g. in the field of forest biomass and its use there are many environmental risks and uncertainties (Upham, P., et al. 2011).

However, wood will remain a competitive energy source with a multiple higher efficiency than today. Furthermore – it's just fun to burn wood in fireplaces and that is part of our genes. To burn wood will remain in an ineffective way as well – a luxury product at high prices (Mantau, U., 2016).

Bioeconomy innovations needs a complex attitude, because these don´t bring just new products and solutions, but can influence regional economies and also some economic variables – employment, demand for certain products, consumption scenarios etc. Bioeconomy policies must be conducted with a respect to interdisciplinary connection and sustainability to meet economic, environmental and social criteria.

Taking into account the above summary we can say that forestry is undergoing major changes, some of which are difficult to predict. On the one hand there is a lot of demands for creation of effective and new methods of forest management, to mobilize resources, but also the principles of sustainability, protection of biodiversity, etc. receive stronger support are announced new territory with the protection regime, where the production function is limited. Differences in natural and socio-cultural conditions in the Member States and the lack of information hampers the formation of uniform concepts. Area bio-economy, however, can help as a unifying framework for building local strategies due to its holistic nature.

We presume that the role of forestry and biomass will be stronger in the next years, but we can also expect some unpredictable changes in management approaches.

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The Application of Expectation Confirmation Model on the Consumers' Satisfaction with Online Group-Buying Purchases in the South Korea

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Abstract

This contribution focuses on the customers´ satisfaction with online group-buying purchases on the South Korean market. The aim of the contribution is to identify a model of consumers´ satisfaction and followed consumers´ loyalty in regards to the theory of Expectation – Confirmation Model. This model is expanded with the factor of consumer trust. The factors leading to consumers´ repurchases intention are determined. The main focus of research within this contribution is based on the perceived value of customers´ interactions across the online group buying, website´s quality, trust, customers´ satisfaction and repeat purchase intention. This research is focused on online shopping behaviour of members of Generation Y that do not hesitate to use online media in their lives. The proposed model of relations between determinants was tested by applying the method of Structural Equation Modelling. The results confirm that perceived value and website´s quality are the important factors for South Korean customers from Generation Y.

Keywords: customers satisfaction, expectation confirmation model, structural equation modelling

JEL Code: C12, L81, M31

1. Introduction

The current phenomenon of e-commerce does not consist only of purchases on e-shops but also contains the online group-buying (G-B), e-auctions etc. In this paper, we focuse on the online G-B that refers to a sale method where goods and services are purchased at significantly reduced prices with the required number of buyers participating in the purchase in a limited time (Jang et al., 2013; Shiau and Luo, 2012).

This contribution deals with the online group-buying phenomenon in the South Korea. The South Korean market of online G-B increases annually about 360% and the sales take annually around KRW 500 billion (€ 360 million) (Park, 2014). Despite the fact that the sales grown exponentially, all major online G-B companies announced a loss in last year (KIET, 2015). The online G-B companies are increasingly criticized for aggressive marketing strategy and inadequate customer service (Park, 2014). However, Zamazalová (2009) claims that a high consumers´ satisfaction rate can increase a consumer loyalty to the service provider significantly. According to Shiau and Luo (2012), consumers´ satisfaction helps companies to establish long-term relationships with consumers. Therefore, it is important to measure and improve the customers´ satisfaction.

The aim of the contribution is to identify a model of consumers´ satisfaction and following consumers´ repurchase intention in regards to the theory of Expectation – Confirmation Model. This model is expanded with the factor of consumers´ trust. As Erdoğmus and Çiçek (2011) claim the discount size is one of the most important motivators to participate in the online G-B. The Expectation-Confirmation Model omits this factor but this model expands possible motivators from another point of view. This approach is one of the most widely used models to describe customers´ behaviour.

The contribution is focused on the behaviour of customers that are members of Generation Y because it can be predicted that these customers can be frequent customers of online group-buying. Members of Generation Y can be determined such as people who were born between years 1980 and 2000. It is however very important to note the year of birth is not the most important. Members of Generation Y are typically people who were influenced by modern information technologies such as mobile phones, computers and internet during their adolescence and later, but using of these technologies during their childhood was not so usual (Van den Bergh and Behrer, 2011).

This contribution contains the theoretical base of identification of Generation Y, satisfaction measurement and Expectation-Confirmation Model (ECM). The subsequent practical part of the contribution contains the research methodology and an introduction of the method of structural equation modelling (SEM), which is used to evaluate the designed model of consumers´ behaviour in the South Korea. Finally, the results are presented. This contribution also includes a discussion of the results and a conclusion.

2. Theoretical background of customers´ satisfaction measurement and Expectation-Confirmation Model

According to Oliver (1999), satisfaction is defined as the psychological condition based on the difference between consumers´ expectation and actual satisfaction measured after a purchase. Usually marketing specialists ask customers to express their opinions about the importance of each satisfaction´s indicator, but it can lead to the erroneous estimation. Respondents can rate some indicators as important even though they have

little impact on the overall satisfaction, or they are important only in one of the moments of the assessment (de Oña et al., 2013). To prevent this erroneous estimation, Weinstein (2000) recommends applying of one of the derived methods that identify the importance of the indicators by statistically testing the strength of the relation of the individual indicators with the overall satisfaction. Shiau and Luo (2012) or Hsu et al. (2014) apply structural equation modelling in order to measure customers´ satisfaction.

As was mentioned above, this contribution applies Expectation-Confirmation Model (ECM) by Oliver (1992) in order to design model of customers' behaviour on the G-B portals in South Korea. See Figure 1.
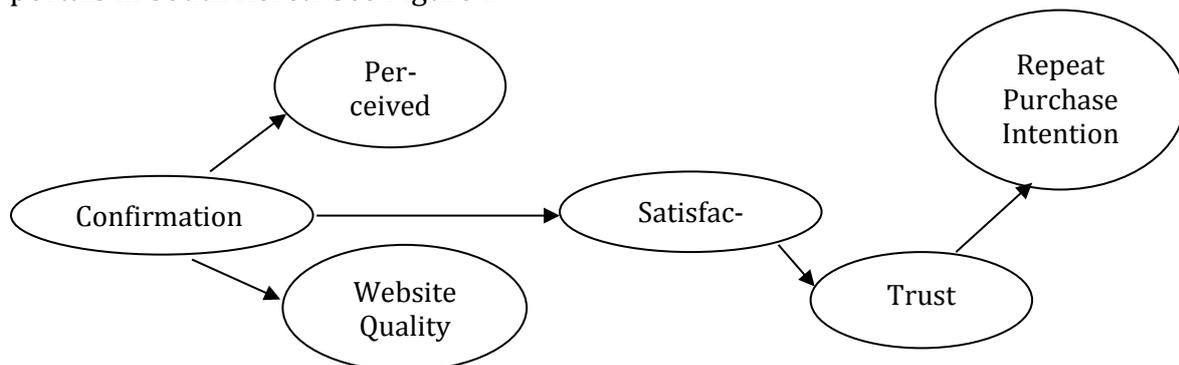
Figure 1: Proposed model based on Hsu et al. (2015)

Confirmation operationalizes the customer's perception of expected benefits. It is considered to be cognition based. ECM model (Oliver, 1992) also postulates the confirmation is positively related to customer's satisfaction, which is affective evaluation process (Hsu et al., 2015).

Perceived Value is the overall assessment of a service by the customer, based on the ratio of benefits to costs. In this study, it is understood as benefits gained from the G-B transaction given the time and effort spend. Chiu et al. (2012) classify benefits into utilitarian and hedonic values, where utilitarian values refer to acquisition of a product in efficient manner, whereas hedonic values reflect the emotional, fantasy and multisensory aspects of the experience.

Website quality refers to the user's perception of the design of a website where the G-B experience is carried. According to DeLone & McLean (2003), it can be divided into three dimensions: system quality, information quality and service quality.

Trust is then defined as the belief a customer has that others will behave as they expect. The customer is then able to accept certain risks based on their belief that the transaction will meet their expectation (Pavlou et al., 2007). Trust is the mechanism that relieves the uncertainty inevitably tied to the process of G-B (or any online transaction). In this sense, satisfaction can be seen as the antecedent of trust (Hsu et al., 2015).

According to Hsu et al. (2015), trust then forms customer's intention to repeat for repeated purchase. Customer that is who forms positive trust is then more likely to return to the G-B site and to make another purchase, which is essential for the service.

3. Research Methodology

The primary research using online questioning was conducted in April 2016. The population were all online G-B users from Generation Y in South Korea. The sample con-

sisted of 169 respondents and the control variables were gender, age and frequency of online G-B purchases. The detailed structure of respondents is shown in Table 1.

Table 1: Structure of South Korea sample of respondents (n=169)

Frequency of online group-buying purchases		Gender		Age	
Once a fortnight	66.86%	Man	33.14%	18–24	32.54%
Once a month	24.26%	Woman	66.86%	25–35	67.46%
Quarterly	5.92%	Total	100.0%	Total	100.0%
Less often	2.96%				
Total	100.0%				

Source: author's calculations.

The all of questions in the questionnaire were the closed questions. The respondents expressed their satisfaction regarding to the statements using a Likert scale of 1 to 5, where 1 corresponded to a positive and 5 to a negative statement. The statements about the indicators influencing satisfaction with online G-B were inspired by Hsu et al (2015). The data that were measured on the Likert scale and qualified as interval variables. A method of structural equation modelling (SEM) was used to evaluate the designed model of behaviour of South Korean members of Generation Y on the online G-B websites.

3.1. Data analysis

A structural equation modelling (SEM) was applied to quantify the factors in the model of customers' behaviour in online G-B according to the ECM. This method is applied in a confirmatory way in order to confirm the designed theoretical model according to Ho (2006). Values of the standardised regression coefficients and goodness-of-fit indexes were calculated in SPSS 20 and SPSS Amos 20 at the significance level of 0.05.

3.1.1. Structural Equation Modelling

A structural equation modelling (SEM) is a method of statistical multivariate analysis (de Oña et al., 2013). According to Nachtigall et al. (2003), a general structural model consists of two parts – a measurement model and a structural model. The measurement model examines the relations between the observed and the latent (latent) variables. In a structural model, there are the relations between the latent variables measured. A structural model identifies which latent variable is independent (exogenous) and which latent variable is dependent (endogenous) (Urbánek, 2000).

The *validity of the proposed model* can be confirmed with multiple chi-squared tests. The CFI and NFI were used in this contribution. The rate of change of a conditional mean is interpreted as a regression coefficient. According to Hair et al. (2010), standardized regression coefficients should take values of 0.5 and higher if the relations between the variables are significant. The comparative fit index (CFI) should be close to 1.000 for the optimal model. This index does not fluctuate much with the sample size (Urbánek, 2000). The normed fit index (NFI) should be also close to 1.000 for the optimal model (Hooper et al., 2008).

4. Model analysis and results

The analysed research model designed according to Hsu et al. (2015) is shown in Fig. 1. This model consists of 58 variables; 23 observed and 35 unobserved variables. The model includes 29 residual variables.

The latent variable *Perceived value* is measured by the observed variables PV1 – PV4. Specifically, the following factors were evaluated:

PV1 Using the online G-B is a convenient way to shop.,

PV2 I can use the online G-B to shop anywhere and anytime.,

PV3 I find shopping at the online G-B stimulating.,

PV4 I think that purchasing products from the online G-B is interesting.

The second latent variable, *Website quality*, is measured by seven observed variables, WQ1–WQ7. Specifically, we explored the respondents' perceptions about the following:

WQ1 The online G-B websites are easy to use.,

WQ2 The online G-B websites are well designed for users.,

WQ3 The online G-B websites provide sufficient information.,

WQ4 The online G-B websites provide reliable information.,

WQ5 The online G-B websites provide up-to-date information.,

WQ6 The online G-B websites provide dependable services.,

WQ7   The online G-B websites give prompt service to consumers.

The third latent variable, *Confirmation*, is measured by the observed variables CON1 – CON3. Specifically, the following factors were evaluated:

CON1   My experience with using the online G-B was better than what I expected.,

CON2   The benefit provided by the online G-B websites was better than what I expected.,

CON3   Overall, most of my expectations from using the online G-B were confirmed.

Another latent variable, *Satisfaction*, is measured by three observed variables, SAT1 – SAT3. To be precise, we explored the respondents' perceptions about the following:

SAT1   I feel good regarding my decision to purchase products from the online G-B.,

SAT2   I think purchasing products from the online G-B is a good idea.,

SAT3   I am satisfied with the experience of purchasing products from the online G-B.

The next latent variable, *Trust*, is measured by three observed variables, TRT1 – TRT2. Specifically, the following factors were evaluated:

TRT1   The online G-B providers are trustworthy.,

TRT2   The online G-B providers are known as one who keeps promises and commitments.,

TRT3   The online G-B providers always keep members' best interests in mind.

The last latent variable, *Repurchase intention*, is measured by three observed variables, RPI1 – RPI3. Specifically, we explored the respondents' perceptions about the following:

RPI1   If I could, I would like to continue using the online G-B websites to purchase products.,

RPI2   I plan to continue using the online G-B websites to purchase products in the future.,

RPI3   It is likely that I will continue purchasing products from the online G-B websites in the future.

4.1. Validity of measurement model

In the measurement model, the relations between latent and observed variables are determined. The actual values of significance and standardized regression coefficient in the measurement model are shown in Table 2.

Table 2: The values of significance and standardized regression coefficient in the measurement model

The observed variable		The latent variable	Significance	Standardised Regression Coefficient
PV1	<—	Perceived value	0.000	0.607
PV2	<—	Perceived value	0.000	0.636
PV3	<—	Perceived value	0.000	0.641
PV4	<—	Perceived value	0.000	0.755
CON3	<—	Confirmation	0.000	0.847
CON2	<—	Confirmation	0.000	0.810
CON1	<—	Confirmation	0.000	0.779
WQ7	<—	Website quality	0.000	0.637
WQ6	<—	Website quality	0.000	0.820
WQ5	<—	Website quality	0.000	0.788
WQ4	<—	Website quality	0.000	0.839
WQ3	<—	Website quality	0.000	0.713
WQ2	<—	Website quality	0.000	0.610
WQ1	<—	Website quality	0.000	0.602
SAT3	<—	Satisfaction	0.000	0.850
SAT2	<—	Satisfaction	0.000	0.754
SAT1	<—	Satisfaction	0.000	0.828
TRT1	<—	Trust	0.000	0.830
TRT2	<—	Trust	0.000	0.811
TRT3	<—	Trust	0.000	0.706
RPI1	<—	Repurchase intention	0.000	0.873
RPI2	<—	Repurchase intention	0.000	0.944
RPI3	<—	Repurchase intention	0.000	0.894

All relations between latent and observed variables are statistically significant according to the actual significance levels. Considering the values of standardised regression coefficients, all tested relations between variables are statistically significant.

4.2. Validity of structural model

According to the structural model analysis, all relations between latent exogenous and latent endogenous variables are statistically significant. See Table 3.

Table 3: The actual values of significance and standardized regression coefficient in the structural model

The latent variable		The latent variable	Significance	Standardised Regression Coefficient
Satisfaction	<—	Confirmation	0.000	0.957
Trust	<—	Satisfaction	0.000	0.882
Website quality	<—	Confirmation	0.000	0.847
Perceived value	<—	Confirmation	0.000	0.896
Repurchase intention	<—	Trust	0.000	0.768

According to the actual values of standardised regression coefficients in the Table 3, the website quality and the perceived value have strong impact on the customers´ confirmation. The confirmation is then very strong predictor of customers´ satisfaction. Customers´ satisfaction is strongly connected with the trust. There is also the strong relation between the trust and the repurchase intention. The model of the consumers´ behaviour in online G-B in South Korea is presented in the Figure 2.
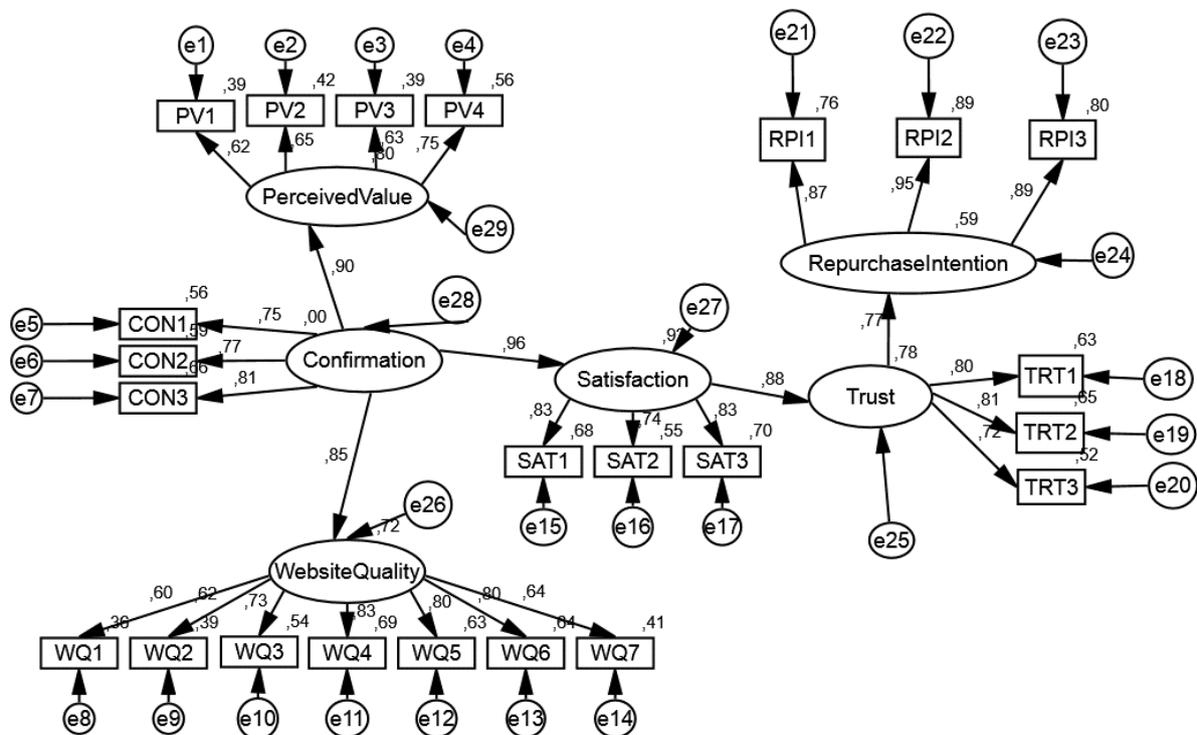
Figure 2: The model of the South Korean consumers´ repurchase intention to online group-buying

4.2.1. Goodness-of-Fit Indexes of the proposed structural model

The actual value of CFI of this proposed structural model takes value of 0.827. This is a high value. NFI takes value of 0.768, which shows that there are small possibilities to improve the model and fit the real data more. According to NFI, the proposed model fits the real data in 76.8%.

5. Discussion, research limitations and managerial implications

Prior studies obviously focus on members of all generations, marking this research quite unique in its focus on Generation Y. If we compare the results with the results of Hsu et al. (2015) that focused on online G-B customers in Taiwan there are very similar results. The results confirm trust and satisfaction are the key factors affecting customers' repeat purchase intention. The findings show that satisfaction has strong effect on trust and it was found that confirmation, website quality, and perceived value maintain significant relationships with customer satisfaction. The analogies in behaviour in those countries could perhaps be explained by their relative cultural and social similarity. We can omit the impact of generations but this result should be confirmed in a further research.

5.1.   Research limitations

The potential limitations of this research lie in the application of the ECM as well as the other factors affecting customer satisfaction with online group-buying purchases. Therefore, it is recommended to apply another theoretical base to identify other important indicators. This could be for example the social exchange theory, the theory of planned behaviour or DeLone and McLean's information success model.

In addition, this research omits the dual role of customer. Trust and satisfaction in online G-B can be divided into two parts, such as trust in sellers, trust in websites, satisfaction with sellers, and satisfaction with websites.

This quite new way of buying is interesting mainly for young people, typically from the Generation Y, but the same research should be conducted also with the respondents from Generation Z and Generation X or Baby Boomers.

5.2.   Managerial implications and suggestions

As the South Korean respondents from Generation Y suggest, online G-B providers should keep purchasing of products from the online G-B is interesting. They should develop new ways to meet consumers' demands and often have new ideas about how to promote products or new approaches to selling products. Managers should keep in mind that their customers like online group buying, which is quite a new way of purchasing. This follows the assumption that customers prefer novelty in every area of product purchasing.

The online G-B providers have to be trustworthy and keep promises and commitments. If the management of online group-buying websites wants to create a trustworthy impression and establish trust between the websites and their customers, it is possible to recommend money refunds if there is a problem with the service, insurance for vouchers or the possibility to withdraw from the contract after a longer period than 14 days. The providers can also set up secure payment options, certificates of quality and security certificates, and they can become members of associations of online group buying. Managers should also provide reliable, up-to-date information on the online G-B websites and the websites should provide dependable services.

6. Conclusion

There is a need to increase Generation Y customers´ satisfaction on the South Korean market with online group-buying. This study examines the Generation Y consumers' satisfaction, trust and repurchase intention to online G-B applying Expectation-Confirmation Model. The aim of this paper is identify a model of consumers´ satisfaction and followed consumers´ repurchase intention in the South Korea focusing on the users from the Generation Y. A structural equation modelling was applied and it was found that the proposed model is acceptable for the South Korean Generation Y consumers´ behaviour in the online group-buying. The factors Perceived Value and Website Quality are indicators that influence the consumers´ confirmation that has the impact on the customers´ satisfaction. The contribution also contains the research limitations and managerial implications.

Acknowledgements

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Key drivers of entrepreneurial intentions of youth in Visegrad countries

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Abstract

Entrepreneurial intention is the first step in entrepreneurial process. It is influenced by many factors that have been studied by researchers from different perspectives, however, some gaps and methodological limitations still exists. The aim of this paper is to analyse the significance of selected individual-level factors in their effect on entrepreneurial intention among youth and young adults in Visegrad countries applying decision tree algorithm method alongside logistic regression models that served as robustness check of findings. Based on GEM data we found out that only two groups of factors (personality-traits and personal background related factors) are significant drivers of entrepreneurial intentions of youth in Visegrad countries.

Keywords: Entrepreneurship, Entrepreneurial Intentions, Youth, Young Adults, Visegrad countries

JEL Code: L26 (entrepreneurship)

1. Introduction

Europe including Visegrad countries counts high level of youth and young adults' unemployment as one of the key current macroeconomic issues. Entrepreneurship is considered as one approach to solve this issue. However, if entrepreneurship should be beneficial in this way, it is important to study many aspects of its complexity. One of them is the intention to start new business. Intention is considered to be the very first important step in the entrepreneurship process and a precondition for individuals towards starting-up a new entrepreneurial activity. This step, which is influenced by

many factors, has been considerably exposed to entrepreneurship research. Researchers focused on studying factors which are the most important for encouraging of intentions to start new business. However, despite decades of research of different factors that influence entrepreneurial intentions, there are still gaps in this field of studies. In youth entrepreneurial intentions there are numerous studies on students' entrepreneurial intentions (Franco et al., 2010; Galicia et al., 2015; studies based on Global University Entrepreneurial Students' Surveys…), on youth entrepreneurial intentions, however less studies are focused on youth in general. Further in Visegrad countries there are missing studies from this field which would use extensive quality data based on representative samples. In addition to that current researchers use statistical methods like descriptive statistics, variance analysis, regression analysis etc. and relation between the independent variables and dependent variables study based on linear relation (Tabachnick & Fidell, 2001; Peng, Z. et al., 2012). This methodological approach leads to biased results.

To overcome some of gaps and methodological limitations addressed above the aim of this paper is to analyse the significance of selected individual-level factors in their effect on entrepreneurial intention among youth and young adults in Visegrad countries applying decision tree algorithm method alongside logistic regression models that served as robustness check of findings.

Our research is based on Global Entrepreneurship Monitor (GEM) data for Czech Republic, Hungary, Poland and Slovakia for four consecutive years 2011–2014. Based on theoretical framework related to entrepreneurial intention we studied three groups of factors: a/ personality traits-related factors (entrepreneurial self-confidence, fear of failure, ability to identify opportunities); b/ contextual related factors (social attitudes toward entrepreneurship – desirability of entrepreneurship as carrier choice, status of entrepreneurs in society, media attention towards entrepreneurship); c/ personal background related factors (age, gender, education, employment status, knowing other entrepreneurs). The rest of the paper is structured as follows: in section 2 literature on entrepreneurial intention is reviewed. Section 3 describes research design – sample description, data and applied methodology. In section 4 we present our results. Section 5 contains discussion and implications.

2. Entrepreneurial Intentions in Literature

Entrepreneurial intentions are entrepreneur states of mind that direct attention, experience and actions toward a business concept (Bird, 1988). This is a basic, general definition. However, in literature there are no identical definitions on individual's entrepreneurial intentions. Some authors apply concept like career orientation (Francis& Banning, 2001) or nascent entrepreneurs (Korunka et al., 2003) etc. On the other side operational definitions are applied particularly for entrepreneurial intentions measurement. According to GEM (Bosma et al., 2012) intention is defined in two ways: a/ as a percentage of population who is expecting to start a new business in the next three years. This group might involve those who have these intentions and have indicated to be a nascent entrepreneur, b/as a percentage of population who is expecting to start a new business in the next three years but only considering the individuals who are currently not involved in entrepreneurial activity. This approach allow to researchers to separate these two groups of individual and study their behavior. In the last decade of the 20th century extensive empirical research on entrepreneurial

intentions has come out to formulation of a few models. Among them there are three the most cited models of the entrepreneurial intention of individuals which created core theories that are behind of entrepreneurial intention. The first is the Theory of Planned Behavior (Ajzen, 1991, the second one is Shapero and Sokol's (1982) model of the entrepreneurial event and Bandura's (1977) model of social learning. In addition to that Robinson et al (1991) in their model of entrepreneurial attitudes orientation described the attitude of the entrepreneur with more than personality and demographic characteristics. However, in 21st century some researchers developed new models based on modification and critiques of previous ones. Among them Elfving, Brännback & Carsrud (2009) focused on creation of contextual model of entrepreneurial intentions that should eliminate limitations of previous models. All these models analyze different factors that affect individual's entrepreneurial intentions. Researchers have studied these factors from different perspectives. Fini et al. (2009) divided factors according to two broad domains: a/individual domain (demographics, personal traits, psychological characteristics, individual skills and prior knowledge, social ties and networks); b/ contextual domain (environmental support, environmental influence, organizational factors). More comprehensive analysis of literature is contained in Al-Harrasi, A.S et al., and is divided into four groups: a/personality – traits related factors (self-confidence, risk-taking propensity, needs for achievements, locus of control, innovativeness, autonomy), b/contextual related factors (cultural, social, economical, political, perceived support); c/motivational related factors (need for more income, desire for security, desire for status); d/ personal background related factors (age, gender, education, family background and business experiences). However, some researchers in addition to the lack of a clear definition of individual entrepreneurial intent, stress the absence of a systematically derived and reliable metric for its measurement that has impact on progress related both to studying entrepreneurial intention (Bruyat & Julien, 2001; Gartner, 1985; Shane & Venkataraman,2000). In his paper Thomson, E.R. (2009) offers further clarification to the concept of individual entrepreneurial intent and the development and validation of an internationally reliable measurement.

Based on above literature review this paper provides comprehensive analysis of the impact of individual factors studied in three main groups on youth's entrepreneurial intentions in Visegrad countries applying decision tree algorithm and logistic regression models.

3. Methodology and Data

We based our analysis on Global Entrepreneurship Monitor (GEM) data. GEM is the largest academic study focused on entrepreneurship in the world. It annually monitors entrepreneurial attributes and activities through two main primary data collection instruments – Adult Population Survey (APS) and National Expert Survey (NES), providing a unique database, which enables to obtain insights on the patterns and trends in entrepreneurship in the analyzed economies (Singer et al., 2015). The APS is being executed every year in each participating country and collects individual-level data through a standardized survey instrument administered to representative samples of minimum 2 000 individuals from adult populations (18 to 64 years old).

We created a pooled sample using GEM APS individual level data for V4 countries from 2011 to 2014, with age range within 18–34 years as the only selection criteria, resulting to a sample of 11 239 individuals (2459 from Czech Republic, 2643 from Hungary, 3091

from Slovakia and 3046 from Poland). In this sample we have identified 2258 individuals with entrepreneurial intentions who owned or managed no businesses and 6753 individuals who owned or managed no business and had no entrepreneurial intentions. This was our primary sample since we wanted to analyze the population not involved in any type of business at that time but having intentions to do so in the future. This sample was then analyzed to extract clean data sample (no missing values or individuals not knowing the answer to a specific question – variable). Final data sample we identified 1632 individuals with entrepreneurial intentions (who had owned or managed no business) and 4626 with no entrepreneurial intentions (who had owned or managed no business). Frequencies (representation in % of each variable in the dataset) of the primary and final data samples have not changed significantly.

Our analysis was based on GEM variables. Dependent variables indicated having entrepreneurial intention between young people aged 18–34 years.

The explanatory variables can be divided into three categories based on the literature: 1) personality traits-related factors: entrepreneurial self-confidence (perception of having knowledge, skill and experience required to start a new business (1 = yes ; 0 = no)), fear of failure (having a fear of failure would prevent one from starting a new business (1 = yes ; 0 = no)), ability to identify opportunities (belief in good opportunities for starting a business in the area where respondent lives (1 = yes ; 0 = no)), 2) contextual related factors – social attitudes toward entrepreneurship: status of entrepreneurs in society (agreement that in respondent's country successful new entrepreneurs possess high levels of status and respect (1 = yes ; 0 = no)), business discontinuance (whether the respondent was already ceased his or her own business in the past) and 3) personal background related factors: age (GEM categories 18–24 and 25–34), gender (male, female), education (primary GEM variable was regrouped to form 3 categories for elementary, high school and university highest educational attainment), employment status (detailed variables describing all types of employment status – full time, part time, student, seeking employment etc.), knowing other entrepreneurs (knowing personally someone who started a business in recent two years (1 = yes ; 0 = no)), household income (total annual household income classified for country into one of three ranges (lowest/middle/upper 33%-tile). Finally, we also included proxies for country and year of survey as control variables. All these variables (twenty-one at total) were considered for both models.

Correlation between variables was tested by Chi-squared test and Cramer's V and was proven not to be problematic.

To investigate the drivers of entrepreneurial intentions within the population of young individuals aged 18–34 we firstly applied a decision tree model. Decision tree model is a powerful tool used for classification and prediction. Based on our data, the decision tree model is method used for obtaining or predicting a set of characteristics which should a young individual have in order to have an intention to start a business. Graphically, the decision tree model is represented in a form of "up-side-down" tree and we present the results from top to bottom. An important feature of this model is the easiness of its interpretation once it is constructed. The construction of the model itself is based on the premise that we look for "the purest" set of individual with specific characteristics – the algorithm chooses individual's characteristics step by step and ideally ends when it finds a set of individuals with all the same characteristics predicting selected dependent variable (alternatively the algorithm ends when the set is too small to be divided again). This is done through calculation of purity measures (in our model entropy is used) and then the information gain is calculated. Information gain is a

measure to decide whether the supposedly added variable is to be beneficial to the model. At each step, the variable with the highest information gain is added to the model. In our model, the algorithm stopped when the final set of individuals was about to be smaller than 5% of the whole population.

After creating the decision tree model, a binomial logistic regression model was constructed as a cross-check for our findings. This model estimates the probability of an event happening. In our case this event was having intentions to start a business. We compared the variables and its probabilities in the final regression model to the results of the decision tree model.

To estimate the parameters of each model we used statistical software R, namely its packages and their functions for decision tree models and built-in functions for Generalized Linear Models (GLM) which was set on binomial family with logit transformation. The selection of the best appropriate logistic regression model was then conducted through step-wise selection.

The results of decision tree model conducted in order to identify the drivers of young individuals aged 18-34 years having intentions to start their own business suggest that three out of twenty-one variables are significant (**Chyba! Nenalezen zdroj odkazů.**).

From the decision tree model below, we can see that 26% of all the observed population has intention to start a business. The first important characteristic is the entrepreneurial self-confidence – perception of having knowledge, skill and experience required to start a new business. 59% young individuals have no entrepreneurial self-confidence and out of this 84% don't have any intention to start a business. For the other 41% of the observed population who believes to have entrepreneurial self-confidence (40% of them has intention to start a business) the second characteristic was discovered – age. When an individual believes to have entrepreneurial self-confidence and is aged 18–24 years 50% of these individuals have intentions to start a business. If the respondent is older, only 28% of such individuals have intention to start a business. The third characteristic is knowing personally someone who started a business in recent two years. When one believes to have the skills to manage his own business, is aged 18 – 24 years and knows someone who has started his own business, 62% of these individuals have intention to start business. The splitting has stopped afterwards because we reached a set threshold of minimum 5% of population in splitting sample.

The results of binomial logistic regression conducted in order to cross-check the results of decision tree model suggest that eleven out of twenty-one analysed variables are significant (**Chyba! Nenalezen zdroj odkazů.**).
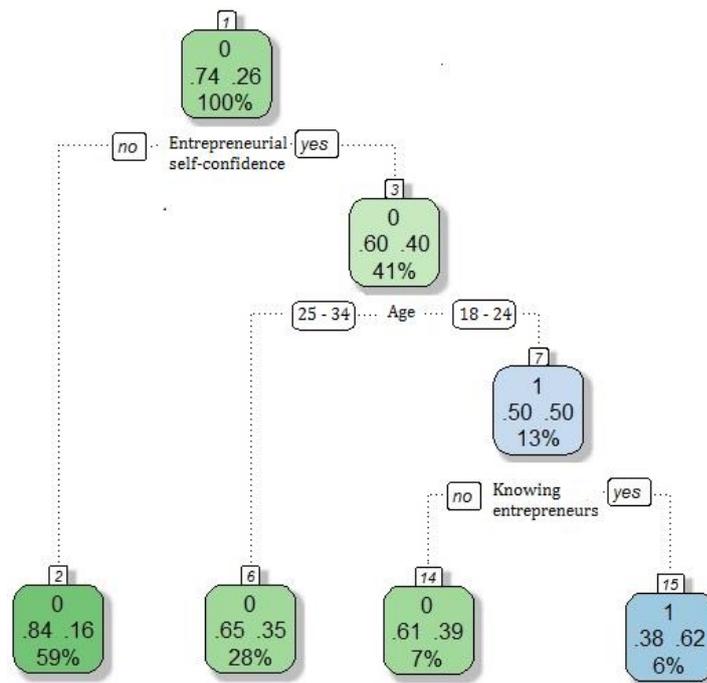
Figure 1: Results of decision tree model

Table 1: Regression coefficient

	Coefficient	p-value	Significance
(Intercept)	−0.7347	0.0006	***
Personality traits-related factors			
Entrepreneurial self-confidence (yes)	1.1640	0.0000	***
Fear of failure (yes)	−0.3184	0.0000	***
Seeing opportunities (yes)	0.4672	0.0000	***
Contextual related factors			
Status of entrepreneurs in society	–	–	–
Business discontinuance	–	–	–
Personal background related factors			
Age (25–34)	−0.3799	0.0000	***
Gender (woman)	−0.3454	0.0000	***
Education	–	–	–
Employment status – full time employment (no)	0.1643	0.0465	*
Employment status – part time employment (no)	−0.1838	0.0614	.
Employment status – self-employed	–	–	–
Employment status – seeking employment (no)	−0.3341	0.0002	***
Employment status – retired / disabled	–	–	–
Employment status – student (no)	−0.2620	0.0037	**
Employment status – at home (no)	−0.1778	0.0495	*
Employment status – unemployed	–	–	–
Employment status – employed	–	–	–
Knowing entrepreneurs (yes)	0.6252	0.0000	***
Income	–	–	–
Other variables			
Country	–	–	–
Year of survey	–	–	–

* Correlation is significant at the 0.05 level (2-tailed); ** Correlation is significant at the 0.01 level; – missing coefficients – variable wasn't a part of the final model.

In Table 1 coefficients describe the effect of a variable on the odds of having intention to start a business relative to not having intention to start a business at all. If the coefficient is positive, holding all other variables equal, an increase in a variable raises the likelihood of having the entrepreneurial intention. Thus, as can be seen from the results, the odds of having entrepreneurial intention among young population is positively influenced by having an entrepreneurial self-confidence (with the highest coefficient value in the model), personally knowing someone who had recently started a business, and perception of good business opportunities. On contrary, significantly negatively related to the odds of having entrepreneurial intentions is age category 2 – young population between 25 and 34 years (with lowest coefficient value in the model which means that if the respondent is older than 24 years, probability that he has intention to start a business decreases), gender – being a woman and not seeking job.

Table 2: Comparison of two models

Variables	Decision Trees	Logistic Regression
Personality traits-related factors		
Entrepreneurial self-confidence	1.	1.
Fear of failure	–	7.
Seeing opportunities	–	3.
Contextual related factors		
Status of entrepreneurs in society	–	–
Business discontinuance	–	–
Personal background related factors		
Age	2.	4.
Gender	–	5.
Education	–	–
Employment status – full time employment	–	11.
Employment status – part time employment	–	9.
Employment status – self-employed	–	–
Employment status – seeking employment	–	6.
Employment status – retired / disabled	–	–
Employment status – student	–	8.
Employment status – at home	–	10.
Employment status – unemployed	–	–
Employment status – employed	–	–
Knowing entrepreneurs	3.	2.
Income	–	–
Other variables		
Country	–	–
Year of survey	–	–

Comparing the two models, we can see in the Table 2 that logistic regression model is more complex, involving more variables. Among the personality traits-related factors, both models identify the entrepreneurial self-confidence as the most influencing. From

category personal back-round related factors, in the decision tree model was second most influencing the intention to start a business age of the respondent, while in the logistic regression model was this variable fourth. It was "outrun" by seeing an opportunity to start a business within the category of personality traits-related factors In both models, the age category predict that the respondent has to be younger (18-24 years old) to be identified to have stronger intentions to start a business than his older peers. Further from the category personal back-round related factors, knowing entrepreneur was identified as second most influencing in the logistic regression model and third in the decision tree model. To sum it up, the two significant categories are personality traits and contextual related factor. The variables from the second category – contextual related factors, none was identified as significant to predict the intention to start business.

4. Discussion and Conclusions

In this paper we have identified key factors that influence youth entrepreneurial intentions in Visegrad countries applying methods which are not very obvious in research works on this subject – decision tree algorithm and binomial logistic regression. These two statistical methods contradict the standard statistical methods like descriptive statistics, variance analysis, regression analysis, cluster analysis and path analysis that can lead to a biased result, due to the linear relation between the independent variables and dependent variables and are hard to present the relations between variables as a whole The logistic regression is a rather power tool to predict probabilities of event occurring. Based on the character of the data, it is a valid tool to predict intention to start a business since based on specific characteristics of an individual, we can assume the probability of him/her really having intentions to open his own business. Then, it is true but it doesn't handle the immediate interaction between the independent variables itself. This was approached by employing decision tree model, which creates links between the characteristics.

Our aim was to shed light on generally frequently discussed topic of youth intention but not from specific region perspective and methods which we have applied. Based on theoretical framework we have studied three groups of factors that influence youth entrepreneurial intentions. According to our finding only two groups of factors (personality-traits and personal background related factors) are significant drivers of entrepreneurial intentions. The first group contains personality-traits related factors. In our results in both models the entrepreneurial self-confidence is the factor which has the highest influence (1st position in order among all studied factors). Self-confidence is considered a valuable individual asset and a key personal success because it makes people happier, and it improves the individual's motivation to undertake projects and persevere in the pursuit of these goals (Al-Harrasi, et al., 2014; Fatoki, O.O. ,2010 etc.). Self-confidence is the only factor from this group chosen by decision tree model. In logistic regression model "seeing opportunities" has also high influence (3rd position). Researchers and practitioners agree that without opportunities entrepreneurship cannot occur. And if one talks about opportunities, one should also discuss intentions (Nielsen, et al., 2012). According to both our finding and in literature, ability to see opportunities belongs to the crucial personality-traits (Bhave, 1994; Shane, 2003).

The last factor in this group is fear of failure which can be understood as a proxy of risk. In literature risk taking propensity is crucial factor of entrepreneurial intention

(Estay, et al., 2013), in our list is significant but rather weaker factor. The most interesting our finding is that contextual related factors (the second group) are not significant drivers for entrepreneurial intention. According to Al-Harrasi, et al., (2014) contextual factors can either facilitate or impede entrepreneurial activities. It looks like in Visegrad countries these two studied factors have no significance for youth intention and its prediction to start a new business.

In the last studied groups – personal background related factors – age has a significant position both according to decision trees (2nd position) and logistic regression (4th position). According to decision tree we found out that if one thinks to have the abilities and skills to start his own business, it is his/her age 18–24 which determine the further intentions to do so. Lastly, it is the fact, if the respondent knows somebody who has started his own business that shapes his intention. In this way we created a link between the variables, where each of them in the model is predetermined by the other.

Our findings in this paper contribute to current status of youth entrepreneurial intention research in Visegrad countries both from methodological and content driven point of view. This a good basis for further studies on the other aspects of youth intention in this region.

Acknowledgements

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The Effectiveness of Agile Programming Illustrated with the Example of HaMIS

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Abstract

The article raises the issue of the information system implementation using agile programming in the public sector. This subject is one of the emerging trends today on the basis of management science. It turns out that it is new on account of the fragmentary knowledge in literature on this subject. It is difficult to find examples of the implementation of this method in the Polish public sector. This article aims at identifying the factors that are necessary for effective implementation of public projects with the use of Scrum. Additionally, it also focuses on identifying evidence tending to apply Agile methods. The article is based on literature on the subject as well as reports on the HaMIS implementation. The literature review showed that the effectiveness of the projects by scrum is affected among others by time, coordinating a team and the resignation of excessive documentation. The analysis shows two main conclusions. Agile enabled to achieve better benefits and their effectiveness suggest creating more legal possibilities for complex IT projects in an environment with a high degree of uncertainty.

Keywords: Agile, Scrum, public sector, HaMIS

JEL Code: M15, D73, O22

1. Introduction

Changes in the world today increase the expectations of taxpayers in relation to the public sector. Their growing public expectations, technological progress and the development of digitization have put pressure on increasing government effectiveness. More and more customers are looking for better services through the Internet. They are looking for faster and more effective methods of project implementation and procurement.

Public administration is one of the largest (if not the largest) clients in each country in terms of the quantity and value of information projects. (Dałkowski, 2000). The leading country (according to the United Nations Public Administration Network) is the United States, which spend an average of about $ 100 billion on projects. According to

research conducted by the Ministry of Digitalization in Poland in 2014, it turned out that electronic form is the preferred way of performing official activities in Polish society. The increase was 18 percentage points compared to 2013 and 22 percentage points in 2012 (E-administration in the eyes of Internet users in 2014).

One of the potential directions for research is the ICT industry because of its interdisciplinary nature resulting from the desire for automation and digitization in particular areas of human activity, leading to continuous measurement of a wide spectrum of problems. (Konieczny, 2014). The implementation of public projects using traditional methods has repeatedly focused on accurate documentation, forgetting about constant technical progress at the same time. Their many failures force them to look for improvements and new ways of implementing projects that will improve the effectiveness of government operations and meet the needs of the people. The contract between the client and the contractor is committed to implementing the software in accordance with the contract, which prevents adaptations and accelerates the implementation of the project. Due to some barriers, other ways of awarding public contracts are sought in order to gain more freedom in the surrounding reality. An example of how to ensure greater efficiency is Agile, commonly used in business.

We know that the same principles that work in business will work in government: Governments that are faster, more flexible, and more responsive (in short, more agile) will achieve better outcomes for their citizens (http://www.atkearney.com).

The unique nature and absence of a clear action plan prevent it from being used for public projects. The ability to use the agile method for realised public IT projects is controversial. Increasingly large projects use agile rules and then celebrate big successes. Researchers are increasingly examining IT projects for the public sector.

The purpose of this article is to identify the key factors that have contributed to the success of the HaMIS IT project. This action is considered important for the implementation of future projects. Identifying the problems encountered and key decisions will improve the implementation of other public sector projects across the world. This article is based on literature and reports from HaMIS project.

2. Agile in IT Project

The unique nature of IT projects is looking for modern, alternative project management methods and guidance on how to achieve the greatest results in greater uncertainty. Jim Highsmith thinks that (2004): If your goal is to deliver a product that meets a known and unchanging specification, then try a repeatable process. However, if your goal is to deliver a valuable product to a customer within some targeted boundaries, when change and deadlines are significant factors, then reliable Agile processes work better. We know when we should use agile methodology but what constitutes its basis?

In 2001, a group of software developers published the Manifesto for Agile Software Development to define the values of the Agile movement (Bird&Bird&, 2016). New methodology has become an alternative to the traditional waterfall approach.

Agile is a time boxed, iterative approach to software delivery that builds software incrementally from the start of the project, instead of trying to deliver it all at once near the end. It works by breaking projects down into little bits of user functionality called user stories, prioritizing them, and then continuously delivering them in short two week cycles called iterations (http://www.agilenutshell.com/).

Agile method builds four universal rules, generalized demands being overvaluation of existing components of the project:

Individuals and interactions over processes and tools
Working software over comprehensive documentation
Customer collaboration over contract negotiation
Responding to change over following a plan[1]

The use of rules in a project is not an aim, but only a means to achieve it. Their wider analysis was contained in the book Krystian Kaczor (2014) on the basis of which these 12 principles can be presented in six categories. The whole activity is directed towards the customer. His satisfaction is an important priority accompanying the project. The software provided systematically – every few weeks, gives the customer a sense of physical progress. His instructions, requests and corrections are taken into consideration which compound the final satisfaction. The key determinant of success is the project team.

Agile Project Management focuses on selecting the right skills for project team members and molding them into productive teams (Jim Highsmith, 2004)

It is known that the best architectures, requirements, and designs are the result of workers organizing by themselves. The creation of favorable conditions for work and the opportunity to develop have a significant impact on the quality of the supplied software. Self-organizing team has a sense of creating something important, as a result there is a 100% involvement into the implemented contract. Thanks to daily cooperation identifying the defective factors is simpler, and their exclusion is beneficial for increasing productivity. Daily meetings not only give a clear picture of the situation "done, in progress, to do", but also become a place for exchange of problems and obstacles encountered in the implementation of the project.

You can only fail better only if you learn from failures. And then failing is something that prompts you to move ahead (Pearl Zhu, 2016). The experience of people working in a team has a vital role at the stage of initial discussions with a client and planning tasks. The real scope of the planned responsibilities becomes the key of success on the road to introduce the software running on time because we know that. In fact, in an agile project, technical excellence is measured by both capacity to deliver customer value today and create an adaptable product for tomorrow (Jim Highsmith, 2004).

With the demands outlined above there emerges Team orientation to implementation of the project expected by the client. Cooperation of this type results in achieving the desired purpose and at the same time makes the method effective. QSM Associetes[2] research shows that projects agile method produced a 37% faster than other methodologies projects. Moreover, only 9% of the projects were carried out in accordance with Agile fails, and waterfall methodologies are up to 30%.[3]

2.1. Scrum

The word scrum ("fight") is taken from rugby and indicates a method of team play that allows you to take possession of the ball and lead it further along the field, and for this you need coherence, unity of intent and a clear understanding of the goal (Jeff Suther-

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[1]http://agilemanifesto.org/
[2]QSM Associetes, "The Agile Impact Report", 2008.
[3]"The Chaos Manifesto", 2013

land, 2014). The scrum is not considered a type of method or process, but the determinant of a specific framework and guidelines that complement Agile Manifesto[4].

According to the Jeff Sutherland (2014) Agile Manifest it declared the following values: people over processes; products that actually work over documenting what that product is supposed to do; collaborating with customers over negotiating with them; and responding to change over following a plan. Scrum is the framework I built to put those values into practice. There is no methodology.

Scrum is a framework for project management that emphasizes teamwork, accountability and iterative progress toward a well-defined goal. The framework begins with a simple premise: Start with what can be seen or known. After that, track the progress and tweak as necessary. The three pillars of Scrum are transparency, inspection and adaptation (http://searchsoftwarequality.techtarget.com/)

A key principle of Scrum is its recognition that during product development, the customers can change their minds about what they want and need (often called requirements volatility) (J.S. Henry, 1993). In the everyday life of the project the design team is made up of 3 to 9 members. It includes individuals involved in the project i.e. programmers, testers, analysts.

A very important person in the project is the Scrum Master, the person in charge of running the process, asks each team member three questions: 1. What did you do yesterday to help the team finish the Sprint? 2. What will you do today to help the team finish the Sprint? 3. What obstacles are getting in the team's way? That's it. That's the whole meeting (Jeff Sutherland, 2014). Clearly defined activities relate to each stage of the production, which has been illustrated in Figure 1.
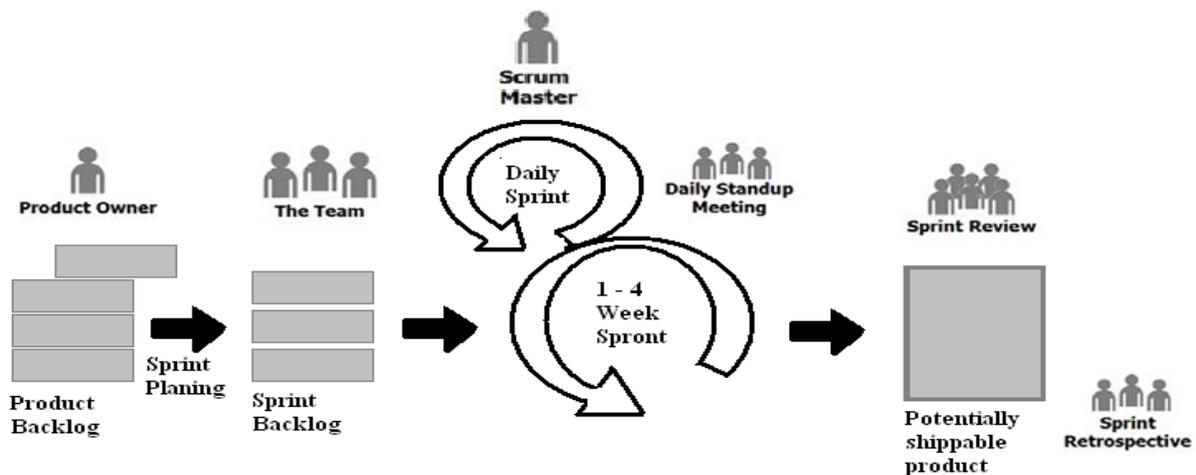
Figure 1: Project life cycle scrum

Source: Own work

Beginning the phase of the process is the Product Backlog, which comprises an ordered list of requirements that a Scrum Team maintains for a product (Russ J. Martinelli; Dragan Z. Milosevic, 2016). So the list containing all the steps that should be performed under the project. The customer is considered a priority value and has an impact on the decisions made. Backing procuct must bring real change, favorable to customers. Initial findings allow the introduction of adjustments and changes in the Thracian implementa-

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[4]http://www.poddrzewem.pl/do-poczytania/scrum-wprowadzenie

tion. Particular attention is given to operations whose realization time is scheduled for the next sprint.

A Sprint (or iteration) is the basic unit of development in Scrum. The Sprint is a timeboxed effort; that is, it is restricted to a specific duration (Gangji, Arif; Hartman, Bob 2015). The duration is fixed in advance for each Sprint and is normally between one week and one month, with two weeks being the most common (*Schwaber, Ken*, 2004).

The Scrum Product Owner is responsible for the correctness of the Product Backlog.

A client was to actively participate in the implementation process in order to improve communication with the team, making key decisions, providing feedback (Konieczny, 2014). The next step is Sprint Planning. The Goal of this session is to define a realistic Sprint Backlog containing all items that could accommodate be fully implemented until the end of the Sprint. Therefore, sprint backlog is understood as a list of tasks to be performed in a specific sprint. It is important to the team that chooses the size and scope of the tasks for the next four weeks, pledging thereby to execute them. Turning to the software development the team performs its tasks in the course of one month. A private employee participates every day in the Daily Scrum. The duty of each member is giving a report of what they managed to do the day before and what goals have been set today. It is also important to remember and mention about all the encountered obstacles. All the sprint is finished with Sprint Review. In this part the Product Owner is acquainted with the final product. During the Retrospective there is a discussion about successes, failures and future plans to improve the product obtained. If the purpose of Product Owner is a software update, the whole process starts from the beginning. Agile methods require an absolute knowledge of the rules and the full involvement of anyone who might have an impact on the success of the product. In return, they allow you to get the most satisfactory results.

3. Barriers and constraints of the project HaMIS[5]

Located on the North Sea The Sea Port of Rotterdam from the XIV is the centre of maritime worldwide transport. The Port of Rotterdam Authority has a turnover of approximately €600 million and a staff of 1,100 employees with widely varying commercial, nautical, and infrastructure-related responsibilities. The foremost customer for the feature teams is the Harbour Master division. This business unit ensures the smooth, clean, and secure handling of shipping traffic (annually, approximately 33,000 ocean-going and 110,000 inland vessels) (Viktor Grgić, 2014). The success resulted in implementation of a new system in 2009 The system HaMIS. Harbour Master Information Management System has become the answer to the outdated, introduced in 1995 Pontis System. The technical barriers of Pontis prevented the further development of business processes, attracting new customers and efficient monitoring of ships. The introduction of the new system was necessary although it was associated with high risk. Changes could not adversely affect the work of the port and the fear of losing public trust as well as citizens' money was an additional hurdle. The aim of the project was to introduce a new information system that will provide administration, management and inspection of vessels

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[5]All information about the project has been taken from the websites:
https://www.infoq.com/articles/hamis-four-teams-four-years
https://less.works/case-studies/port-of-rotterdam.html#PortofRotterdam

visiting Rotterdam at any time. The resulting plans, budget, expectations of suppliers and integrators of software made investors realize the demanding requirements and the accompanying risks. There was too much uncertainty about the project done with the use of waterfall method. The complexity of the project, unspecified objectives and implementation of the uncertain environment prompted investors to use methods scrum.

3.1. The Product Owner

Formally, the order has been placed by the Sea Port of Rotterdam. In defense of the interests two project managers were recruited. The first official acted as the project manager HaMIS. The other was responsible for external communications and coordination of the projects partly dependent on other companies or departments.

Both of them came directly from business, and have always been dedicated full-time to HaMIS. The product owners were supported by a number of domain experts who would gather and provide information to product owners and teams (Viktor Grgić, 2014). The scope of their responsibilities associated with the determination of the project included: planning activities, making the most important decisions, responding to questions. The distribution of tasks between two people received a detailed development of each element of the project. Due to the public nature of the project, the analysis has been subjected to every potential user input system and its expectations. Systematically shared elements of the new system were subjected to the public. Based on the feedback they made adjustments and amendments.

3.2. HaMIS team and working conditions

Understanding the nature and the scope of the operation scrum method was laborious. All the relevant issues of the project were discussed in the presence of all participants in the project. Victor Grgić (2014), a project participant, published the following comment about project teams: We do have a number of very experienced craftsmen, but we also have many developers who only learned to write proper software in the past four years. The HaMIS team is a mix of Port of Rotterdam employees and contractors, with contractors making up about three-quarters of the workers. The contractors are a combination of freelancers and employees from several service integrators. It was interesting to observe that contractors, after four years and in some cases for much longer, felt more connected to HaMIS than their official employer.

We can see that the confrontation of people with varying degrees of experience led to the exchange of information and the development of individual units. Project teams consisted of 3 to 7 people. The Management of the project did not interfere in the selection of new members of the teams. Confidence from the owner favored self-organizing teams. A 15-minute meeting (stand up) every morning became very common. It was an oral report of the achievements and obstacles encountered on the previous day. Each team had one Scrum Master, whose gesture was to raise awareness of essence and principles of the scrum in the various activities. The people who have influence on the finished software include:

- Product Owner (two people)
- Project & Program management (three people)
- Domain Experts / Analysts (three people)
- Scrum Master, developers, tasters, Geo (three people)
- Scrum Master, Developers, testers, DBA (three people)

- Scrum Master, developers / testers, UX (seven people)
- Scrum Master, developers, testers, DBA (five people)
- Infrastructure specialist (one person)

Employing people with various professional qualifications and creating favorable working conditions led to better experience of individual employees. It finally brought more effective work. It is recognized that a good relations between team members is the key. Phone calls and video conferences using Skype overcame the barrier of space. Each success was celebrated.

3.3.   Time and life cycle of HaMIS

HaMIS is not an updating of existing software, but a completely new product created from scratch. The first elements were created with the use of waterfall method. The method involved restrictions which have changed the way of implementation of the software. The used life cycle of the project included product backing. Specific requirements of a customer and potential users became the basis of specific expectations of the implemented system. Plans included a range of activities for the next three months. Selection of acceptable agents were contained in the Sprint Planning. Their disposal between the various task groups formed Sprint Backlog. The Specifically developed range of activities of project teams concerned 4 weeks. A 15-minute daily report on the previous day (Daily Scrum) gave the actual picture of completed tasks. After the end of a one-month action plan, each team presented the final product to the Product Owners in Sprint Review. The meetings lasted an average of 1h. Thanks to the analysis of the previous month in Sprint Retrospective the team shared the obstacles which they came across taking into consideration suggested updates.

3.4.   Diagnosis of HaMIS Features

The Analysis of Project HaMIS raises suspicion concerning the use of agile project to completion of the public project. The purpose of information contained in Table 1 is to compare and identify features combining the method of management in the discussed project with the scrum method.

Table 1: HaMIS features within the context of the scrum

Factors conditioning Scrum	Components of the project Hamis
People involved in the project: The Product Owner, Scrum Master, Testers, Analysts, Programmer etc.	- Product Owner (2 people) - Project & Program management (3 people) - Domain Experts / Analysts (3 people) - Scrum Master, developers, tasters, Geo (3 people) - Scrum Master, Developers, testers, DBA (3 people) - Scrum Master, developers / testers, UX (7 people) - Scrum Master, developers, testers, DBA (5 people) - Infrastructure specialist (1 person)
Recognition of customers' needs as a priority	Product Owner was present at every stage of the project in order to improve communication with the team, make key decisions, give feedback
Working software delivered to a customer regularly every 3–4 weeks	Working software delivered after each Scrum within 4 weeks
The project team consists of 3 to 9 people	Individual task teams ranged from 3 to 7 people
The product was created by fully engaged people who were provided with the appropriate working conditions.	The right conditions for individual and group work were provided. Phone calls and video conferences through Skype helped to

	avoid misunderstandings They celebrated every positively ended scrum
Development opportunities for individuals participating in the project	People with a lot of experience were able to demonstrate it. Responding to questions they educated inexperienced workers.
Product Owners' trust in employees	Management did not interfere in the selection of new employees by individual project teams

The life cycle of the project:
    1. Product Backlog,
    2. Sprint Planning,
    3. Sprint Backlog,
    4 .Daily Scrum,
    5. Sprint Review
    6. Sprint Retrospective
	The life cycle of the project:
	    1. Product Backlog, – defining an action plan for the next three months.
	    2. Sprint Planning – a one – month implementation plan
	    3. Sprint Backlog – assigning specific tasks for teams
	    4. Daily Scrum – realization of the plan
	    5. Sprint Review – Review of successes, barriers encountered and future plans connected with the improvement of the resulting product. The average duration of the meeting is 1h.

Team meetings last for 10–15 min. The previous day is analysed as "done, in progress, to do"	Daily meetings lasted for 15 minutes. The members exchanged their experience in the field of the problems encountered and the successes of the previous day.

Source: Own work

Presented in the table above components of the project HaMIS imply the use of the method as a dominant scrum. The reason for the start of the project was to replace the system Points with the new system, HaMIS, within two years. The main target has been achieved. The use of agile programming has allowed for the implementation of the new opportunities that were previously considered impossible. Without a doubt, the elements indicated in Table 1 had a decisive influence on the successful completion of the project, and thus its effectiveness. More than this, the attention was focused on the needs of specific visitors. Interviews, tests and observations of users during their work proved to be helpful. Not less important was the involvement of the project team members.

4. Summary

Implementation of Agile methods is neither easy nor quick. It requires a thorough analysis of the current state of the organization and constructing the most optimal processes and their implementation. To exploit the benefits of Agile methodologies as fully as possible, it is essential to open yourself to the cultural and mental change in the organization (Stocki, Prokopowicz, Żmuda, 2008). As shown in the example discussed, agile is possible to use in the project public after appropriate adaptation. Evidence of this effectively implemented method shows benefits of the system HaMIS. Its success consists of many factors. It is considered that the main element is a proper selection of duties and trainings in the methodology of scrum for teams. Giving the roles and

responsibilities is clearly defined. A valuable ally to the project HaMIS was time, which mobilized to work at every stage of the project. The pressure of time increased effectiveness of the team and focused team's attention on what's important. Updates appearing every 4 weeks gave the image of physical progress. Another motivator was adequate working conditions, development opportunities and mutual trust. However, the key element in the project proved to be a customer orientation. Specific purpose,

testing and constant conversation with the customer allowed us to create a system with more opportunities than expected in the beginning. Without a doubt, the project HaMIS broke the barrier of the use of agile method in the public sector and has become an example worth following. Despite the huge success, many countries still have concerns about using agile in public sector. Using the method of waterfall in IT projects not only does not produce the desired results but more often fails. Bad management of public money has a negative impact on relations with citizens. The public sector needs improvement so it is important to promote and seek effective agile factors in order to use it in the public sector.

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Comparison of Bankruptcy Prediction Models in Relation to SME segment in the Czech Republic

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Abstract

The good and stable financial situation of enterprises is the factor which eliminates credit risk of a bank, so the prediction of a bankruptcy and a credit risk of a bank is an unflagging object of a discussion. We focus on small and medium sized enterprises (SMEs) considering the fundamental role played in the Czech economy and the considerable attention placed on SMEs. The aim of this article is the comparison of the real predicting abilities of several bankruptcy models. We have chosen the Altman Z-score, the Ohlson O-score, the Zmijewski's model, the Taffler's model, and the IN05 model. The basic form of the models is used as proposed by their authors. The results are compared using the classification table and ROC curve.

Keywords: credit risk, bankruptcy prediction, SME, bankruptcy model, insolvency, probability of default

JEL Code: C52, C53, G31

1. Introduction

The ability to predict the bankruptcy is important above all for financial users, but it is also crucial for groups such as investors, creditors, stakeholders, credit rating agencies, auditors etc. Predicting bankruptcy as early as possible is always important and it is considered as very important in periods of financial and economic crisis (Liftschutz and Jacobi, 2010). Bankruptcy prediction has long attracted the interest of researchers. Academics and practitioners have focused their research to improve the performance of existing bankruptcy models by the reason of the former financial crisis when bankruptcy

risk models and rating systems failed to adequately estimate the risk in the corporate sector (Diakomihalis 2012).

The aim of this contribution is the comparison of the real predicting abilities of several bankruptcy models in relation to small and medium sized enterprises in the Czech Republic. We have chosen the bankruptcy models which are used very often in many scientific papers. We compare models of the Altman Z-score, the Ohlson O-score, the Zmijewski's model, the Taffler's model, and the IN05 model.

We focus on small and medium sized enterprises (SMEs) because they are reasonably considered as the backbone of the economy many countries. Thanks to their simple structure, they can respond quickly to changing economic conditions and meet local customers' needs, growing sometimes into large and powerful corporations or failing within a short time of the firm's inception. For OECD members, the percentage of SMEs out of the total number of firms is higher than 97%. SMEs employ approximately two third of employees and create more than half of added value in EU-28 (Eurostat, 2017). From a credit risk point of view, SMEs are different form large corporates for many reasons. For example, Dietch and Petey (2004) analyse a set of German and French SMEs and conclude that they are riskier but have a lower asset correlation with each other than large businesses (Altman and Sabato, 2007). Another motivation is to show the significant importance of modelling credit risk for SMEs separately from large corporates.

2. Literature review

The literature about default prediction methodologies is substantial. Many authors during the last fifty years have examined several possibilities to predict default or business failure. The seminal works in this field were Beaver (1967) and Altman (1968) (Altman and Sabato, 2007). The researcher William Beaver was the first to apply a number of ratios, which could discriminate between failed and non-failed companies up to five years prior to bankruptcy. Altman improved Beaver's method, applying a discriminant analysis using financial ratios concerning to liquidity, profitability, financial leverage, activity and solvency. Being the first person to successfully develop multiple discriminate analysis (MDA) prediction model with a degree of 95.0% rate of accuracy, he is considered the pioneer of insolvency predictors. Altman's model has been applied successfully in many studies worldwide concerning the subjects of capital structure and strategic management, investment decisions, asset and credit risk estimation and financial failure of publicly traded companies (Lifschutz and Jacobi, 2010).

Other model based on the MDA principle and very often cited in research literature is Taffler model developed in Great Britain in 1977 (Taffler, Tishaw, 1977).

Another MDA model has been developed by Inka and Ivan Neumaier in 1995 known as IN95. This model was constructed especially for the Czech market and was updated in next years. We use the last version – IN05 model which was developed in 2005 (Inka and Ivan Neumaier, 2005).

For many years thereafter, MDA was the prevalent statistical technique applied to the default prediction models. However, in most of these studies authors pointed out that two basic assumptions of MDA are often violated when applied to the default prediction models. Considering these MDAs' problems, Ohlson (1980), for the first time, applied the conditional logit model to the default prediction's study. The practical benefits of logit methodology are that they do not require the restrictive assumptions of MDA and allow working with disproportional samples. Next, very often cited model, which

uses conditional probability, is model by Mark E. Zmijewski (1984). He was the pioneer in applying probit analysis to predict default. A probit approach is the same as in logit approach different is only distribution of random variables.

There are a number of papers, which propose different methods of bankruptcy prediction. Above all, we can mention artificial neuron networks used by Angelini et al. (2007), decision trees method used by Gulnur and Fikret (2011) and hazard models used by Shumway (2001).

3. Methodology and Data

We have chosen the bankruptcy models, which are used very often in many scientific papers. We compare models of the Altman's Z-score, the Ohlson's O-score, the Zmijewski's model, the Taffler's model, and the IN05 model. Many different versions of these models exist; we use the following form of the models.

Altman's Z-score:

$$\mathbf{Z_{1983}} = (0.717 \times X_1) + (0.847 \times X_2) + (3.107 \times X_3) + (0.42 \times X_4) + (0.998 \times X_5) \qquad (1)$$

$$x_1 = \frac{\text{working capital}}{\text{total assets}}$$

$$x_2 = \frac{\text{retained earnings}}{\text{total assets}}$$

$$x_3 = \frac{\text{EBIT}}{\text{total assets}}$$

$$x_4 = \frac{\text{equity}}{\text{liabilities}}$$

$$x_5 = \frac{\text{sales}}{\text{total assets}}$$

Distress zone ... Z < 1.23

Taffler's model:

$$\mathbf{Taffler} = (0.53 \times X_1) + (0.13 \times X_2) + (0.18 \times X_3) + (0.16 \times X_4) \qquad (2)$$

$$x_1 = \frac{\text{EBT}}{\text{short} - \text{term payables}}$$

$$x_2 = \frac{\text{current assets}}{\text{liabilities}}$$

$$x_3 = \frac{short - term\ payables}{total\ assets}$$

$$x_4 = \frac{sales}{total\ assets}$$

Distress zone ... Taffler < 0.2

Model of Inka and Ivan Neumaier:

IN05 = $(0.13 \times X_1) + (0.04 \times X_2) + (3.97 \times X_3) + (0.21 \times X_4) + (0.09 \times X_5)$ (3)

$$x_1 = \frac{total\ assets}{liabilities}$$

$$x_2 = \frac{EBIT}{interest\ cost}$$

$$x_3 = \frac{EBIT}{total\ assets}$$

$$x_4 = \frac{total\ revenues}{total\ assets}$$

$$x_5 = \frac{current\ assets}{short - term\ liabilities + short - term\ bank\ loans}$$

Distress zone ... IN05 < 0.9

Ohlson's O-score:

O-score = $-1.32 - (0.407 \times X_1) + (6.03 \times X_2) - (1.43 \times X_3) + (0.0757 \times X_4) - (1.72 \times X_5)$
$+ (2.37 \times X_6) - (1.83 \times X_7) + (0.285 \times X_8) - (0.521 \times X_9)$ (4)

$$x_1 = \log\left(\frac{total\ assets}{GNP\ index\ of\ price\ level}\right)$$

$$x_2 = \frac{liabilities}{total\ assets}$$

$$x_3 = \frac{working\ capital}{total\ assets}$$

$$x_4 = \frac{short - term\ liabilities}{current\ assets}$$

$x_5 =$ 1 in case, that total liabilities are higher than assets, otherwise 0

$$x_6 = \frac{\text{net income}}{\text{total assets}}$$

$$x_7 = \frac{\text{operating cash flow}}{\text{total liabilities}}$$

$x_8 =$ 1 if net income was negative last two years, otherwise 0

$$x_9 = \frac{\text{net income}_t - \text{net income}_{t-1}}{\text{abs}(\text{net income}_t) + \text{abs}(\text{net income}_{t-1})}$$

Distress zone ... O-score > 0.5

Zmijewski's model:

Zmijewski $= -4.336 - (4.513 \times X_1) + (5.679 \times X_2) + (0.004 \times X_3)$ (5)

$$x_1 = \frac{\text{net income}}{\text{total assets}}$$

$$x_2 = \frac{\text{liabilities}}{\text{total assets}}$$

$$x_3 = \frac{\text{current assets}}{\text{short} - \text{term liabilities}}$$

Distress zone ... Zmijewski > 0.5

We used data for the Czech SME companies from Bisnode database for the years from 2008 to 2014. The models are used for predicting bankruptcy within two years.

For the quality assessment of the models, we applied one of the most commonly used methods for evaluating models based on binary output, namely the ROC curve and the classification table. In tested models we used the original estimated coefficients by their authors. We did not use our data for estimating coefficients in the models; therefore we are able to use the whole dataset as a validation sample for the verification of these models.

Quality evaluation of bankruptcy models is also dependent on the determination of the so-called 'cut-off' points. This is the value above (or below) which the firm will be regarded as bankrupt. The optimal cut-off point is the value that minimizes errors of type I and II. However, although everything depends on the purpose for which the model will be used. Therefore, for example, we may choose higher cut-off limit if the request is to better characterize the companies that are going to bankrupt at the expense that there will be higher number of healthy ones wrongly ranked.

ROC (Receiver Operating Characteristic) curve is a graphical method, which is based on a square showing the relationship between true positive rate (TPR – also called sensitivity) and false positive rate (FPR – also called fall-out). TPR measures the proportion of positives that are correctly identified as such. FPR is also known as probability of false alarm, and it is calculated as the ratio between the numbers of negatives that are wrongly identified as positives. TPR is applied to the y-axis and FPR on the x-axis. ROC curve combines the values of TPR and FPR.

There are two possible extreme cases. The first case occurs when the predicted values are absolutely similar as real values. In this case the curve copies the border of the graph beginning in down left corner through upper left corner and ends in upper right corner. The second case is the exact opposite and describes the model with no predictive power. The curve in this case is a diagonal from down left corner to upper right corner of the graph. Thus, the closer the curve is to the upper left corner, the better predictive power of the model.

ROC curve is closely related to AUC (Area Under Curve) indicator that numerically represents the graph and helps with comparison of two or more models. This indicator quantifies the area under the curve and is useful for comparing two or more curves, because they are transformed into one measure and easily comparable. AUC ranges from 0.5 to 1, where a higher value indicates a better prediction model.

Other method is to use classification table. Classification table is very simple and intuitive method of assessing binary prediction models. As the name suggests, its principle is to assess the correct and incorrect classification of the individual observations and consequently the whole model. Prediction model is assessed by the proportion of correctly classified observations to the total number of observations. As it was discussed above the total percentage is dependent on the determination of the cut-off value. From the classification table we are also able to identify type I and II errors for a given cut-off boundaries.

4. Results

In this section we compare our selected models according to ROC curves, AUC, and classification table. We want to show, which of these models is the best in its original form and what are the differences between them.

Table 1 shows the number of observations for each model. These numbers are different due to NA values in some variables that are not the same in every model. The lowest number of observations has the Ohlson's model, because it works with more lagged variables, which significantly reduced the number of usable observations. The third and fourth columns show the number of companies that survived and go bankrupt. The fifth column contains the number of bankrupted companies in percentage terms. The last column is the most important for our analysis, and it shows the AUC values. AUC represents the performance of the model for all possible cut-off boundaries; therefore it allows us to compare the models as a whole. We can see that the best performing model is Zmijewksi's and Ohlson's models, respectively. These models applied probit and logit methodologies and produced better results than models based on discriminant analysis, but the results are pretty close. Individual ROC curves for each model are in Figure 1.

Table 1: Basic characteristics and AUC

Model	Observations	Non-Bankrupt	Bankrupt	Bankrupt (%)	AUC
Altman	128,825	127,479	1,346	1.04	0.620
Taffler	128,822	127,476	1,346	1.04	0.584
IN05	128,824	127,479	1,346	1.04	0.634
Zmijewski	128,824	127,479	1,346	1.04	0.663
Ohlson	39,313	38,900	413	1.05	0.646
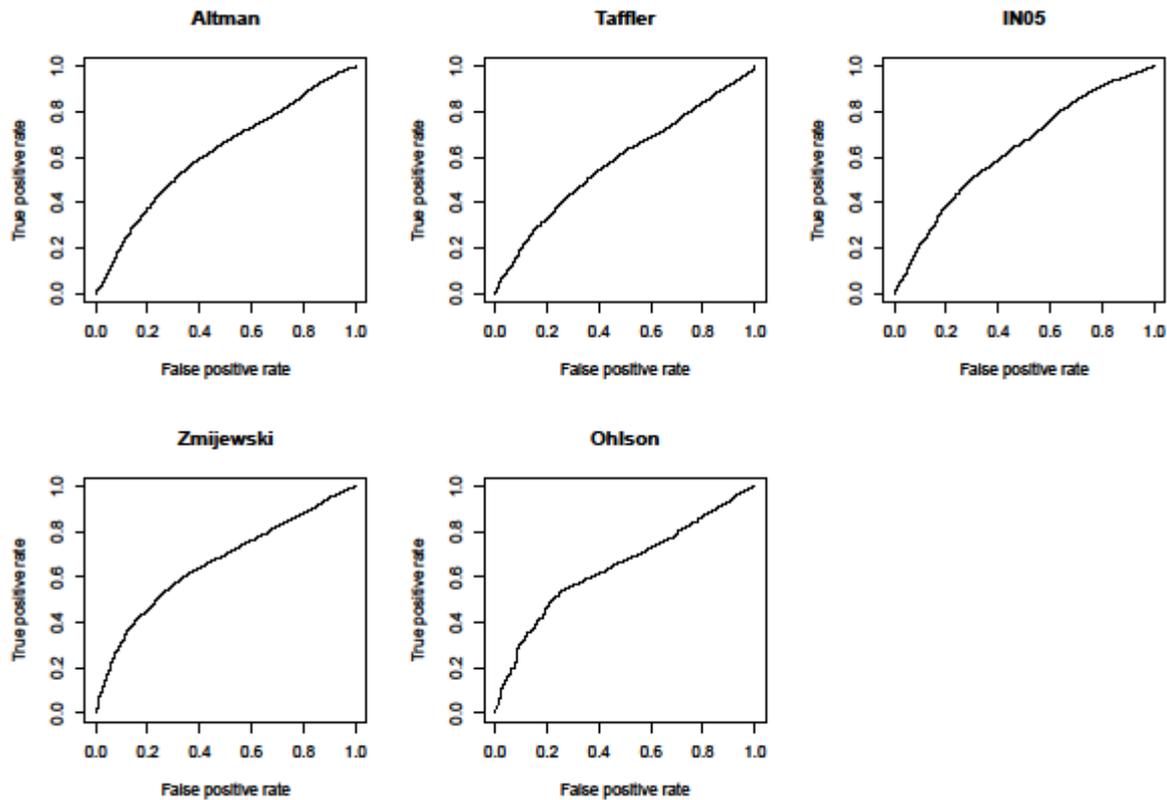
Figure 1: ROC curves for selected models

The second part of our analysis is to apply cut-off boundaries recommended by the original models and compare the results. For this purpose the classification table is used. The results are in Table 2. It is obvious that the first two models of Altman and Taffler used too low cut-off boundary in comparison with the rest of the models. They have the high number of correctly classified observations, but this number decline significantly in case of companies that go bankrupt. The opposite situation occurs in case of IN05 model and Ohlson's model, where the cot-off boundary is relatively high. The overall accuracy of these models suffered but they are more successful in revelation of bankruptcy. Zmijewski's model is somewhere in-between. As we can see, setting the right cut-off boundary is always crucial and it could influence our results significantly. We cannot say what is right or wrong, but it is important to keep in mind that each model approach the cut-off boundary in different way and produce dissimilar results.

Table 2: Classification table

Model	Correct	Incorrect	Type I error	Type II error	Non-Bankrupt correct	Bankrupt correct	TPR	FPR
Altman	74.30	25.70	98.45	0.87	74.69	37.67	0.747	0.623
Taffler	88.45	11.55	98.70	1.01	89.24	13.45	0.892	0.866
IN05	30.00	70.00	98.75	0.55	29.19	84.84	0.292	0.152
Zmijewski	41.21	58.79	99.42	1.70	41.30	32.24	0.413	0.678
Ohlson	19.97	80.03	99.07	1.55	19.43	71.19	0.194	0.288

5. Discussion and Conclusions

In this paper we examined how the original established models are able to predict bankruptcy for the Czech SME companies. According to AUC, the best model is specification by Zmijewski, but the overall results are not very good. The models are able to provide better results than random walk; however, they did not fulfill our expectations. We are convinced that estimating our own coefficients in logit analysis would produce much more accurate results.

When comparing default cut-off distress zones, we find out that each model provide different approach for setting the cut-off zones. Therefore it is crucial to think carefully about our goals in any analysis and adjust the cut-offs appropriately.

As a result, we recommend being aware of using bankruptcy models in their original form and always adjust the model to our needs and achievements. We confirm the idea 1) that SMEs require models and procedures that focus specifically on the SME segment because SMEs are significantly different from large companies from credit risk point of view, 2) that it is necessary to estimate our own coefficients strictly for the Czech market.

As a suggestion for further research, we propose to perform logit or probit analysis and find the best model for the examined dataset, which is in our case the Czech SMEs.

Acknowledgements

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State Aid in the Agricultural Sector and its impact on the competitiveness of the EU Member States

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Abstract

The subject of the article is to present the conditions of admissibility of State aid in the European Union, taking into account the specific aid instruments applicable to the agricultural sector. The qualitative analysis of State aid granted by the Member States is carried out under the provisions of the Treaty on the functioning of the European Union and the rules of State aid admissibility on the basis of the implementing regulations: there are *de minimis* provisions, there is one comprehensive block exemption regulation, and one set of guidelines applicable to the agricultural sector. Statistical data for quantitative analysis will be gathered on the basis of reports published by the European Commission on State aid granted by Member States. This should lead to verify the hypothesis of the influence of State aid on the competitiveness of the EU Member States, which have provided State aid for undertakings in agricultural sector in the years 2000–2014. This analysis is carried out based on the linear regression model. The response variable (dependent variable Y) is the GDP *per capita*, and explanatory variable (independent variable X) is the expenditure on State aid in the agricultural sector.

Keywords: State aid, Agricultural Sector, competitiveness, economic growth, the European Union

JEL Code: E62, K20, K33

1. Introduction

State aid for enterprises is applied in the European Union as derogation from a rule of creating equal opportunities for starting and running a business in the Single European Market. The rules of State interventionism in the economy has been defined precisely in this field and they tend to seek a compromise between the position of the European Commission and the position of the Member State concerned with the admissibility of State aid (Buts, Joris, Jegers, 2013). These rules, on the one hand, prohibit providing

State aid so as not to lead to distortions of competition in the market of integrating countries, while on the other hand, they allow for providing the aid by public authorities in order to correct the imbalance in development between regions, stimulate or accelerate necessary changes and development of certain sectors of the economy.

Legal regulation of the issue of State aid is an element of protection of the mechanism of competition, which has been recognized in the Treaty on the Functioning of the European Union (TFEU, 2012) as one of the basic tools for the realization of the tasks assigned in it. The general prohibition of providing state aid has been formulated in Article 107 par. 1 TFEU, whereas this provision does not specify the definition of State aid, but indicates the criteria taken into account when assessing the specific actual circumstances (Bartosch, 2007; Sinnaeve, 2007; Köhler, 2012; Nicolaides, 2014; Podsiadło, 2016). These criteria were formulated in the catalogues of terms defining State aid, i.e. the origin from the State or from State resources, selectivity, economic advantage to the beneficiary or beneficiaries of the aid and the disruption or threat to distort competition and affecting the trade between Member States. The primary objective pursued by the precise determination of the means which form State aid is not establishing an absolute prohibition on their use, but only a selection of the action circle which is subject to testing for their possible negative impact on competition in the Internal market level (Crocioni, 2006). Further study mostly comes down to the analysis if the binding specific provisions of the European law allow for providing State aid in the given case.

The agricultural sector involves on the one hand, the so-called primary production of agricultural products, and on the other hand, the processing and marketing of agricultural products. The distinction between primary production of agricultural products and processing and marketing of agricultural product is justified by the fact that for certain types of aid, the processing and marketing of agricultural products is very similar to other industrial activities which do not relate to agricultural products. Therefore, there is no justification for a treatment which would be different from the normal State aid rules. This explains why some general State aid rules (for example *de minimis* aid) apply also to aid in favour of processing and marketing of agricultural products, but not to aids granted in favour of primary production of agricultural products.

The purpose of this article is to analyze the conditions of admissibility of State aid in the agricultural sector. This should lead to verify the hypothesis of the influence of State aid on the size of the GDP *per capita* in the Member States, which have provided this kind of State aid to enterprises in the years 2000–2014. The positive correlation of GDP *per capita* with the amount of expenditure on State aid in the agriculture sector would mean that with increasing amount of State aid to enterprises their competitiveness measured in terms of GDP *per capita* should increase, and thus the competitiveness of national economies and the competitiveness of the EU economy ought to increase.

2. Specific Rules of State aid in the Agricultural Sector

One of the main characteristic of the State aid rules applicable to the agricultural sector is their enshrinement in the broad agricultural and rural development policy (Heidenhain, 2010). As a consequence of this, the State aid policy in the agricultural sector seeks consistency with the support granted under the European Union's common agricultural and rural development policy. The agricultural guidelines highlight two concrete aspects of this need for consistency: State aid cannot be incompatible with the

rules on the Common Market Organization, and particular rules are set to ensure the consistency with the EU rules for rural development.

One of the fundamental differences with the normal State aid rules lies in the fact that the Articles 107 to 109 TFEU are only applicable insofar as determined by the Council (Article 42 TFEU). The competence of the Commission to assess the State aids in the agricultural sector are therefore based on the legislation adopted by the Council, and do not derive directly from the Treaty, contrary to the State aid rules in the industrial sector.

Article 180 of the single Common Market Organisation regulation (EC, 2007) which applies to most of the agricultural products, provides for the application of the State aid rules of Articles 107–109 TFEU. Similarly, Article 88 of the Rural Development Regulation (EC, 2005; EC, 2006) expressly provides that Articles 107–109 TFEU are applicable to aid granted by Member States to support rural development.

In practice, it can therefore be concluded that the State aid rules are fully applicable to the agricultural sector, exception made of some products which are not subject to a common organisation of the market. It concerns horsemeat, coffee, vinegars derived from alcohol and cork. This means that there is an obligation to notify aids in favour of these products, but that the Commission cannot take a final negative decision in case of incompatibility. The powers of the Commission for these products are limited to the formulation of comments and recommendations. If a Member State does not follow these recommendations, there is a possibility for the Commission to apply the procedure foreseen by Article 258 TFEU. In practice, this has however never been used.

The Commission has adopted guidelines setting out its policy on State aid for agriculture (Commission, 2007a; Commission 2013). The categories of aid that may be granted in accordance with the guidelines are divided into rural development measures, risk and crisis management measures and other types of aid. In addition, Commission Regulation (EC) No 1857/2006 (Commission, 2006) established a block exemption in respect of aid for SMEs active in the production of agricultural products. The aim of this block exemption regulation is to simplify the granting of State aid to agricultural SMEs, by exempting Member States from any notification obligations provided the conditions of the agricultural block exemption are respected. The exemption regulation makes it possible for aid to be granted to farmers faster, which is particularly important, for example, where they sustain losses due to bad weather or animal or plant diseases. On 20 December 2007, the Commission also adopted a regulation on *de minimis* aid in the agricultural production sector (Commission, 2007b). This regulation fixed the ceiling for small amounts of aid in the agriculture sector to €7.500 per beneficiary over any period of three fiscal years. One of the particularities of the agricultural *de minms* rule is that the maximum ceiling of €7.500 is coupled to a maximum total per Member State of 0.75% of the value of agricultural output.

3. Methodology and Data

According to the definition used by the European Commission, the competitiveness is defined as "the ability of the economy to provide residents with high and rising standard of living and a high level of employment and productivity, based on a solid basis" (Commission, 2001). The measure of competitiveness is here the indicator determining the size of the GDP *per capita*. The size of GDP *per capita* in relation both to the entire EU and individual Member States determines the standard of living and level of economic

development. The higher is the value of GDP *per capita* the higher the country competitiveness. At this point, it seems reasonable, therefore, to conduct a comprehensive analysis of the relationship between the EU Member States expenditure on State aid in Agricultural Sector and the size of GDP *per capita*. The response variable (dependent variable Y) is the GDP *per capita*, and the explanatory variable (independent variable X) is the expenditure on State aid in agricultural sector.

Statistical analysis will be carried out based on two source tables. The first table shows the calculations for the linear regression model concerning respectively the slope parameter (directional factor β).

t Stat is a test of linear relationship occurrence between expenditure on agricultural State aid and the size of the GDP *per capita*. This statistical test allows to verify the authenticity of the so-called null hypothesis that the parameter of the regression function I type β is equal to zero, with the alternative hypothesis that it is not equal to zero ($H_0: \beta = 0; H_A: \beta \neq 0$). The acceptance of the null hypothesis that the parameter $\beta = 0$ would mean that the increase in the value of expenditure on State aid by € 1 million will not cause any changes in the size of the GDP *per capita* which means the lack of any relationship between expenditure on State aid and the size of the GDP *per capita*. In other words, the acceptance of the null hypothesis means the lack of the influence of the agricultural State aid provided by the Member States of the European Union on the size of their GDP *per capita*. From the perspective taken in this paper it will be essential to reject the null hypothesis in favor of the alternative hypothesis which states that between the studied phenomena – expenditure on State aid and the size of the GDP *per capita* – there is a significant statistical relationship. From the tables of critical values of t-Student it is seen that $\pm t_{\frac{\alpha}{2}} = \pm 2.1604$ for $\alpha = 0.05$ and $n - 2 = 13$ degrees of freedom. The null hypothesis can be rejected in favor of the alternative hypothesis only when: $t_b < t_{\frac{\alpha}{2}}$ or $t_b > t_{\frac{\alpha}{2}}$, that is when $-t_b < -2.1604$ or $+t_b > +2.1604$.

The second table contains regression statistics. Among the regression statistics are: the correlation coefficient, determination coefficient, standard error and the parameters of F test, that is the value of F-test and the probability of making type I error, when the hypothesis is verified concerning the lack of impact of expenditure on State aid on the size of the GDP *per capita* (irrelevance of State aid expenditure in the regression model). F-test, similarly as described above t-test, is used for testing the significance of linear regression coefficient β evaluation. The checking of this test is a statistic F having F-Snedecor distribution of k_1 and k_2 freedom degrees. When rejecting the null hypothesis $F > F_\alpha$ of no relation between expenditure on State aid and the size of the GDP *per capita* and accepting the alternative hypothesis of the existence of a statistically significant relationship between the variables. From the table of critical values of the F-Snedecor for $k_1 = 1$ (1 independent variable) and $k_2 = n - 2 = 13$ degrees of freedom and $\alpha = 0.05$ we read $F_{0.05} = 4.67$. Thus, the alternative hypothesis can be adopted only when $F > 4.67$.

4. Results

The amount of State aid granted in the agricultural sector is substantial. The proportion of the agricultural State aid in the global State aid picture is important. Member States granted aid earmarked for agricultural development of about € 162.2 billion in 2000–2014 (table 1). The largest amounts of agricultural State aid have been granted by France (€ 28.5 billion), Finland (€ 22.1 billion), Germany (€ 19.4 billion), Italy

(€ 12.2 billion), Netherlands (€ 11.5 billion) and United Kingdom (€ 11.3 billion). In Bulgaria, Latvia, Romania and Finland, there is a very high proportion (between 70 and 90%) of agricultural aid in the total amount of all aid measures granted.

Does State aid in Agricultural Sector provided by Member States to enterprises have an adverse effect on the condition of their competitiveness, leading to a decrease in the GDP *per capita*? Or does such aid not have any impact on the PKB *per capita*? Answers to these questions will be provided by the regression analysis.

Table 1: The size of State aid in the Agricultural Sector and the GDP *per capita* – the analysis of variance: the line "variable X"

EU Member States	2000	2002	2004	2006	2008	2010	2012	2014
Austria	1149.6	253.3	223.2	192.4	196.0	190.4	186.9	161.2
Belgium	479.0	154.9	167.2	119.6	119.9	117.5	77.7	104.5
Bulgaria	0	0	0	0	208.8	19.5	45.8	88.7
Croatia	—	—	—	—	—	—	—	122.0
Cyprus	0	0	63.1	11.9	31.3	26.8	25.0	18.7
Czech Republic	0	0	247.4	272.6	227.6	209.5	195.6	159.1
Denmark	383.6	170.5	129.7	134.2	112.3	97.5	87.4	81.5
Estonia	0	0	42.6	32.2	32.7	31.6	28.7	34.3
Finland	1693.5	1544.4	1626.2	1696.6	1356.3	1329.0	1194.1	1032.8
France	4014.4	1250.9	2342.8	1479.3	1572.9	1718.9	1734.8	1168.5
Germany	2148.2	1739.4	1554.2	1288.2	1240.9	809.3	910.2	1019.0
Greece	269.2	31.6	116.6	141.1	776.5	415.6	310.9	259.0
Hungary	0	0	345.3	357.8	219.6	196.1	270.4	250.8
Ireland	469.7	1363.3	131.1	161.7	1219.0	731.0	307.3	283.1
Italy	1071.4	411.6	1141.6	707.1	876.5	845.5	715.4	629.0
Latvia	0	0	41.9	146.6	10.0	33.4	43.8	44.5
Lithuania	0	0	113.4	96.7	100.2	83.3	93.9	102.8
Luxembourg	50.8	54.2	58.3	40.9	21.1	22.7	24.7	34.4
Malta	0	0	20.6	25.4	16.2	11.6	2.6	1.1
Netherlands	1436.3	1060.8	871.8	436.7	718.4	663.2	509.8	466.3
Poland	0	0	1084.7	1179.9	717.6	688.8	715.7	433.8
Portugal	413.8	61.2	46.1	16.6	21.9	9.3	53.5	8.4
Romania	0	0	0	0	606.1	100.5	233.7	123.2
Slovakia	0	0	22.7	56.8	59.1	57.4	13.1	14.0
Slovenia	0	0	118.5	90.1	77.7	76.9	59.8	58.8
Spain	946.5	171.3	467.5	934.9	737.9	525.1	688.3	526.6
Sweden	523.6	73.0	89.9	224.6	111.8	56.7	32.1	33.8
United Kingdom	1201.4	1138.8	1308.4	813.4	572.5	478.4	347.8	340.1
EU 28	16251.2	9479.1	12374.7	10657.1	11960.9	9545.5	8908.8	7599.8

Source: Eurostat, 2017.

The most important statistical test in the simple regression analysis is a test of whether the regression coefficient equals zero. If in a specific case it could be concluded that the directional coefficient of the real regression line in the population equals zero, it will mean that between expenditure on State aid and the size of GDP *per capita*, there is no linear relation, or expenditure on State aid and the size of GDP *per capita* are not linearly dependent. Therefore, there should be a test of the linear relation occurrence between expenditure on State aid in Agricultural Sector in the Member States and the size of their GDP *per capita*. Statistics on this test are shown in table 2.

Table 2: The size of State aid in the Agricultural Sector and the GDP *per capita* – the analysis of variance: the line "variable X"

EU Member States	Regression coefficient b	Standard error Sb	t Stat tb	p-value	Lower 95%	Upper 95%
Austria	**−3.1E−06**	**1.09E−06**	**−2.88034**	**0.012885**	**−5.5E−06**	**−7.8E−07**
Belgium	**−6E−06**	**1.41E−06**	**−4.2738**	**0.000906**	**−9.1E−06**	**−3E−06**
Bulgaria	**4.31E−06**	**1.73E−06**	**2.489559**	**0.027117**	**5.7E−07**	**8.06E−06**
Croatia	–	–	–	–	–	–
Cyprus	1.5E−05	9.73E−06	1.538156	0.147988	−6.1E−06	3.6E−05
Czech Republic	**9.83E−06**	**1.98E−06**	**4.971941**	**0.000255**	**5.56E−06**	**1.41E−05**
Denmark	−5.1E−06	3.41E−06	−1.4947	0.158866	−1.2E−05	2.27E−06
Estonia	**7.15E−05**	**1.62E−05**	**4.402545**	**0.000714**	**3.64E−05**	**0.000107**
Finland	−3.4E−06	1.69E−06	−2.01407	0.065176	−7.1E−06	2.47E−07
France	**−4.9E−07**	**1.49E−07**	**−3.30331**	**0.005711**	**−8.1E−07**	**−1.7E−07**
Germany	**−3.3E−06**	**6.66E−07**	**−4.94965**	**0.000266**	**−4.7E−06**	**−1.9E−06**
Greece	2.82E−06	2.04E−06	1.381307	0.190466	−1.6E−06	7.22E−06
Hungary	**3.03E−06**	**8.16E−07**	**3.7119**	**0.00261**	**1.27E−06**	**4.79E−06**
Ireland	−9.9E−07	1.45E−06	−0.68128	0.507652	−4.1E−06	2.14E−06
Italy	9.36E−07	9.37E−07	0.999704	0.335699	−1.1E−06	2.96E−06
Latvia	**1.61E−05**	**7.23E−06**	**2.2249**	**0.044416**	**4.67E−07**	**3.17E−05**
Lithuania	**2.44E−05**	**5.33E−06**	**4.567371**	**0.000528**	**1.28E−05**	**3.59E−05**
Luxembourg	**−0.00014**	**5.52E−05**	**−2.49885**	**0.026646**	**−0.00026**	**−1.9E−05**
Malta	−1.1E−05	2.33E−05	−0.45101	0.659414	−6.1E−05	3.99E−05
Netherlands	**−3.4E−06**	**8.87E−07**	**−3.85225**	**0.001999**	**−5.3E−06**	**−1.5E−06**
Poland	1.22E−06	7.63E−07	1.606049	0.13227	−4.2E−07	2.87E−06
Portugal	−2.7E−07	4.98E−07	−0.54881	0.592435	−1.4E−06	8.03E−07
Romania	9.59E−07	5.35E−07	1.792044	0.096419	−2E−07	2.12E−06
Slovakia	2.49E−05	1.48E−05	1.682391	0.116342	−7.1E−06	5.68E−05
Slovenia	**2.45E−05**	**6.74E−06**	**3.642057**	**0.002982**	**9.99E−06**	**3.91E−05**
Spain	3.23E−07	9.68E−07	0.333602	0.744	−1.8E−06	2.41E−06
Sweden	**−9.9E−06**	**3.15E−06**	**−3.15227**	**0.007638**	**−1.7E−05**	**−3.1E−06**
United Kingdom	**−2.9E−06**	**1.02E−06**	**−2.83795**	**0.013976**	**−5.1E−06**	**−6.9E−07**
EU 28	**−2.4E−07**	**8.77E−08**	**−2.74624**	**0.016657**	**−4.3E−07**	**−5.1E−08**

Source: Own calculations.

On the basis of the calculations set out in table 2, it should be distinguished that the statistical basis for the recognition of the occurrence of a linear relation between expenditure on State aid and the size of GDP *per capita* exist in the case of 15 Member States, i.e. Austria, Belgium, Bulgaria, Czech Republic, Estonia, France, Germany, Hungary, Latvia, Lithuania, Luxembourg, Netherlands, Slovenia, Sweden and United Kingdom. This relation occurs also at the level of the European Union (EU-28).

For the eight countries there is a negative relation between the variables analyzed. **For Austria, Belgium, France, Germany, Luxembourg, Netherlands, Sweden and United Kingdom regression coefficients are negative, which means that expenditure on State aid in the Agricultural Sector have a negative impact on GDP *per capita* in these countries.** The increase in expenditure on public aid by €1 million comes together with a fall in GDP *per capita* – respectively – with an average of €3.13, €6.02, €0.49, €3.30, €137.93, €3.42, €9.93 and €2.89. At the level of the EU-28 decrease in the value of GDP *per capita* is: – €0.24. Estimation errors are respectively €1.09, €1.41, €0.15, €0.67, €55.20, €0.89, €3.15 and €1.02. For the EU-28 it is €0.09. Taking into account however the confidence interval for the regression coefficient it can be said with a

probability of 95% that the increase of granted State aid for undertakings in the Agricultural Sector with €1 million will cause fall in GDP *per capita* by the value of the interval (€0.78; €5.48) for Austria, (€2.98; €9.06) for Belgium, (€0.17, €0.81) for France, (€1.86, €4.74) for Germany, (€18.68, €257.18) for Luxembourg, (€1.50, €5.33) for Netherlands, (€3.12; €16.73) for Sweden, (€0.69; €5.09) for United Kingdom and (€0.05; €0.43) for EU-28. It should also be noted that the probability of type I error (p-value), involving the rejection of a true null hypothesis that, in the case of these countries providing State aid in the Agricultural Sector do not significantly affect the size of the GDP *per capita* of the countries, is below the accepted level of significance, i.e. 0.05. The consequence is that the result of the study in relation to these countries, may be considered important, and thus the null hypothesis can be rejected in favour of the alternative hypothesis.

In the case of **Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania and Slovenia**, the regression coefficient takes a positive value. Consequently, the increase in expenditure on State aid by €1 million is accompanied by an increase in GDP *per capita* by average: €4.31, €9.83, €71.53, €3.03, €16.09, €24.36 and €24.55. Margin of error is: €1.73, €1.98, €16.25, €0.82, €7.23, €5.33 and €6.74. Bearing in mind however the confidence interval for the regression coefficient, it can be with a probability of 95% said that the increase of granted State aid for undertakings in the Agricultural Sector by €1 million will cause an increase of GDP *per capita* of: Bulgaria from €0.57 to €8.06, Czech Republic from €5.56 to €14.10, Estonia from €36.43 to €106.63, Hungary from €1.27 to €4.79, Latvia from €0.47 to €31.72, Lithuania from €12.84 to €35.89 and Slovenia from €9.99 to €39.11.

Occurrence of the linear relationship between expenditure on State aid in the Agricultural Sector in the above-mentioned Member States and the size of their GDP *per capita* is also confirmed by the F test parameters, i.e. the value of F-test and the probability of type I error when the hypothesis is verified on the lack of impact of expenditure on State aid to the size of GDP *per capita* (irrelevance of State aid expenditure in the regression model). For all the indicated countries (also at the level of the European Union) F-test values are higher than the applied critical value of 4.67, and the probability of type I error is less than 0.05. The calculations in this regard are presented in table 3.

Countries, such as **Germany, Belgium and Netherlands** are characterized by strong negative relationship occurring between the amount of provided State aid in the Agricultural Sector and the level of their GDP *per capita* - respectively 0.81, 0.76 and 0.73.

For Germany determination coefficient is 0.653355. Therefore, variations in GDP *per capita* in this country were explained in 65.34% with variations in expenditure on State aid in the Agricultural Sector, while the remaining 34.66% result from the impact of other factors. If the coefficient of determination takes the values less than 0.5, the regression explains only less than 50% of the variation in GDP *per capita* and predictions based on such a regression model may be unsuccessful because the regression model explains then very little. This means that the predictions can be created basing on the Germany model, because the regression model is characterised by a satisfactory fit and is little burdened with the estimation error, which provides grounds for precise forecasting.

In the case of **Austria, France, Luxembourg, Sweden and United Kingdom**, the values of the correlation coefficient are included in the interval (0.57; 0.68). These countries are characterized by weak negative relationship occurring between the amount of provided State aid and the level of their PKB *per capita*. Moreover, there can be no satis-

factory adjustment of the regression line to the empirical data. The determination coefficients for these countries equal: 0.39, 0.46, 0.32, 0.43 and 0.38.

Table 3: The size of State aid in the Agricultural Sector and the GDP *per capita* – regression statistics and F-test

EU Member States	Regression statistics			Test F	
	Corelation indicator	Determination coefficient	Standard error	F	Significance *F*
Austria	**0.624153**	**0.389567**	**1322.833**	**8.296361**	**0.012885**
Belgium	**0.764333**	**0.584204**	**670.3695**	**18.26537**	**0.000906**
Bulgaria	**0.568192**	**0.322843**	**491.8209**	**6.197902**	**0.027117**
Croatia	—	—	—	—	—
Cyprus	0.392393	0.153972	1042.859	2.365925	0.147988
Czech Republic	**0.809541**	**0.655357**	**744.9588**	**24.7202**	**0.000255**
Denmark	0.382953	0.146653	1047.004	2.234126	0.158866
Estonia	**0.773658**	**0.598547**	**939.319**	**19.3824**	**0.000714**
Finland	0.487674	0.237826	1654.053	4.056469	0.065176
France	**0.675527**	**0.456336**	**504.9492**	**10.91184**	**0.005711**
Germany	**0.808285**	**0.653325**	**1005.937**	**24.49905**	**0.000266**
Greece	0.357751	0.127986	1527.057	1.90801	0.190466
Hungary	**0.717308**	**0.514531**	**508.262**	**13.77821**	**0.00261**
Ireland	0.185667	0.034472	2056.824	0.464137	0.507652
Italy	0.267188	0.071389	883.1003	0.999409	0.335699
Latvia	**0.525141**	**0.275773**	**1078.131**	**4.950179**	**0.044416**
Lithuania	**0.784905**	**0.616076**	**977.9943**	**20.86088**	**0.000528**
Luxembourg	**0.569626**	**0.324474**	**2913.165**	**6.244252**	**0.026646**
Malta	0.12412	0.015406	875.3663	0.203409	0.659414
Netherlands	**0.730098**	**0.533043**	**944.1106**	**14.8398**	**0.001999**
Poland	0.406896	0.165564	1167.508	2.579394	0.13227
Portugal	0.15048	0.022644	251.4522	0.301196	0.592435
Romania	0.44508	0.198096	711.2864	3.211421	0.096419
Slovakia	0.422844	0.178797	1380.847	2.830439	0.116342
Slovenia	**0.710659**	**0.505037**	**976.4296**	**13.26458**	**0.002982**
Spain	0.092131	0.008488	750.2985	0.11129	0.744
Sweden	**0.658198**	**0.433225**	**1717.077**	**9.936785**	**0.007638**
United Kingdom	**0.618497**	**0.382538**	**1396.008**	**8.053932**	**0.013976**
EU 28	**0.605925**	**0.367145**	**830.6677**	**7.541846**	**0.016657**

Source: Own calculations.

Czech Republic, Lithuania, Estonia, Hungary and Slovenia are characterized by occurring between the amount of provided State aid to undertakings in Agricultural Sector and the level of GDP *per capita*, strong positive correlation – respectively 0.81, 0.78, 0.77, 0.72 and 0.71. In the case of all five countries, there is a possibility to speak of a satisfactory adjustment of the regression line to the empirical data. For example, in the case of Czech Republic, the coefficient of determination is 0.655357. This means that the variation in GDP *per capita* of Czech Republic has been explained in 65.54% with the volatility of the expenditure on State aid in the Agricultural Sector. The remaining 34.46% is the effect of random and non-random factors (other non-aid variables, imprecise fit of a straight line to the empirical data etc.).

For all countries of the European Union (EU-28) between the amount of State aid in the Agricultural Sector and real GDP per capita there is a negative correlation (r = –0.61). However, the determination coefficient assumes lower values and

amounts to 0.367145. This means that there can be no satisfactory adjustment of the regression line to the empirical data.

5. Discussion and Conclusions

In the market of the European Union, which is based on the mechanism of free competition, many changes occur as a result of the impact of micro-, meso- and macroeconomic factors. On the one hand, these changes go together with positive effects in the form of the development of the enterprises, both those already operating in the Internal market as well as those whose strategic goal is to enter the market and do business activity in the long term. Compliance with the principles of free competition, reduction of the entry barriers, elimination of customs barriers, consistent combating monopolistic practices, the inflow of direct foreign investments and the related production increase, creating the conditions for public procurement and the suppliers endeavour for uniform purchase prices and purchasing the products at prices adopted in the country where they are the lowest, they are the desired effects of competition in the Single European Market, enabling economic and social development of the European Union. On the other hand, not all market processes can be considered as the desired effect of competition. Then it is indicated, that the market economy, in which the primary regulator of the occurring processes is the competition, is burdened with certain deficiencies. The deficiencies of the market system are in such a situation justification for a replacement or supplement based on free competition of the market mechanism by other decision making processes, such as the State intervention.

The agricultural sector is characterised by a high number of small undertakings. This difference in the size of the beneficiaries concerned justifies the application of different rules which are closely linked to the specific structure of the markets concerned. The small size of the undertakings concerned in the sector of the primary production of agricultural products increases the risk of distortions of competitions even when only small amounts of aid are at stake. This explains why a different *de minmis* threshold applies, or why maximum amounts of aid are considerably lower than thresholds defined in other sectors.

Hypothesis, according to which, both in relation to the European Union and its individual Member States, the amount of expenditure on State aid in Agricultural Sector is positively correlated with the rate of GDP *per capita*, determining the level of development and competitiveness of the European economy, should be rejected . It cannot be considered as a true the thesis that with increasing the amount of agricultural State aid the competitiveness of the EU economy increases. It was incorrect to assume that this correlation occurs for all Member States, because of the amount spent on State aid to agricultural undertakings are very different at the level of individual Member States. Different is also the proportion of aid actually granted in the aid approved by the European Commission.

Acknowledgements

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Innovative perspectives of business management

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Abstract

The purpose of this study is to point out the extent to which enterprises want to exploit the possibilities of information technologies (IT), system integration of information systems (IS) and business process automation with the aim to increase the intelligent work with information. The goal of the study is to assess what kind of barriers constrains to utilize maximum of their possibilities in the processes of awareness about competitive environment. Completing the questionnaire, 189 managers of Slovak SMEs reported the rate of utilization of information technologies and evaluated the types of barriers to widespread use of these systems in all stages of work with information. Using the method of regression analysis we will examine the validity of our own hypotheses aimed at assessing the causes and barriers which prevent better utilization of working methods with information and its sharing. As the basis for the summary of the conclusions we will use the results of our research in the years 2015-2016 as well as findings from other surveys in this area. The possible causes of barriers to use IT were also discussed with the 26 respondents – representatives of IT companies and suppliers of solutions for business process automation and system integration of IS (via on-line interview). The evaluation of the practical experience, findings, knowledge of managers and IT companies should allow us better assess and predict the occurrence of obstacles, which lead to the decline or loss of competitiveness, as a result of unrealized knowledge.

Keywords: Innovation, ICT, Business process automation, Management development techniques

JEL Code: M150, M210, O330

1. Introduction

Successful business performance is strongly dependent on managers´ possibilities to obtain the most available information, expertise, knowledge and wisdom by using all information systems` possibilities and tools supported by information technology. All

required data exist, but manual processes to search, extract, summarize and report on an ongoing basis are too time consuming and expensive. This is often caused by incorrect structure of available information or insufficient analysis.

According to our previous research (realized in 2015 with managers of SMEs), the level of information usage obtained within using such tools as marketing information systems, business intelligence, competitive intelligence strongly effects business growth, particularly in the sector of micro-enterprises (strong dependency). Although Slovak enterprises own above mentioned information systems supported by the newest information technologies, they usually do not use all their possibilities. Managers usually make analyses of markets, competitors, partners and technologies, but they use only basic available tools. It is common to use only MS Excel (scenario planning, simulation/modelling, e.g.) for processing information despite of the fact they own better tools. It is due to lack of knowledge and lack of finance. This relates not only to their internal, but external environment as well. One possibility how to succeed is to get control over the processes whether over the main or supportive ones. In this way a company can improve the control of performed processes and achieve improvement of knowing about their progress. It allows managers to increase quality of management and decision making. Innovation as a change makes companies to put higher stress on effective utilization of available software equipment and its intelligent application aimed at support of the whole company performance.

2. Basic assumptions for innovation of business management

The information technology industry is one of the most robust industries in the world as it, more than any other industry or economic facet, has an increased productivity, particularly in the developed world, and therefore is a key driver of global economic growth (Abu Rub, Issa, 2012). It rapidly increased the growth and improvement of ICT. Each enterprise (regardless its size or turnover) may dispose with the newest technologies and use their opportunities.

As we found in the conclusion of our previous research activities (in 2015), the processes of globalization have been taking its place, which was reflected by the development of information technologies that conditioned the changes in the processes of business organization and in the conception of traditional business models. It increases electronic ways of obtaining, analyzing, processing and distributing information. According to Pomffyova and Bartkova (2016) information is essential in every business – about internal environment as well as external environment in micro and macro view. There is no problem to obtain information, to work with it, analyse it and to make decisions as long as an enterprise has a few customers or suppliers and its competition on a target market is small. It increases the need to orientate in data about enterprise environment and its surroundings. It can be a problem if it is not organized reasonably. As we have found, it is usually the case that some information is obtained and processed duplicate on several places and another is missing in an enterprise. It means there is no problem with lack of information, but with its surplus, relevancy and verity. Both content and form of information are important. This is almost the reason for refusal to cooperate with the new partners or to entry to new market. If cooperating enterprises do not dispose with the right system for obtaining, processing, sharing and using of information, employees and managers will be lost in information and will not know how to make

a decision (Peyrot, et al., 2002; Biere, 2003; Fitriana, 2011; Abbott, 2014). These ways increase the importance of electronic business models and their applications. As we can see, the importance of them increases also due to constant broadening of extents of corporations' activity. Prosperous conditions for electronic business development have been formed due to intensive processes of globalization and increasing extents of competition (Jovarauskiene, Pilinkiene, 2009). It is common to have it not only in big companies but also in SMEs. On the market – complex information systems as modular applications that are not designed just for large companies but also for small organizations are available.

As Bankole and Bankole (2017) state, ICT innovation is one of the major forces for socioeconomic development. It is the key element to spur growth of the economy of a nation. When entrepreneurs innovate, this consequently contributes to higher levels of international competitiveness (Ferreira et. al., 2017). As Lopes et al. (2017) also state, innovation plays a key role towards effective strategic sustainable management. Hall and Sena (2017) find that firms that innovate and rate formal methods for the protection of intellectual property highly are more productive than other firms.

As we have researched, in practice, there is occurred the problem related to a lack of systems integration of information systems. It is related with refusing to provide information in electronic ways among various departments within an enterprise (especially in multinationals corporations). Therefore employees have to write and analyse all needed information laboriously. We decided to research the key barriers that slow ICT using as well as system integration of IS.

Summarising our previous research activities of as well as literature findings, we found the following key barriers slowing ICT adoption: competition among enterprises in the target group, lack of awareness, often combined with mistrust regarding ICT and ICT service providers, because they worry about information leak, costs, lack of internal ICT and management knowledge, network infrastructure issues: access and interoperability, as well as legal uncertainties. The reason of slowing ICT adoption especially in SMEs is also the result of the fact that under current legislation enterprises are not required to have information systems supported by ICT and dispose with electronic ways of communication.

The European Commission has identified three factors that make it difficult for SMEs, in particular, to engage more fully with ICT and develop sustainable business practices (Gatautis, Vitkauskaite, 2009). Firstly, the relatively high costs associated with investments in ICT, secondly, the lack of technical and managerial skills, and thirdly, reluctance on the part of SMEs to network with other enterprises.

As Wu (2017) states, enterprises should build a well technological innovation system, increase the technology innovation input and be active in technological innovation activities. We can follow the approaches how to be more successful than competition. It lies in an inter-functional coordination that was firstly defined at the beginning of 90s (Kanovska, Tomaskova, 2012). It is the coordination of all enterprise activities leading to the increase of business performance. Inter-functional coordination of all enterprise processes (connected with market orientation, based on marketing conception) can be achieved in companies by using hi-tech solutions. Such approach allows them to improve the already deployed systems as well as design and implement comprehensive ready-to-use solutions. The higher the level of market orientation at the hi-tech firms, the higher is the level of getting information and using it inside the enterprise for decision-making processes. Hi-tech firms perceive inter-functional coordination as very necessary presumption for enterprise future development and prosperity..

3. Innovation as a driver for change

The method of creating innovation is to discover, create and develop ideas, to refine them into useful forms, and to use them to make profits, increase efficiency, and/or reduce costs (Závadský et al., 2012). It enables companies to achieve results that are compatible with corporate strategy (Dallavalle de Pádua et al., 2014). By Pansera and Martinez (2017) innovation underpins a purpose, a goal that is not just novelty for the sake of novelty.

Very important task of each company is to determine which processes will be automated in view to achieve the desired increased efficiency. According to Kabaale and Kituyi (2015), the current inefficient operating processes are used as a way of change. Companies can decide to automate the main or support processes, the business processes in which more employees participate, the processes that require continuous monitoring compliance with deadlines, overview of their current state which regularly evaluates their performance and efficiency, those that are risky of default procedures, those that must be made in a certain time, alternatively, those that have the recurring fixed deadline, etc. All of such processes are suitable candidates for automation.

3.1. Business Process automation and management improvement

Particularly, business process automation is replacing manual and frequently recurring activities with appropriate software support. It regards the use of ICT to promote performance and business process management. The main result is to achieve synchronization and coordination of business processes. Business processes will thus be able to control, measure, evaluate, optimize with minimal involvement of employees. So, the enterprises will be provided not only with adequate information about the progress and duration of activities, it may dispose with accurate information related to controlled processes and their response. It allows them better implementation of managerial and decision making processes. As Tuček et al. (2013) state, Business Process Management (BPM) serves as the comprehensive process management. The goal is to set the process in order to achieve the maximum efficiency. Traditional approaches to BPM generally follow this sequential order: first, a business strategy is proposed; second, the business structures and processes are planned; third, business structures and processes are implemented with the support information technology (Kabaale, Kituyi, 2015). According to Pradabwong et al. (2015), this process-oriented approach is used to design, analyze and improve business processes to enable it to effectively manage and improve performance. Le Loarne and Blanco (2009) claim that it is increasingly used not only in large, but in recent years also in small and medium-sized enterprises with the aim to create successful and effective functioning of innovation processes.

3.2. IT support of BPM

Information technology has the highest possible impact on IT-driven BPR methodologies (Panayiotou et al., 2015). Novel technologies open new possibilities of individually shared information and new kinds of interaction among employees (Bögel et al., 2013). On Slovak market, many companies specialize in services for the area of IT support intended for the process control and process automation. Hänel and Felden (2005) state, that the integration leads to higher efficiency and improves business processes. As Samaranaake (2009) states, the choice of a particular software application itself affects the

performance of business processes. Their usage also allows the enterprise to use vast amounts of data to obtain valuable information about business processes (Suriadi et al., 2015). In addition, these systems help create an integrated and functional whole in terms of IT business support.

Business process management allows to achieve many benefits: full automation of business processes, fast implementation and relatively low requirements for operation and maintenance, converting the fast changes in the process, assistance in meeting deadlines and resource efficiency, simple and fast data collection, centralization and security of data processing, setting uniform approval procedures, setting time limits for performing duties, simple processing of the necessary documents, facilitate and streamline many business operations, linking with other follow-up activities, etc.

3.3. The impact of regional innovation potential

As Rodriguez (2014) states, regions rely not only on their own efforts and characteristics but also on their capacity to attract and assimilate knowledge produced elsewhere to innovate. It means interactions among individuals, companies and institutions produce the transmission of knowledge in the form of knowledge spillovers. Potential of regional hi-tech companies as well as companies which offer knowledge-intensive business services (KIBS) as a basic solution of company IS have also a great impact, regardless as a support of solutions aimed for innovation of core or support business processes. One of their main features is their capacity to adapt and disseminate tacit knowledge. It is more important in the case, when these producers create the software implementation for companies operating in selected local region.
What is the situation in presented areas of innovation was reviewed based on views of managers of SMEs as well as IT managers that are interested in our researches.

4. Methodology and Data

As the basis for the summary of the conclusions we will use the results of our research, realized in 2015–2016, which is a part of the research aimed at utilization of Competitive Intelligence and Business Intelligence in Slovak companies as well as findings from other surveys in this area. The object of our research are the opinions of respondents concerning the barriers that restrain the widespread use of IT, system integration of IS and tools supporting business process automation.

We will consider our assumptions as well as comments and views obtained by summarizing the arguments of respondents – company managers and representatives of IT companies. We used questionnaire distributed electronically as well as personally, and also on-line structured interview method.

The questionnaire consists of factual questions, as well as professional questions aimed at assessing the qualitative and quantitative characters, reported the rate of utilization of information technologies used as tolls for information seeking, analyzing, and using as information support of decision-making process on various levels of management. They also evaluated the types of barriers to widespread the use of these systems in all stages of work with information. The professional questions included 14 closed-ended, 16 semi-closed questions and one open question. Closed-ended questions consisted of four scaled questions with four- or five-point Likert scale, seven matrix questions (to examine the time frequency) and three multiple choice questions. Semi-closed

questions consisted of multiple choice questions that are making use of rating semantic differential scales, in combination with one open answer, which is openly requested the opinion or view of respondents.

Our questionnaire research sample consists of 189 respondents from Slovak SMEs on positions of middle and upper managers or owners and partners. Using the identification questions we analyze structure of the research sample according to the size of enterprises and their average annual turnover (112 micro, 40 small and 36 medium enterprises), area of doing business (44% in area of wholesale and retail, 27% in food and textile and furniture industry, 12% in metal and engineering industry, 8% in building industry, 5% in banking, healthcare and agriculture sectors, 3% in transportation, and 5% in various types of industry), as well as what type of software do they use to working with information.

We also researched the opinions of 26 providers of software support for business process automation (69%) and those which only focus on providing system integration of information systems (31%). From all the surveyed respondents there were most micro companies (48%), small businesses (37%) and the smallest representation consisted of medium-sized companies (15%).

To evaluate barriers as well as obstacles which prevent better utilization of technologies and innovations potential we set our partial hypotheses.

We set following hypotheses:

H1: Most of SMEs use some type of software to working with information.

H2: If companies are interested in new technologies and innovations they will be more frequently interested in new information about them.

H3: If enterprises do not prefer to seek and analyze information about software, IT and innovations, the reason is: "I do not consider it to be effective" or it is "too time consuming", is mostly frequently occurred answers, than "required information is not available" and "special skills are needed".

Next we examine the validity of these hypotheses using the methods of regression analysis. We used the statistical software, named SPSS. We used built-in method as the Friedman test as well as Mann–Whitney U test. To assess levels as well as orders of respondent's preferences we used also the descriptive and frequency statistics, comparative and summarizing methods – synthesis, as well as the thought processes – induction and deduction.

5. Results

The goal of the study was to assess the barriers that restrain the widespread use of IT, system integration of IS and tools supporting business process automation. We focus our attention on assumption of the level of basic conditions for using all the possibilities offered by potential of innovation and technologies and its utilization in SMEs.

To verify our first hypothesis, we examined respondents' views (189 managers of SMEs) to the question "What software they almost use to process information in their company". As we found, in micro and small enterprises the most frequently used software is office information system (with mean rank position equal to 4.15). We also evaluated the orders of the respondents' preferences concerning the use software support to process information in their company, using a non-parametrical Friedman test. The second mostly used software is "company IS" (with mean rank position equal to 3.15). Such software is usually used as common software for data processing in medium and then in

small enterprises. Only a small part of all SMEs also used system supporting processes management and its outputs and other systems (both with mean rank 2.59). We also found out that in micro sector it is common that they do not use any information systems to process information in their company (value of mean rank was 2.51). Our hypothesis H1 was confirmed.

Next we tried to verify our second hypothesis H2. According to our previous research (realized in 2015 with managers of SMEs), only a small part of SME was interested in the new technologies. We tried to find the key barriers, which prevent companies to utilize the potential of new technologies and innovations. We decided to research the common situation in this area also in the sector of SMEs. To review adequate amount of information we analysed respondents´ answers to the question if companies have enough information about the technologies and innovations. The result is that in two above mentioned areas companies see low level of satisfaction with the rate of their awareness (the worst was situation concerning foreign markets awareness).

Using Wilcoxon Signed Ranks non-parametrical test we considered mutual relation between awareness of new technologies and innovations. As we found,

$$\alpha = 0.127 \ > 0.05,$$

therefore, we want to state, that they feel to be better informed about technologies than about innovations. Then we reviewed frequency of seeking information about technologies and innovations. We considered respondents´ answers to question "How often do you search information about technologies or innovations?" We tried find out if they more often seek information daily, weekly or monthly or prefer seeking information once a half year, once a year or never. By Wilcoxon Signed Ranks Test we considered the frequency of seeking information. We calculated, that

$$\alpha = 0.827 \ > 0.05.$$

We found out that they are mostly seeking information about innovation or technologies (app. monthly, 29% or half yearly, 20.5%). That is why we can state that, if companies are interested in new technologies and innovations, they will be more frequently interested in new information about them. Our hypothesis was confirmed.

Next we examined hypothesis H3. Firstly we examined "What is the reason for lack of information about these areas?" Using Friedman´s non-parametrical test we found out that respondents assume that it is not effective for them (mean rank=2.74), next it is too expensive for them (mean rank=2.53). As following there are: "they do not have enough information about searching methods" (mean rank=2.45) and a part of them use opportunities of external company (outsourcing) (mean rank=2.28).

Secondly we researched the situation: "Why enterprises do not prefer to analyse information about innovations or technologies?" If they make such analyses, they prefer almost financial analyses (app., in 28% cases). To set the order of preferences, we used Friedman test. We found out, that the situation is different as the above mentioned one. We found out, that the barriers are: it is too expensive (4.72), required information is not available (4.70), special skills are needed (4.53) and it is too time consuming (4.43) and respondents do not consider it to be effective (4.36) or special software is needed (4.25). As we can see, the barriers are not the same. Enterprises mostly consider that it is not effective, or it is too expensive for them to seek such information. The situation is different in the case of barriers why enterprises do not prefer to analyse such kind of

information: as the biggest barriers are: "it is too expensive", "required information is not available" or "special skills are needed". Therefore, H3 is not confirmed.

We also searched how often they use outsourcing to make analysis about technologies and innovations. In this case, $a = 0.180 > 0.05$, and it means that disinterest in both outsourcing of technologies and innovations prevails. Better situation is in the area of interest in utilization of a special program to automatize processes (app. 31% uses it monthly, but 60% do not use it at all).

It means that only enterprises where positive enterprise attitude for innovation, preference for systems that support teamwork, mutual cooperation of all the managed processes and also effort to be flexible exist can succeed in hard competition.

Next, we summarized our findings and discussed the barriers of widespread using of system integration of IS and business process automation (using structured interview). We examined opinions of 26 representatives of IT companies and suppliers of such solutions. The possible causes of barriers to use IT, to integrate and innovate common IS as well as attitude to innovate enterprise processes were discussed.

As we found, for the biggest barriers, that may occur in the software implementation considered representatives of IT firms: wrong estimate of the time necessary to implement (30%), lack of analysis and therefore knowledge of the system (26%), wrong estimate of human resources (18%). It follows: under-estimated resources (financial, material, etc.) – (15%) and among other barriers (11%) companies reported fast changing demands of the customers, does not assess properly the complexity or difficulty solutions, customer interaction, customer does not have well-defined and structured processes, extensive editing application support during the process testing, incomplete idea of the customer's real needs.

6. Discussion and Conclusions

In this paper we examined the barriers that restrain the widespread use of IT, system integration of IS and tools supporting business process automation based on the arguments of respondents – company managers and representatives of IT companies. We evaluated our hypotheses aimed to receive or decline our assumptions in the area of the exploitation the potential of IT, especially in the SMEs. Hypotheses are partially confirmed.

We can state, most of SMEs use some type of software to working with information. Most common reasons are that enterprises almost do not search information about technologies or innovation because it is not effective for them, it is too expensive for them or they do not have enough information about searching methods. As we also have researched (based on views of IT managers) for the biggest barriers, that may occur in the software implementation and integration of IS, considered respondents the wrong estimate of the time necessary to implement it, lack of analysis and therefore knowledge of the system, wrong estimate of human and other resources and other barriers.

It indicates that only enterprises, that will be well informed about new technologies and complex solutions of IS and BPM can succeed in hard competition. Before software implementation, it is necessary to acquire adequate information about the company. According to the views of literature findings, respondents' and interview representatives' views, we can classify this information in the following order: finding functionality in order to use software support, the level of integration with other instruments, identifying areas of corporate activities, and the price they are willing to invest in the ICT support, technical requirements, existing IT support and the other requirements included –

bottlenecks in business processes, knowledge of work practices, current processes and planned changes, process model, as well as the application to be supported.

Enterprises, in which these problems may be good explained, can create a positive enterprise attitude for innovation, preference for teamwork, co-operation and effort to be flexible. Many of these areas have to be discussed before implementation of specialized solution by suppliers of IT solution. In the case of knowledge-intensive business services it is recommended to cooperate with local IT company, because one of their main features is their capacity to adapt and disseminate tacit knowledge as in the case of initial audit, which is essential for understanding the company, in the case of consulting with specialists in specific areas of business, or any other consultants or specialists.

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The Ecodevelopment of Protected Areas in Poland – Payment for Environmental Protection in Opinion if Inhabitants for Farmers and Enterprises

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Abstract

The area covered by protected areas in Poland amounts to 33, 1%; the region with the highest percentage of areas covered by them is in the Swietokrzyskie Voivodeship – 62%. These areas are usually landscape parks and protected landscape areas. The basic of development of protected areas should be based on the production of high quality food and food processing. This paper presents problem payment for environmental protection in opinion inhabitants in Poland. The work continues discusses theoretical issues of instruments and institutions with reference to polish protected areas. Following the topic, the role of inhabitants in ecodevelopment of protected areas has been analyzed. The last chapter presents opinions of inhabitants in the aspect of ecodevelopment, especially payment for environmental protection for two subjects (farmers and enterprises). The problem of strategic management in the context of ecodevelopment has been raised in this paper. Special attention is paid to the participation of the public and the authorities in planning at different stages and role of enterprises in development. The work ends with a brief conclusion.

Keywords: Ecodevelopment, Inhabitants, Local Development, Rural Areas, Protected Areas

JEL Code: H41

1. Introduction

Protected areas as a public good should be used in the special way. The size of protected areas is various depending on the state in the EU, where the degree of their development is also different. A lot of infrastructural investments were built in the countries of the old UE in protected areas before the present binding regulations of environmental protection, which enabled socio-economic development for the inhabitants and provided potential for further development. The completely different situation is in the countries which entered the EU in the 21st century where there were shortages resulting from planned economy and significant underdevelopment in the development of infrastructure. The regulations of environment protection stop and constrain the development of the local government units and the given entities in the present conditions in these countries. The aim of this paper is to present this problem concerning public participation and compensations for limitations through payment for environment protection illustrated with the example of the research by L. Poplawski performed in the Swietokrzyskie Voivodeship in Poland.

2. Methodology and Data

In this paper as a preliminary tool descriptive method is used. A particular phenomenon of eco-development of protected areas in Poland was chosen and described. Authors presented some of own results published in other works and the concept of participation of habitants in selected boroughs. The research composed of setting the courses of development of protected areas in the Swietokrzyskie voivodeship include, among others, recognising nature and landscape value of protected areas in the Swietokrzyskie voivodeship. This research has been carried out since 1998. The stock-taking of environment components was limited to basic factors conditioning multifunctional and eco-development of rural areas and agriculture.

Residents who showed initiative and were interested in the development of their municipality were selected to participate in the questionnaire, similarly to participating farmers. The selection of residents was made after obtaining preliminary information from boroughs Offices and with their participation, and as a result of consultations with municipality authorities.

The basic research instrument was an interview using a questionnaire prepared by the author – L. Poplawski, supplemented by direct observation and meetings with residents and authorities, concerning the development of the boroughs. The survey was prepared specifically for a purpose of examining the possible development of protected areas; the respondents included municipality residents with various levels of education, mainly persons considered to be community leaders (including representatives of farmsteads). This type of questionnaire can be regarded as a quota sampling of the whole population of the area; even though it is not random, in the case of such an approach to the problem, this kind of a procedure is possible and correct, and frequently used in English-language literature.

3. Discussion

3.1 The essence of protected areas

In the literature, there are many definitions of protected areas. The article presents the most important of them, and so, a protected area is defined as: "an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means" [PHILLIPS, A. (Editor) 1998, p. 3].On the other hand, a protected area is "a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values" [DUDLEY, N. (Editor), 2008. pp. X + 86.].

In the literature, there are six categories of protected areas, like [PHILLIPS, A. (Editor) 1998. p. 4]:

An area of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features and/or species available primarily for research and/or environmental monitoring. A wilderness area is a large area of unmodified or slightly modified land and/or sea retaining its natural character and influence without permanent or significant habitation which is protected and managed so as to preserve its natural condition.

A natural area of land and/or sea designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations; (b) exclude exploitation or occupation inimical to the purposes of the area; and (c) provide foundation for spiritual, scientific, educational, recreational, and visitor opportunities all of which must be environmentally and culturally compatible.

1. An area containing one or more specific natural or natural/cultural feature which is of outstanding or unique value because of its inherent rarity, representative or aesthetic qualities or cultural significance.
2. An area of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of habitats and/or to meet the requirements of specific species.
3. An area with coast and sea, as appropriate, where the interaction of people and nature over time has produced an area with significant aesthetic, ecological and/or cultural value and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area.
4. An area containing predominantly unmodified natural systems managed to ensure long term protection and maintenance of biological diversity while providing at the same time a sustainable flow of natural products and services to meet community needs.

The six-level system classifies protected areas according to their management objectives, which range from strict nature conservation to multi-use reserves (objectives must not be inconsistent with the primary purpose which is biodiversity conservation) There are also many kinds of protected areas that meet this broad definition, and which can have a wide range of conservation objectives (e.g. ecological and human).

3.2   Sustainable development in socio-economic policy[1]

Socio-economic policy, which includes sectoral and specific policies, plays an important role in the development of protected areas, especially through measures that are part of environmental, agricultural, and regional policies [SULICH A. 2016a, pp. 78–91]. Economic policy comprises macroeconomic, microeconomic, and socio-economic development policies, including a structural, regional, and environmental policy of economic growth [SULICH A. 2016b, pp. 926–934].

Economic policy may also be seen as two kinds of measures:

- *instrumental* – such as: monetary and credit policy; fiscal and budget policy; price and income policy; investment, research, and employment policies.
- *sectoral* – such as: industrial, agricultural, trade, communication, tourism, and housing policies.

Economic policy should also include elements of environmental policy due to the need for environmental protection (Fig. 1). The 1980s saw the beginning of the process of isolating environmental policy as an area of economic policy [GÓRKA K. 1992]. From the viewpoint of sustainable development, the relation between environmental and economic policies is very important, since it has an impact on the environmental situation and on the management of natural resources. The convergence of objectives of environmental and economic policies consists in adopting the principle that the management of natural resources is reasonable and based on respect for nature and on a rational exploitation of the environment, especially minerals. Reconciling economic development, which ensures better living conditions for the population, with simultaneous care for the quality of the environment is difficult and, as Górka and Poskrobko [GÓRKA K., POSKROBKO B. 1987] conclude, requires solving two basic issues, i.e.:

- adopting new value standards, specifying the objectives of socio-economic development and prolonging the time horizon of management,
- implementing such economic instruments which will stimulate appropriate behaviour of organisations and businesses responsible for environmental degradation.

Economic policy objectives should be based on an organic approach to the natural environment and to life in the human environment. Additionally, it is important that the principle of rational management, taking development processes on the global scale into account, is treated in a holistic and interdisciplinary way. They should be combined with the activities of entities on lower levels of management. It should be noted that the rationality of management is reflected not only in economic results, but is also measured in the extent to which appropriate quality of life is ensured. However, increasingly more attention is paid to such factors as: security level, participation in management, opportunities for self-fulfilment, and quality of the environment. These are qualitative elements, and as such they are often non-quantifiable. Such factors are reflections of the changes taking place in economic, social, and environmental policies; they emphasise the anthropogenic aspects of protecting the natural environment as the human habitat, and do not focus solely on protecting nature and its biotic components.

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[1]This article is part of Ł. Popławski`s unpublished dissertation in English (The conditions of eco-development of rural communities in the protected areas of the Swietokrzyskie Voivodeship. The publishing house Wyd. Naukowe PWN. Warsaw, 2009).

Additionally, it is an important part of reconciling economic development with environmental requirements to implement such economic instruments that stimulate environmental protection, and contribute to the greening of economic policies. B. Fiedor [FIEDOR B. 2004] was right to accept that the first step of developing environmental protection is to turn to greener economy, by introducing standards and laws, as well as various direct regulations, enforcing lower pollutant emission and other activities damaging to the environment. The second step of the process consists in an economic approach to the environment and a green approach to economy, i.e. in applying economic and market instruments stimulating protective measures and in implementing the principles of sustainable development as a result of setting new economic objectives and adopting new social behaviour.
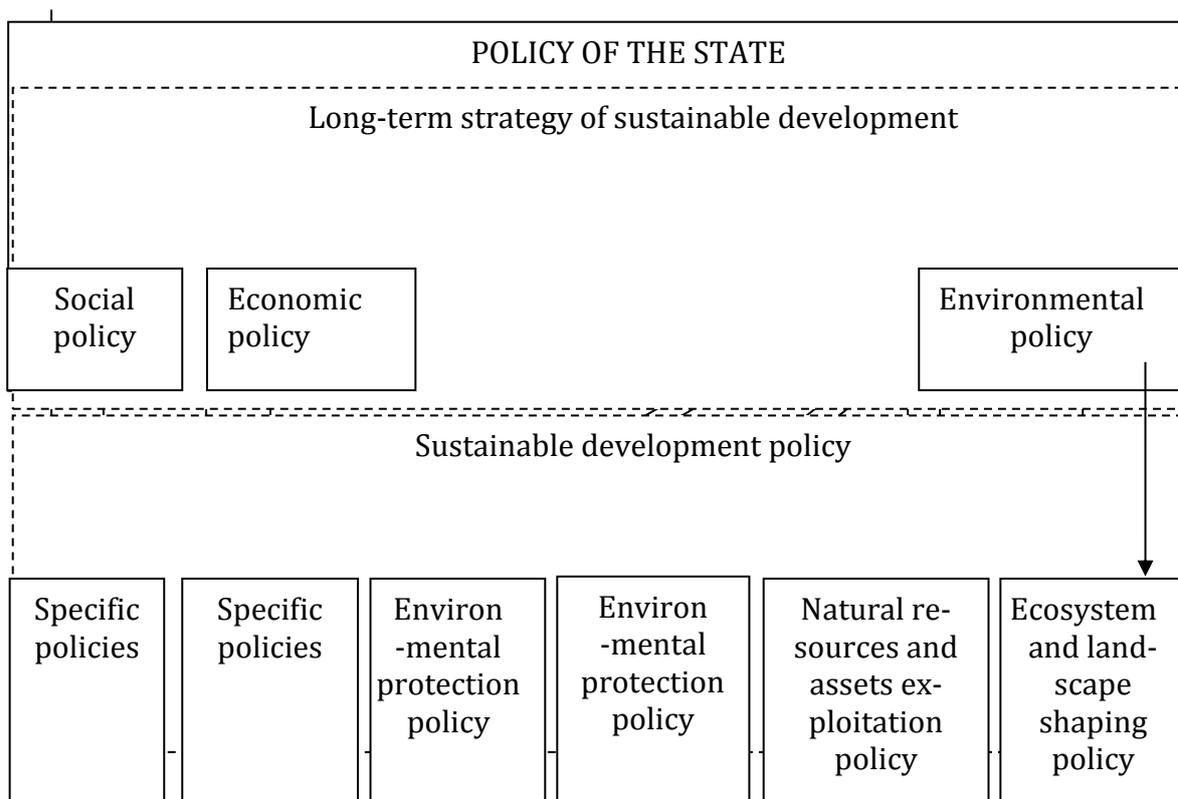
Figure 1. The place of environmental policy in the policy of the state
Source: POSKROBKO B. 2007.

3.3   Public Participation in Planning for Sustainable Development

In literature there are many definitions of sustainable development, but it is assumed for the purposes of this Article that sustainable development is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:
- the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and
- the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs" [Our Common Future, Chapter 2: Towards Sustainable Development, From A/42/427. Our Com-

mon Future: Report of the World Commission on Environment and Development].

The three pillars of sustainability are a powerful tool for defining the complete sustainability problem. Therefore the principle of The Three Pillars of Sustainability says that for the complete sustainability problem to be solved all three pillars, as: social sustainability, environmental sustainability, and economic sustainability of sustainability, must be sustainable (Fig. 2).
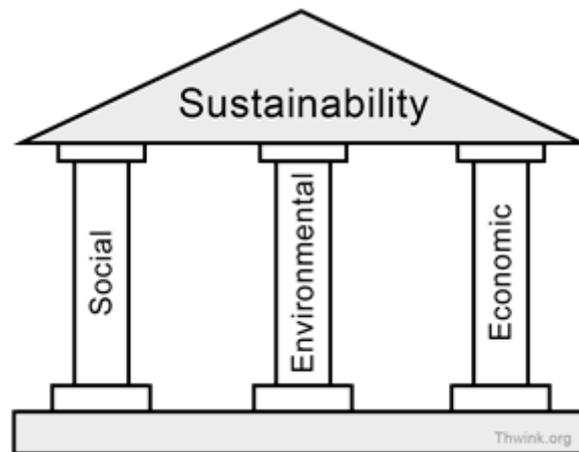
Figure 2. The Three Pillars of Sustainability
Source: http://www.thwink.org/sustain/glossary/ThreePillarsOfSustainability.htm [access: 5.01.2017]

- Social Sustainability – is the ability of a social system to function at a defined level of social well being and harmony indefinitely.
- Environmental Sustainability – is the ability of the environment to support a defined level of environmental quality and natural resource extraction rates indefinitely.
- Economic Sustainability – is the ability of an economy to support a defined level of economic production indefinitely.

Nowadays, the world's biggest actual problems are: Economic Sustainability – since the Great Recession of 2007 and 2008, which endangers progress on the environmental sustainability problem and Environmental Sustainability – since the consequences of not solving the problem now are delayed, the problem receives too low a priority to solve.

Public participation in planning for sustainable development is contained primarily in the two documents as:
- Principle 10 of the Rio Declaration stressed on different levels of participation including "the opportunity to participate in decision-making processes" (and) "States shall facilitate and encourage public awareness and participation by making information widely available". Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided. In addition, Principle 1 stresses that, "human beings are at the centre of concerns for sustainable development; they are entitled to a healthy and productive life in harmony with nature" [The Rio Declaration on Environment and Development from the Earth Summit in Rio de Janeiro, 1992].
- Public participation is also highly stressed in Local Agenda 21, which is one important strategy to achieve sustainable development. Chapter 26 in Local Agenda reads, "Recognizing and strengthening the role of indigenous people and their

communities" during Chapter 27 mentions about "Strengthening the role of non-governmental organization, who are considered as "partners for sustainable development". This clearly calls for commitment and genuine involvement of all social groups in planning and decision-making as one of the fundamental prerequisites for the achievement of sustainable development [Agenda 21, United Nations Conference on Environment & Development Rio de Janeiro, Brazil, 3 to 14 June 1992.].

3.4   Protected Areas in Poland-Payment for Farmers

Protected areas are mainly situated in rural areas, so it can very generally be said that the basic problems that are not related to legislation on nature conservation are relevant to rural areas. In most European countries, there is a deep crisis, on many levels, especially concerning the depopulation of rural areas. The policies of industrialisation and supporting backward or underdeveloped areas, dominant for many years, are just some of the processes contributing to the economic diversification of rural areas. In Poland, they are characterised by a considerable spatial diversity in terms of the extent of social and economic development, the existing economic structures, the network of settlements, and infrastructure saturation. Next to relatively wealthy, well-developed areas there are those which can be described as experiencing serious developmental problems. They mainly occur in southern Poland, but also in the peripheries of some of Poland's biggest voivodships, e.g. Lower Silesia, West Pomeranian, or even Mazovia [POPŁAWSKI L. 2011, pp. 96–117].

Boroughs are not allowed and have no chance to directly support private companies, but they can support them by other means. They can offer companies tax reductions and other financial incentives (e.g. tax exemptions). The *borough*'s number one obligation is to ensure the development of its territory. However, offering tax reductions and exemptions decreases its revenues, which are supposed to finance its own activities. *Boroughs* can have a direct influence on their own development, e.g. through tangible investments, such as developing the technical infrastructure, and through financial investments, such as contributing to or purchasing companies. Decentralisation has led to self-governments' more important role and increased influence on the economic development of their territory, especially through the development of private entrepreneurship. According to the Polish law, the most important local taxes include; fiscal instruments (taxes, fees) are a commonly used tool of stimulating entrepreneurship [POPŁAWSKI L. 2014, pp. 97–104].

Fiscal instruments are one of the most important tools supporting the development of both entrepreneurship and specific branches of industry. Taxes are the main instrument of stimulating the development of a specific branch of industry or area; especially tax rates, tax reductions, and tax exemptions. Tax rates are either specified precisely, which does not allow any room for change, or as "brackets", which allows *boroughs* to choose rates within the range defined by law. The same is true for tax reductions and tax exemptions; the law regulates the ability to fix their rates, and specifies the requirements necessary to apply for them. In this way, self-governments can support the activity of those business entities which influence or will influence the development of their territory. *Boroughs* authorities can also, through their decisions discouraging the development of business entities, make their activity more difficult. This is the case e.g. when they compete with local businesses or when their activity could cause considerable damage to the environment [POPŁAWSKI L. 2014, pp. 242–254].

At present, the greatest threat to rural areas, following from the uneven development within a region, is the region's weaker part losing out to the more efficient and better organised centre (core, growth centre) when it comes to competing for ready markets. The resulting synergy effect, combined with a quicker development of the industry (sector) concentrated in the regional centre additionally leads to the draining of best-qualified staff and capital resources from the region to the centre. As a consequence, there is a stronger process of concentration and specialisation of production in regions with the most advantageous natural, social, and economic conditions, taking into account the needs of often distant, foreign ready markets. Outlays are also concentrated in the most effective territories, while problem areas are marginalised, so that it is more and more frequent that less fertile areas are abandoned by agriculture and inhabitants (depopulation of rural areas), which is detrimental to the environment and local inhabitants.

According to the Polish law, the most important local taxes include: property tax, motor vehicle tax, land tax, agriculture income tax, forest tax, inheritance and gift tax, and flat-rate income tax paid in the form of tax card. Each of the listed taxes brings revenues to the budget, to a various extent, and some of the taxes do not have an influence on local development at all. The idea of using instruments of stimulating local development by means of tax reductions and exemptions, i.e. by lowering the tax burden, is somewhat conflicting, since it is assumed that by sacrificing the current income we will achieve its increase in the future, e.g. through the growth of entities obliged to pay taxes. In many cases, increasing the number of entities is a positive effect in and of itself, since fully satisfying the needs of a community (the number one objective of a *boroughs*), e.g. achieving a lower unemployment rate or a bigger number of jobs outside agriculture, is paramount to the growth of *boroughs* revenues as such. These instruments (reductions, exemptions) enable the *boroughs* to increase targeted revenues in the future, without which it would be difficult to accomplish the main objective (i.e. the maximum possible satisfaction of the needs of a given community), which is supposed to lead to a better standard of life for the inhabitants [POPŁAWSKI L. 2010, pp. 285–290].

Agricultural and environmental programmes are tools reinforcing efforts for nature conservation and sustainable development, due to the incentive in the form of subsidies. Apart from having an agricultural and environmental programme in force, it is also essential to introduce other economic instruments, such as faster depreciation of fixed assets for business entities already existing there and for ones set up on similar principles as in the case of supporting innovativeness. Based on the responses obtained from the questionnaire, it can be concluded that a 200% higher subsidy would be regarded as encouraging; in the case of a 500% higher subsidy only respondents in one out of four *boroughs* answered that such a subsidy would not accelerate environmentally friendly efforts. Such an amount of subsidy is ten times higher than the regular subsidy per 1 hectare. The questionnaire results may mean that the currently underused instrument of national agricultural and environmental programme fixes too low subsidy rates, and farmers mostly expect to receive higher prices for crops from their farms, guaranteed prices, and contracts for the supply of produce. Remuneration for performing a specific job, such as mowing the grass, is the most positively regarded element of the currently implemented programme. It should also be said that frequently, farmers were unable to choose a specific instrument out of the offered options and responded "I don't know" [POPŁAWSKI L. 2009].

4. Conclusions

The participation of society in the realization of sustainable development (eco-development) will require the complete change in orientation of all interested parties, in accordance with the rules of social economy. This problem has already been and will still be of more and more importance as it will not be possible any longer in order to prevent the participation of local communities from creating their own programme of development. In connection with this, the following remarks can be presented:

- Sustainable development allows a compromise which is obtaining satisfactory economic results with the deep concern about the social surrounding as well as the natural environment.
- There is a possibility to improve the economy and a contribution to improvement of social services in most recommended procedures of planning.
- The elementary processes can influence one another at many stages and the participants can contribute to these influences differently, which is connected with the existing interdependencies between the elements of the system.

Moreover, protected areas are the example where the procedures can be implemented in the first place through the appropriate formation of economic instruments for supporting eco-development. The vital element is forming the relation a human-entrepreneur and a farmer appropriately, which would be possible if given protection of a given element of the environment or a given action was paid like the farmers want to.

These principles are also binding for local development, for which self-government is responsible. The inhabitants of these areas, although they own public goods that serve the present generations, not only do not get paid for conservation efforts, but suffer losses, such as the decreased value of land under protection. The inhabitants who are not farmers are not entitled to compensation (at present). The problem will grow despite the fact that the new Common Agricultural Policy for 2021–2027 very strongly emphasises this issue if this instrument exists.

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The Rio Declaration on Environment and Development from the Earth Summit in Rio De Janeiro, 1992.

The Importance of Financial Ratios for Predicting Stock Price Trends: The Evidence from the Visegrad Group

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Abstract

This study examines the effect of the main microeconomic factors on the stock prices of select financial sector companies listed on the Central European Exchanges (Budapest Stock Exchange, Prague Stock Exchange, Bratislava Stock Exchange, or Warsaw Stock Exchange). The microeconomic factors are based on the financial situation in companies. For the analysis are used financial ratios, gained from the financial statements of the individual companies. In general, the paper confirmed that rentability and debt ratios are the most important business factors from the prospective of its impact on stock prices. The relationship between observed variables is explored using panel regression analysis. The ordinary least squares method is used for constructing a regression model. The sample period of our dataset is composed of annual data from 2002 to 2015.

Keywords: microeconomic factors, financial ratios, stock prices, Visegrad, regression

JEL Code: C58, D24, G21, M21

1. Introduction

This paper investigates the dynamic linkages between microeconomic factors and stock market developments. There has been considerable research on this relationship. Two basic theoretical approaches and interpretations of this relationship are frequently used. The efficient market hypothesis (Fama 1970) assumes that stock prices already contain all the relevant information; the theory of arbitration (Ross 1976, or Chen et al. 1986) provides a framework in which the effect of the macroeconomic and microeconomic variables on stock prices is confirmed. The existing literature provides strong evidence on the existence of linkages between stock prices and microeconomic fundamentals mainly for the general stock market indices. The aim of this paper is to examine the character of the relationship between the financial ratios and the stock prices of select financial companies in the Visegrad Group (composed of four countries: the Czech Re-

public, Hungary, Poland and Slovakia). The relationship between observed variables is explored using panel regression analysis. The ordinary least squares method is used for constructing a regression model. I believe that the financial sector in the Visegrad group deserves additional study. The interaction between the financial sector and the national economy is a broad area of research. The relations between these two may have far-reaching significance for the overall direction of individual countries within the global economic system.

The last years have been significance by recovery of the world economy from the impact of the financial crisis and the following European debt crises. In this connection, it is important to determine the impact these crises had on the financial companies in the Visegrad group and to determine the other impacts these crises had on the national economies. Currently, it is widely recognized that a well-functioning financial system is crucial to economic growth. An efficient financial system increases financial savings and the investment allocation range and reduces asymmetric information or transaction costs. Although the most prominent economic sector of in the Visegrad Group is manufacturing, the financial sector is one of the fastest developing sectors among the national economies; in addition, the financial sector comprises the highest proportion of the service sector.

According to the Global Financial Development Database, bank assets to GDP exceed 60% in all observed countries. The Czech Republic has the highest ratio with more than 69%; Poland has approximately 65%, Slovakia has 64% and Hungary has approximately 60% assets to GDP. In addition, the Czech Republic has the highest ratio of financial system deposits to GDP (67%). The remaining countries have a ratio approximately 50%. Therefore, in this paper are specifically used blue chip stocks of important banks, insurance companies and financial funds. Blue chip stocks are stocks of large companies that have strongly positive reputations. These companies create a presumption for finding real linkages between the observed variables.

The financial ratios used in most estimations in the literature that was reviewed are the debt/equity ratio, the financial leverage ratio, the return on assets ratio, and the return on investments ratio. The remainder of this paper is organized as follows. The relevant literature is reviewed in Section 2. The data and the methodology used in this paper are introduced in Section 3. The results of the empirical estimation are reported in Section 4. The conclusion and summary of the main findings is in Section 5.

2. Review of Literature

The following papers investigated the relationship between stock market movements and financial ratios. The importance of financial ratios for predicting stock price trends was an important, debatable issue for Lewellen (2002). According to the regression results of the paper, the dividend yield, the book-to-market and the earnings-price ratio predict stock market returns in the long horizon. Similarly, Dzikevičius and Šaranda (2011) aimed to determine a predictive ability of the financial ratios in the Lithuanian stock market. The paper investigated 5 companies and 20 financial ratios and the correlation analysis and the covariance analysis were used as the main analytical tools. The researchers found positive and rare examples of negative linkages between stock returns and financial ratios, depending on the ratios and the method used.

Kalcheva and Lins (2007) presented the study in which companies are painted as higher level of liquid assets holders in higher individual firm risk sensitivity on liquid

assets policy. Pinkowitz, Stulz and Williamson (2006) introduced the study with a proof for individual firm risk sensitivity on liquid assets policy. The paper concluded the hypothesis that cost for the controlling shareholders consumption is higher when the private benefits attached to liquid assets holding and, that shareholders value liquid assets holding less, when investors are better protected.

Michalski (2013) investigated a classification of financial consequences of managerial decisions in current assets investments level. Empirical illustration collected from Polish firms shows that efficiency measure ROA is linked with one period lag with current ratio, liquidity ratio and without lag with current ratio and collection period. That confirms that individual risk sensitivity is an important part of managerial decisions. The capital structure of listed firms in Visegrad countries was investigated by Bauer (2004). Furthemore, the differences in capital structure and potential determinants of leverage were provided. According to the result, the financial leverage is negatively correlated with profitability and tangibility. Similarly like Altman (1968), also Bauer (2004) supported the view of size of firms as an inverse proxy for the probability of bankruptcy.

In general, ratios measuring profitability, liquidity and solvency prevailed as the most significant indicators. The order of their importance is not clear since almost every study cited a different financial ratio as being the most effective indication of impending problems.

3. Methodology and Data

3.1. Description of the Stock Prices

The financial companies selected are listed on the Bratislava Stock Exchange, the Budapest Stock Exchange, the Prague Stock Exchange and the Warsaw Stock Exchange. The actual market capitalization of shares and units of the Bratislava Stock Exchange (BSSE) is EUR 4 194 mil. The official share index of the BSSE is the Slovak Share Index (SAX) where Všeobecná Úverova Banka (VUB) has the largest weighting with 21.30%. The most marketable company in the regulated free market in 2015 was Tatra Banka (TTB). The banking sector´s profit growth in 2015 was EUR 626 mil., representing a year-on-year increase of 11.7%. The growth was largely based on the growth in lending and on reductions in funding and credit risk costs. In 2015, all banks in Slovakia continued to meet the minimum capital requirements, and the common equity Tier1 ratio remained at 16%.

The Budapest Stock Exchange (BSE) has market capitalization of EUR 441 mil.; it is composed of the official index of blue-chip shares (BUX) and of the index of Mid and Small Cap shares (BUMIX). The financial companies that were chosen have the largest share weighting in both indices. OTP Bank (OTP) has a 35.5% weighting in the BUX index, and FHB has a 9.5% weighting on the BUMIX. The banking sector closed 2015 with a profit of EUR 97 mil. The profitability of the Hungarian banking and insurance sector remains below that of the other sectors of the region. Although several institutions have relatively high non-performing portfolios and low profitability, the capital adequacy ratio is 20%.

The market capitalization of the Prague Stock Exchange (PX) is EUR 36 041 mil. Two companies that are part of this study are among the top three companies with the largest proportion of market capitalization on the PX. The Erste Group Bank (EGB) has the highest proportion of approximately 22.2%; Komerční Banka (KB) has the third

highest with 18%. The last financial company analyzed is RMS Mezzanine which is a successfull company providing non-bank funding in the Czech Republic. The domestic banking sector is profitable in the long term; the profit for 2015 totaled EUR 2.47 bil.; a 6.1% growth rate. The results of the banking stress tests show that the financial sector remains highly resistant to adverse development scenarios. The total capital ratio increased by 0.4 to 18.4%.

The Warsaw Stock Exchange (GPW) has the highest actual market capitalization of countries in the Visegrad Group with EUR 59.2 bil.. Financial companies are the main components of the official domestic index WIG. These companies comprise approximately 40% of the WIG. The chosen companies are all primary constituents of the WIG; this includes Bank Pekao (PEK), which has the highest proportion of total equity turnover 9.32%. Bank Zachodni WBK (BZW), and ING Bank (ING) are the remaining companies chosen. The domestic banking sector is characterized by high average credit risk weightings (80% for commercial banks); this reflects the conservative methods of estimating the capital requirements for credit risk. The total capital requirement did not change substantially; the total capital ratio remains approximately 15%.

Figure 1 describes the stock price development of the select financial companies in the Visegrad Group. Although the Warsaw Stock Exchange has the highest market capitalization in the Visegrad Group, its stock prices had the greatest fluctuation because of the pronounced strengthening in capital after 2005. All the stock exchanges experienced declines thereafter from 2008 to 2011; this was caused by both the global financial and the European debt crises.
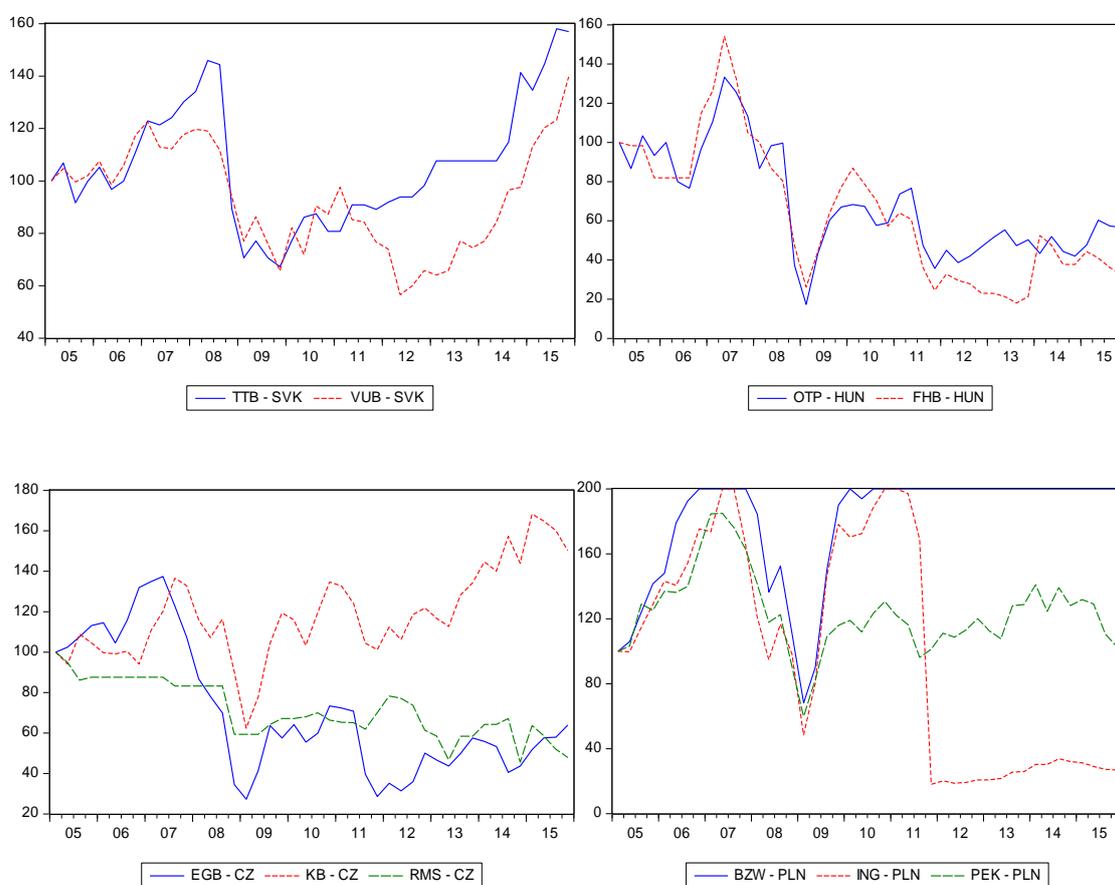

Figure 1: Development of stock prices of the select financial companies (2005=100%)

3.2. Description of the Financial Ratios

The financial ratios under investigation are the debt/equity ratio, the financial leverage ratio, the return on assets ratio and the return on investments ratio. Debt/equity (DE) ratio indicates how much debt a company is using to finance its assets relative to the amount of value represented in shareholder´s equity. DE ratio measures a company´s debt relative to the total value of its stock and may often be referred to as risk or gearing. DE is calculated by dividing a company´s total liabilities by its equity.

A financial leverage ratio (LEV) is any one of several financial measurements that look at how much capital comes in the form of debt, or assesses the ability of a company to meet financial obligations. If a company´s operations can generate a higher rate of return than the interest rate on its loans, then the debt is helping to fuel growth in profits. Financial leverage ratio is computed by dividing a company´s total assets by equity.

The return on equity (ROE) is the amount of net income returned as a percentage of shareholder's equity. ROE measures a corporation´s profitability by revealing how much profit a company generates with the money shareholders have invested. ROE is useful for comparing the profitability of a company to that of other firms in the same industry and it is calculated as net income divided by shareholder´s equity.

The return on investments (ROI) is one of the basic indicators of business economics, marketing, selling and investing. This indicator represents, how many units of the funds spent to earn one unit of the funds. ROI is very popular metric because of its versatility and simplicity. Essentially, ROI can be used as a rudimentary gauge of an investment´s profitability. ROI can be very easy to calculate and to interpret, when the net profit is divided by investment.

Table 1: Description of financial ratios

Econ.	Stat. Descr.	DE	LEV	ROE	ROI
CZE	Mean	7.6287	8.2086	0.1324	0.0188
	Median	8.4077	9.1984	0.1527	0.0158
	Max.	19.6271	17.421	0.2751	0.0973
	Min.	0.0029	1.0029	−0.0033	−0.0022
	Stand. Dev.	5.3946	5.1171	0.0799	0.0171
HUN	Mean	12.2020	13.1664	0.1112	0.0102
	Median	9.9734	10.9734	0.1081	0.0101
	Maximum	25.8967	26.8969	0.4173	0.0315
	Minimum	5.6775	6.6775	−0.5772	−0.0306
	Stand. Dev.	5.6752	5.6027	0.2026	0.0141
PLN	Mean	8.1317	9.1306	0.1327	0.0153
	Median	7.7547	8.7547	0.1289	0.0149
	Maximum	15.4796	16.4796	0.2208	0.0268
	Minimum	5.4802	6.4803	0.0103	0.0009
	Stand. Dev.	2.2517	2.2531	0.0415	0.0057
SVK	Mean	9.9854	10.9932	0.1498	0.0136
	Median	9.9554	10.9554	0.1472	0.0129
	Maximum	14.9207	15.9208	0.2193	0.0226
	Minimum	7.1917	8.1917	0.0885	0.0104
	Stand. Dev.	1.9862	1.9806	0.0387	0.0028

Table 1 shows the basic description of select financial ratios. DE ratio, LEV ratio and ROE have the highest maximum value for the companies in Hungary, but these companies have also the largest standard deviation. All results in Hungary could lead to non-significant relationship between observed variables. In contrast, other results of finan-

cial ratios in the Czech Republic, Poland and Slovakia provide the conclusion that development of ratios is steady and the final regression model could quantify mutual relationship between observed variables.

3.3. Ordinary Least Squares Methods

The effort of the panel regression model is to explored the general trend in the changes in response variables due to changes in the explanatory variable. The ordinary least squares method is used for constructing a regression model to minimize the sum of squared deviations of actual data values from theoretical values. Linear regression model must to meet four basic conditions. The stationarity test of time series is used as a precondition for carrying out tests and analyzes of econometrics models. The Levin, Lin and Chu common unit root process is used for verification of stationarity in panel regression. Furthermore, among the regressors there must not be a strong correlation; multicollinearity. The presence of multicollinearity is characterized by the correlation coefficient greater than +/−0.80. In this case, at least one of the variable should be abstracted to meet the criterion.

The third condition deals with the exclusion of residue autocorrelation measured by the Durbin-Watson statistical indicator of the regression models output. The value of indicator must be close of 2.00. Observed autocorrelation may be caused by delaying variables. The fourth basic condition is the absence of the heteroscedasticity of residuals. It is important for the robustness of model that the residue has a constant and finite variance.

As an additional condition is used the test of normality. For the normal distribution of residual variables are key factors; the skewness, kurtosis and the Jarque-Berra test. The principal mathematic formulation of an ordinary least squares method of regression function by Brooks (2002) is:

$$Y_t = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \ldots + \beta_k X_{ik} + \varepsilon_i \quad i = 1,2,\ldots,n \tag{1}$$

where Y_t represent a dependent variable (stock prices) at time t, X_{ik} a label for each independent variable (financial ratios) in time and, coefficients β_0 to β_k are the parameters of the regression function, which estimates implementing the method of least squares, and ε is the residual part of estimation.

4. Results

The basic condition for the ordinary least squares method is the stationarity of time series. The Levin, Lin and Chu common unit root process is used for verification of stationarity in panel regression. In the case of observed variables, the stationarity was proved at the first difference of time series. These stationary data are further subjected to a correlation analysis. The second condition is the absence of multicollinearity among repressors'. As is shown in Table 2, the strong mutual relationships (coefficient higher than 0.80) were demonstrated especially between debt equity ratio (DE) and financial leverage (LEV) and also for return on equity (ROE) and return on investments (ROI). For this reason, some of the variables shall be subtracted from the panel regression function.

Table 2: Correlation matrix

Econ.	Var.	DE	LEV	ROE	ROI
CZE		1.0000	0.5729	−0.0824	−0.3204
HUN	DE	1.0000	**0.9961**	0.4565	0.2784
PLN		1.0000	**0.9996**	0.0622	−0.1310
SVK		1.0000	**0.9986**	0.1430	−0.3302
CZE		0.5729	1.0000	−0.1680	−0.5790
HUN	LEV	**0.9961**	1.0000	0.4486	0.2691
PLN		**0.9996**	1.0000	0.0610	−0.1322
SVK		**0.9986**	1.0000	0.1490	−0.3252
CZE		−0.0824	−0.1680	1.0000	**0.9010**
HUN	ROE	0.4565	0.4486	1.0000	**0.9815**
PLN		0.0622	0.0610	1.0000	**0.9807**
SVK		0.1430	0.1490	1.0000	**0.8866**
CZE		−0.3204	−0.5790	**0.9010**	1.0000
HUN	ROI	0.2784	0.2691	**0.9815**	1.0000
PLN		−0.1310	−0.1322	**0.9807**	1.0000
SVK		−0.3302	−0.3252	**0.8866**	1.0000

Based on the literature review and based on the significance of variables, the ROI and the DE ratios will not be part of panel regression function. Only in the case of the Czech Republic, the DE ratio meet the criterion of non-presence of multicollinearity and the ratio is part of estimation. The output of regression function, which is shown in Table 3, contains results of the coefficients for individual regressors, statistical significantion, the coefficient of determination (Adjusted R2), the overall statistical significance of estimated model (F-stat.), or the coefficient of autocorrelation (Durbin-Watson).

From the results, it is obvious that only model for the Czech Republic is statistically significant. The Durbin Watson coefficient for autocorrelation, which is one of the main condition of OLS method, achieved the required value around 2.0. For the robustness of the model is important that two financial ratios; ROE and LEV are statistically significant. Hungarian and Polish models do not provide any statistically significant variables nor overall model significance. Even if the Slovakian model presents one statistical significant ratio; LEV, overall significance and Durbin-Watson coefficient do not meet the required criteria. For these reasons, the last two conditions are related to the model of the Czech Republic.

Table 3: Output of panel regression function

Econ.	Adj. R^2	F-stat.	Durbin-Watson	Variables	Coefficient
CZE	0.5263	**14.3347 ***	**2.1224**	DE	0.2290
				LEV	**−5.4725 ***
				ROE	**−0.9286 ****
HUN	−0.0082	0.9186	2.5911	LEV	−0.2568
				ROE	−0.1984
PLN	0.0106	1.2027	**2.1205**	LEV	−1.0814
				ROE	0.0799
SVK	0.1056	2.4758	1.2971	**LEV**	**0.9029 ****
				ROE	0.0200

The heteroscedasticity test of residual series and the normality test are presented in Figure 2 and in Table 4. Residual series of the model are not correlated with the financial ratios, it means that that the residue has a constant and finite variance and in the model is not presence of heteroscedasticity. The last condition for the robustness of es-

timated model is normal distribution of residual series. Even if the coefficients for skewness and kurtosis do not achieved optimal results, the null hypotheses for the Jarque-Bera normality test cannot be reject and residual series have normal distribution.

Table 4: Normality and heteroscedasticity tests

| Normality		Heteroscedasticity		Prob.
Skewness	–0.7527	**Residual x DE**	-1.38^{E-16}	1.0000
Kurtosis	3.7396	**Residual x LEV**	-8.59^{E-17}	1.0000
Jarque-Bera test	4.3369	**Residual x ROE**	1.71^{E-17}	1.0000
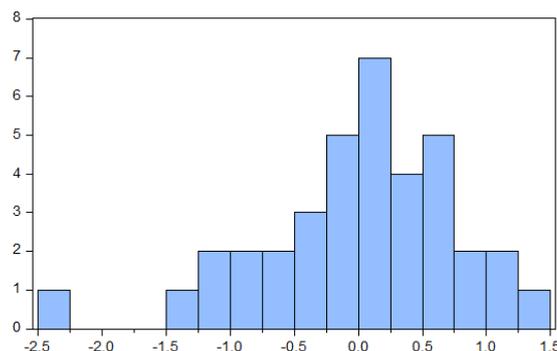
Figure 2: Histogram – normality test

The last surveyed area of the regression model is test of fixed effects. While the aforementioned regression output had no added effects, following regression output will be precisely these effects added. The first effect of the sample period could be years of the financial crises. These effect do not provide any results to confirm fixed effects during the financial crises. The second fixed effect added to the model was year 2002, because of the first difference at this year. The sample period was changed to 2003–2015 and results are presented in Table 5.

Table 5: Output of panel regression function with fixed effects in the Czech Republic

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DE	**0.459473**	0.181570	2.530558	**0.0204**
LEV	**–5.369658**	1.094538	–4.905869	**0.0001**
ROE	**–0.881855**	0.399214	–2.208978	**0.0397**
C	**–0.341865**	0.121995	–2.802300	**0.0114**

Effects Specification

Cross-section fixed (dummy variables)
Period fixed (dummy variables)

R-squared	**0.806447**	Mean dependent var	–0.203903
Adjusted R-squared	**0.633268**	S.D. dependent var	1.185642
S.E. of regression	0.718006	Akaike info criterion	2.481817
Sum squared resid	9.795127	Schwarz criterion	3.265507
Log likelihood	–27.91362	Hannan-Quinn criter.	2.758105
F-statistic	**4.656720**	**Durbin-Watson stat**	**2.063552**
Prob(F-statistic)	**0.000895**		

Estimated model with fixed effects meet the criteria of overall model significance, normal distribution of residual series and also the coefficient of determination Adjusted R^2 explain more variability than model without fixed effect. All observed variables are statistically significant and could be quantified by OLS equation (2). The coefficients for each explanatory variables demonstrate how financial ratios could predict the stock price trends. Specifically, if the debt-equity ratio (DE) increases of the unit, the stock prices of the Czech firms will increase by 0.4595 units. In contrast, if the financial leverage (LEV) or return on equity (ROE) increases of the unit, the stock prices will decrease by 5.3697 or 0.8819 units depending on the ratio.

$$\text{Stock} = -0.3419 + 0.4595\, DE - 5.3697\, LEV - 0.8819\, ROE + \varepsilon i \quad i = 1, 2, \dots, n \quad (2)$$

5. Conclusions

This study examined the effect of select financial ratios on the stock prices of select financial sector companies listed on the Central European Exchanges (Budapest Stock Exchange, Prague Stock Exchange, Bratislava Stock Exchange, or Warsaw Stock Exchange). The financial ratios used in estimations are the debt/equity ratio, the financial leverage ratio, the return on assets ratio, and the return on investments ratio. The order of their importance is not clear since almost every study cited a different financial ratio as being the most effective indication of impending problems.

The relationship between observed variables is explored using panel regression analysis. The effort of the panel regression model is to explored general trend in the changes in response variables due to changes in the explanatory variable. The ordinary least squares method is used for constructing a regression model to minimize the sum of squared deviations of actual data values from theoretical values. Linear regression model had to meet four basic conditions; the stationarity of time series, non-presence of the multicollinearity and heteroscedasticity of residuals, the autocorrelation of time series and normal distribution of residuals. From the results, it is obvious that only model for the Czech Republic is statistically significant. Hungarian and Polish models do not provide any statistically significant variables nor overall model significance. Even if the Slovakian model presents one statistical significant ratio; LEV, overall significance and Durbin-Watson coefficient do not meet the required criteria.

Estimated model with fixed effects for the Czech Republic met all the criteria. The coefficients for each explanatory variables demonstrated how financial ratios could predict the stock price trends. If debt-equity ratio (DE) increases of the unit, the stock prices of the Czech firms will increase by 0.4595 units. In contrast, if financial leverage (LEV) or return on equity (ROE) increases of the unit, the stock prices will decrease by 5.3697 or 0.8819 units.

This paper confirmed the importance of financial ratios for predicting stock price trends. Estimated model is possible to use in practice, but results depend on several conditions. Ordinary least squares method has specific conditions which are described in this paper and it is also important, to select variables have the steady course. Development of Hungarian financial ratios was not stable in sample period and also regression model was insignificant. In contrast, healthy bank sector could be one of the reason for statistically significant mutual relationship.

Acknowledgements

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The system for selecting suppliers based on user requirements

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Abstract

The Google service delivered a breakthrough customer experience. It has not been neces-sary to browse through a large catalogue of web pages to find a company solving a partic-ular problem. The user just simply wrote a plain question and received related sources. The service understood users' requests. Later there came personal assistants like Siri or Alexa. Both being able to understand our straightforward questions. We dare to argue that many users are not willing to adjust their ways of communication with the computer or service to its needs, they anticipate that the service will be able to adjust for them. Our paper presents a service focused primarily on the recommendation of workers such as plumbers or home teachers or service providers such as finance or grant advisors. The service is based on natural language processing and the whole design is user centered. We outline our design approach as well as the service architecture. Moreover, we describe the key issues we have met during the development and recommend a viable solution.

Keywords: electronic marketplace, web application, text mining, natural language pro-cessing

JEL Code: L86

1. Introduction

At the time of the information explosion and dramatically changing conditions it can be complicated and time consuming to find the appropriate service provider which solves the customer's problem with a leaking pipe or malfunctioning washing machine. The times when in the village there was a blacksmith, baker or a carpenter, whom everyone knows, they are gone forever. The quantity of services offered now is much bigger and moreover the services are more complex. Also the structure of service providers changes more often. Where the baker was yesterday the bookseller is today. And last but not least,

to obtain information on the quality of services provided is complicated too. Therefore, there are different solutions on the Internet to help customers select suitable suppliers.

One of such solutions can be the web application MojiLidi (http://www.mojilidi.cz) introduced in this article. The application was created as a response to the gap in searching the information and suppliers. In the first phase it was inspired by the market of subsidies.

There are thousands of subsidy programs on the market and in 2009, it was virtually impossible to get simple and understandable information about the various programs. Providers of information gave subsidies in their "own language" on dozens of websites. Therefore, if applicants for subsidy did not have an experienced consultant, they could not find the needed information and unfortunately did not have where to call or write.

The first project was the creation of a web site dotacni.info (http://www.dotacni.info) where there were simply presented hundreds of subsidies, so that the users could have access to them and they were easier to comprehend. The idea was met with success and now over 100 inquiries from potential clients come every week.

A few years later the Internet was glutted with relatively high-quality websites which provided the information about commercial interesting subsidies. When an applicant was looking for necessary information, the search engines offered websites of largest companies in the field of subsidy consultancy, or often multiple sites of one such company. Thus on the Internet there arose a sort of oligopoly of leading organizations.

One of the problems was an amount of irrelevant inquiries (e.g., small projects or uninteresting projects). It was complicated to work effectively with these clients. They were not commercially interesting and communication with them took a lot of time. They could be passed to externally cooperating smaller subsidy advisors. On the other hand, a considerable number of them were interesting.

It is evident that the combination of demand for information or suppliers on the Internet does not meet with a range of suitable providers. Large suppliers, publishing, implementing the advertising, gain the irrelevant demand and on contrary the small, without publishing or advertising potential cannot gain relevant questions or get clients.

As an opportunity to solve this problem, the system MojiLidi was modelled, within which we try to combine supply and demand based on the parameters of price, quality and speed, rather than publishing and advertising power.

The introduced problem is evident also on other markets. The aim of the application development is the creation of a new form of a globally used open application combining a searching engine with the principles of social networking (not friends, but strangers) including the principles of demand portals. So that the system could be successful, it must include all areas of human existence and contain a functional search / pairing algorithm. It is also necessary to encompass either a huge amount of registered suppliers or connect the system to existing catalogues and created Internet resources. These tasks are now engaged by the partner consortium of CYRRUS ADVISORY, a. s. and Mendel University in Brno.

2. Supplier recommendation systems

We can find many different systems that are focused on the interconnection of a potential customer with an appropriate supplier. Probably the oldest and the easiest way the customers look for the service providers on the Internet is the usage of Internet catalogues

similar to the previously used printed phone books. The providers are divided into categories according to their area of business. An example could be the Czech web server Seznam.cz (http://www.seznam.cz) with the catalogue Firmy.cz (http://www.firmy.cz) or ABC Českého hospodářství (http://www.abc.cz). The disadvantage of such approach is that the customer sometimes cannot be able to specify the area of business precisely, or the company can be placed into more than just one category. Equally, the service provider can have the problem with putting a company into one category or even finding a suitable category. The usage of such a catalogue can be complicated for both sides. Therefore, the new services are focused on finding the appropriate supplier to the potential customer automatically.

On the market, there is a lot of such recommendation systems available. We selected a few top servers in Czechia to evaluate their approaches to the problem of a customer recommendation to see their approaches, benefits and also potential drawbacks. Between the top service recommendation sites, we selected four of them. For the selection, we tried to identify the sites with the greatest count of registered offering companies or sites with an innovative approach to customers. We reviewed following sites:

AAAPoptávka.cz (http://www.aaapoptavka.cz/) belongs to the most used sites in Czechia. The principle of recommendation can be described as a functional classic. The system is based on a vast catalogue of companies that are offering their services (suppliers). Suppliers are able to test the system for free for a limited amount of time. After 90 days the supplier can leave the service or become a subscriber in the selected prepaid program. Each tier of subscription promises better technical support from the service and also more offers.

The user searching for a service (customer) can place a request. The system is providing a simple text form with predefined text boxes (description of the offer, date, location etc.) and text boxes for personal information. The request is checked by an operator and it is published in a catalogue of demands sorted by keywords. The operator also forwards the request to selected suppliers and publishes it in the publicly available catalogue. Important details are, of course, available only for paying suppliers.

Nejřemeslníci (https://www.nejremeslnici.cz/) belongs between services that are trying to approach a recommendation system differently. The site is trying to be minimalistic and communicates with the demander. If offers two input boxes. The first one promisingly encourages a user to describe "What do you need to solve?". Sadly, the input field is short and expects a demander to fill only a keyword. The keyword is then paired with a corresponding category in the system. The second field is a location based (post identification number). This input generates a list of suppliers and their recommendations by other users. Suppliers can register freely, without any additional fees or subscriptions.

Epoptávka.cz (http://www.epoptavka.cz/) is based on a similar classic system as AAAPoptávka service. The potential customer fills the request into the system through a simple text form with predefined text boxes (description of the offer, date, location etc.) and fields for personal information. The request is subsequently sent to the suppliers. Becoming a supplier is a little bit complicated because it is necessary to leave a name and telephone number for subsequent direct communication with the service provider. There is also a publicly accessible catalogue divided into categories based on location and keywords.

Trh poptávek (http://www.trhpoptavek.cz/) is using a direct input system for the request that has significant resemblance with the Nejřemeslníci service. Unlike Nejřemeslníci, the system requires to input a keyword, location, category and time frame. The

system also offers a public catalogue of demands and a subscription system with a time unlimited free tier.

If we summarize the brief review of the existing systems, we can distinguish two different approaches. The first one is based on usage of common forms. The other is aimed at simplification of the task. Nonetheless, contemporary used systems are in this case not able to provide some advanced functionality. Therefore, we focus on design that unifies the best features from both approaches: straightforward user interface without complex forms and advanced functionality that allows pinpointing the best suppliers.

3. System design

We have compared many similar systems that are available on the market. Although there are differences in their design, they have one common drawback. Each time the user wants to find some service, he/she must fill quite a large amount of different forms or browse through extensive catalogues of providers. We can compare this approach to finding the web pages in large catalogues like Altavista or others (Resnick and Vaughan, 2006). Nonetheless, these archives, although they are still used in special cases, are generally taken as an obsolete approach. Full-text search is in most cases much more efficient. In the last years, we can clearly see the arise of various personal assistants like Siri, Cortana etc. (Waters, 2016). The fundamental principle of these assistants is that they emulate common conversation. They even "understand" the relations between multiple sentences in many cases.
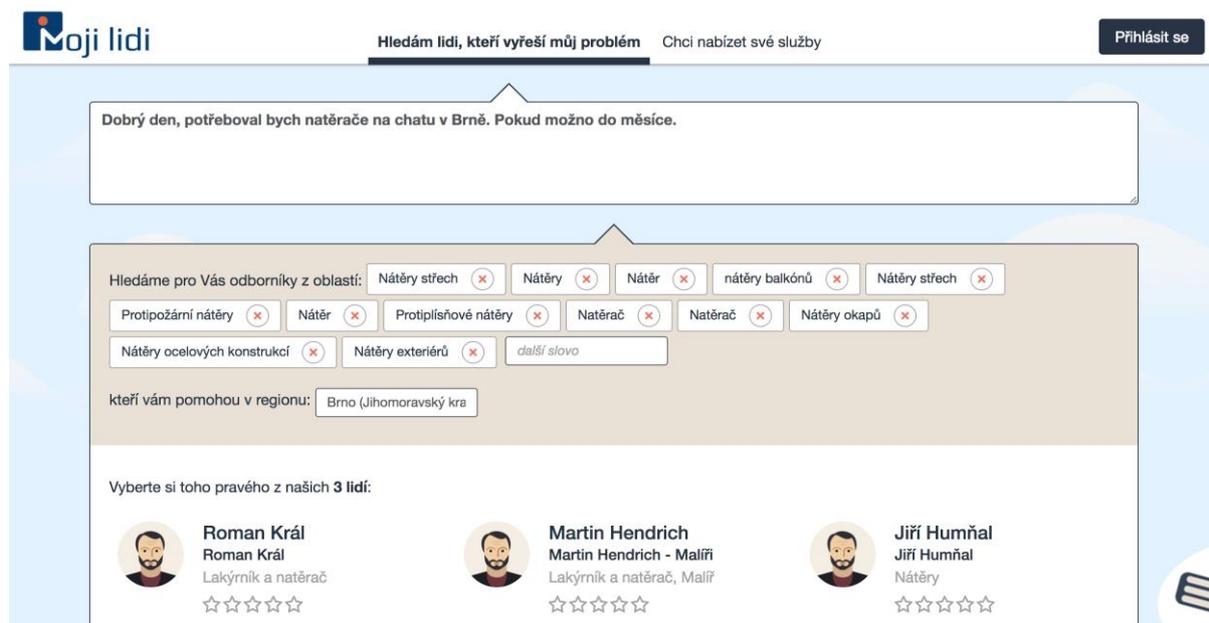
Figure 1: User formulated a problem with the typical sentence. In the brown part, the results of an analysis of the sentence can be seen. Unrelated keywords can be removed, new keywords describing the domain can be added, the region can be adjusted.

Therefore, we have decided to create our system on a similar basis. The user just formulates his/her problem with a simple sentence (e.g., "I need someone to teach me basic algebra in Brno during next two weeks."). Our system analyses this sentence and tries to identify the domain of the problem (e.g., the user needs a home teacher), the location that

is related to the question (Brno), and finally the time span (within the following two weeks). You can see an example of such a question and analysis on Fig. 1.

Certainly, none the systems that are based on the processing of natural language is perfect. Therefore, we have proposed a two-step approach. The user formulates a question, and the system presents an analysis of the request. It shows the keywords that are related to the required domain and a detected region where the service should be provided. In case the system misinterpreted the request, the user can reformulate the entire request or only adjust its interpretation. On the basis of this interpretation, a list of persons or companies that are possibly able to fulfil the request is provided. From this list, the user can select the persons that will be contacted (see Fig. 2). These contacted persons will receive the user's request and well as added details. Later, the user can communicate with the service providers through an embedded communication client. This approach can substantially shorten the time that is necessary for finding the appropriate service provider.
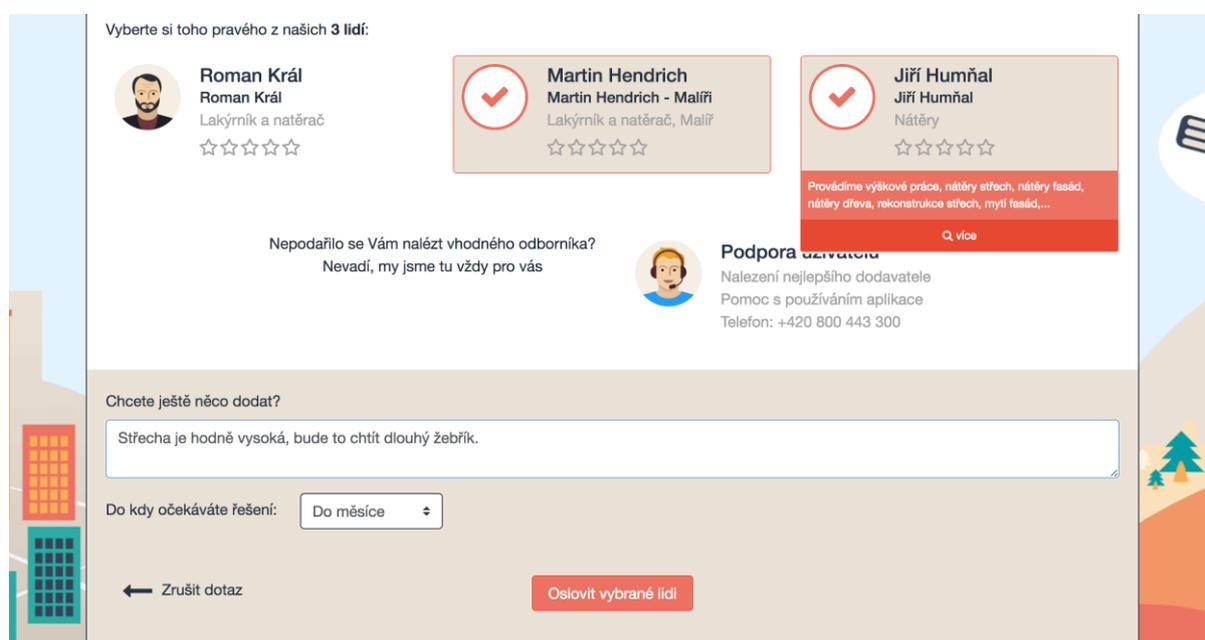
Figure 2: Selection of possible service providers and the final adjustments of the request.

3.1. Usability testing

During the design of the system, we used the design approach called user-centered design (UCD) (Gould and Lewis, 1985; Abras et al., 2004). This is one of many methods used for user interface design (Hauenerfauth, 2002). UCD is used especially in case an entirely new system is developed. The functions have not been defined yet; therefore, they must identify the user needs and design appropriate functions. Nonetheless, even skilled designers are not able to determine and design all required features on the first guess. Hence, usability testing is a standard part of the design process (Kuniavsky et al., 2012). We have used both common usability testing approaches – expert and user usability testing.

The basis of the expert testing is that a group of designers goes through the application, performs different usage scenarios and tries to identify potential flaws. In most cases, this approach allows identifying the vast majority of critical issues.

The user testing consisted of performing prepared scenarios and taking the interviews with the users. The testing group consisted of 10 people, eight males, and two females. The users age varied between 22 and 70 years. Respondents provided information about their computer skills, especially about their internet usage and web services they are used to work with. They had to describe themselves on the scale from one to four, where one means a beginner, four stands for a very advanced user. One person stated himself as a beginner (1), another one presented himself as an advanced user (4). The rest of the group often could not decide between two and three. We used two essential methods during the testing: "think-aloud" and "user observing". Hence, the user was encouraged to describe his/her thoughts aloud and the whole process was recorded and analysed by other designers/developers. Testing was executed in two rooms, first one with a tester and moderator, the second one with the observers. The observer group consisted of three designers, one developer, and an investor representative. The testers got a script with three tasks and were asked to perform them. The moderator bolstered them in the case of uncertainty. The moderator, as well as the observers took notes about problems identified during the testing.

Finally, we compared the results from both testings and adjusted the design accordingly.

4. Implementation

4.1. Architecture and implementation of frontend

The MojiLidi application was designed as a web service. Many approaches are available for the development of the web services frontend – from tightly coupled backend applications that generate HTML pages based on templates to lightweight frontend applications written in JavaScript, which communicate with the backend via well-documented API (Brehm, 2013; Sanderson, 2012). We chose the latter approach. Our service was implemented as so-called Single Page Application (SPA) – a special case of a Rich Internet Application (RIA). SPA approach is preferred nowadays in many projects as it delivers fast responses for users' actions and removes unnecessary delays of page reloading. Mobile users appreciate decrease in amount of transferred data achieved thanks to this architecture. This approach is specific in significant use of Internet browser capability to execute JavaScript, which is responsible for major part of the application logic, communication with a server, and user interface rendering.

4.2. Used frontend technologies

A selection of frontend technologies was carried out according to their suitability for the given task, state of documentation, and personal preferences of our team. The goal was to use the right set of tools that would provide a stable environment and long-term support.

The designed user interface and functionality were implemented using the first edition of Angular JS framework (https://angularjs.org/). User interface is fully responsive and CSS styles are generated using the SASS pre-processor (http://sass-lang.com/). Bootstrap CSS framework (http://getbootstrap.com/) was used for layout and Font Awesome for basic icons (http://fontawesome.io/). The frontend functionality of the application is secured by automatic tests created with Jasmine (https://jasmine.github.io/) and Pro-

tractor (http://www.protractortest.org/). All build and deployment related tasks are automated using the Gulp task runner (http://gulpjs.com/). Our approach allows to generate a standalone application for mobile devices using Apache Cordova (https://cordova.apache.org/) with the same codebase as the web frontend.

The application backend was implemented in the Perl programming language and it uses the PostgreSQL database described below.

4.3. Application backend

This part of the application responsible for the communication between the database and the user interface is written in the programming language Perl. It delivers the required data according to the user requirements. The backend is divided into parts they take care of the authentication and user profiles, communication, or query analysis. The backend uses the traditional approach verified in many previous projects the developers were responsible for. It means we designed separate Perl modules communicating with the database using common database interface on one side and the JSON format for the communication with the frontend on the other side. No specialized framework was used. This approach was proved to be functional in the prototype of this application and the main reason of it was the rapid application development in the environment where no similar implementation was available.

4.4. Communication interface

Because the frontend of a web service is the standalone JavaScript application, a well-documented API is needed to transfer data between the client and server side API. The backend and the frontend both implement interface defined in API documentation. We designed simple REST API (Fielding, 2000) using HTTP methods GET, POST, PUT, and DELETE, HTTP status codes, and a set of URIs that represent resources available from the backend. Data is transmitted in the JSON format (http://json.org/). The API was designed and documented using API blueprint syntax (https://apiblueprint.org/) that also allows to create a mock of the backend for development and testing purposes. Client authentication is transferred as a text token with each request using a custom HTTP header after he/she logs in. Local storage of the Internet browser is used to persist a token between user sessions.

4.5. Data storage

Data of the system is stored in the traditional rational open source database system PostgreSQL. This database system suits every need of the system. The system uses more than 20 database tables to store the information about users, offers, or user queries including the location of the demand. At this moment the system does not support spatial queries, however in the future extension of the system we plan to use PostGIS, which is a spatial database extender for PostgreSQL. It adds support for geographic objects allowing location queries to be run in SQL (http://www.postgis.net/). We plan – for the further analysis of text queries written by users looking for the service – to use a non-sql database which meets the requirements of large data storage and processing better.

4.6. Text processing

The system is being built as a flexible one so several pre-processing options are available. A particular suitable setting will be deducted from the results of a user behaviour analysis after a longer period.

Before the retrieval algorithm is applied to the query non-alphanumeric characters, HTML tags and entities are removed and the remaining text is broken into tokens according to whitespaces present in the text. Because Czech uses diacritics and some people prefer not using it when typing a text on a computer or smartphone, it is removed. Words that are shorter than two (when finding locations) or three (when looking for service keywords) characters are removed as well. All substrings generated by stripping the last one, two, and three characters of every words are added as well to increase recall when some of the query words are inflected or conjugated. Stop words (including only prepositions at this moment) are eliminated. The result of this first step is a list of tokens derived from the query.

The query is expected to contain the description of a service that is desired and a location where it should be provided. Both types of information in the form of natural language expressions are stored in the system's database. These facts can be considered text documents (although very short, sometimes having only one word, such as "Brno" for a location). Thus, having a query Q and a set of documents D_L (locations) and D_{KW} (keywords), finding relevant services or locations becomes an information retrieval problem. Each document from D_L and D_{KW} is compared with the query and a score S is calculated for it. The score value allows to find relevant documents (non-zero score) and rank them according to the relevance (higher score means higher relevance).

To give higher preference to longer matches (when a location or a keyword consists of multiple words) calculation of the score given to a match is based on the Jaccard index (the score is calculated as the size of intersection between the query and a document divided by their union):

$$Score\{Q, D_i\} = \frac{Q \cap D_i}{Q \cup D_i}$$

Because there might be quite large numbers of documents retrieved, their number is limited to 10 for locations. In case of keywords the situation is different because one keyword might be related to many different services. Thus, the list of all relevant keywords identified in the text is retrieved and for each keyword a list of all related services is found. A small number of services (e.g., three) that have been found most frequently are then presented to a user.

5. Discussion and conclusions

In order to improve retrieval characteristics (to achieve sufficient precision and recall values) and user satisfaction, a deeper analysis of application usage and user behaviour is needed to be performed in the future. From the text processing perspective, additional preprocessing steps or alternative settings might be considered, for example, working with word n-grams, using some primitive or advanced spelling corrections, keeping num-

bers or selected symbols in the text, applying term replacement rules, working with a limited dictionary obtained from the analysis of data stored in the database, using stemming or lemmatization.

Other possible alternations can be identified in the search algorithm. Different numbers of retrieved results or keywords from different numbers of categories might be presented to a user. In the future, historical data about placed queries, retrieved results, and actually selected services and places can be used in order to intelligently learn importance of diverse pieces of text, domain related stopwords, or typical textual patterns when looking for particular information.

At this time the testing with real users of the application is in process. The operator of the system registers new users who send the question using the web dotacni.info everyday. After the registration, the communication continues via MojiLidi. This process works well and with no problems. The users report only a few problems from other areas. For example, the first of them is the user has not noticed he/she gets the new message or he/she ignores it. The solution could be integration of mobile application with notices on a mobile device. Also the e-mail with the notice of a new message in the application is not attractive, it is only a plain text without any interactive elements. The users report the problems with the request modification. If they change the text of it, the application removes all keywords inserted before including those the user added or removed manually and it could be frustrating. Sometimes the users are afraid to click on the selected profiles, because they think the new demand will be created. These problems will be analysed and modifications in the user interface will be made.

The users rate very positively the large database of experts in the respective fields. For example, a database of energy specialists and design consultants is truly unique.

In general, the most intensive development must be done in the area of request analysis. The application sometimes fails to identify the location and includes its name into the keywords or, oppositely, the application identifies a category keyword as a location name.

The new features we plan to implement include the multilingual support, asking the specific users directly using their profiles specified by @username, a payment gateway, searching users also in other catalogues, or the registration to the application using the Facebook or Google profiles.

Acknowledgements

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Financial Performance and Effective Tax Rates of Czech Subsidiaries under Foreign Control

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Abstract

The paper evaluates the financial performance of Czech entities under control of the EU listed companies and its association with effective tax rates. Using individual corporate data (sample of 5,033 firm-year observations), wide dispersion both in performance and taxation is documented. The domicile of the parent has an impact on the subsidiary's effective tax rate. The effective taxation of Czech subsidiaries under control of foreign listed parents is significantly lower than for other Czech companies. Despite exhibiting some kind of tax avoidance, data reveal high variability in relative tax rates, suggesting that the majority of foreign parents from western and northern EU countries prefer to tax profits in the Czech Republic rather than to shift them elsewhere. The shifting profits to the Czech Republic results in superior reported performance of affected subsidiaries. On the other hand, empirical evidence shows that parents from southern EU countries search the way how to avoid taxation. The parent domicile therefore really influences the effective tax rates of Czech subsidiaries. Consequently, the unclear tax motives of the parent companies hinder from appropriate assessment of financial performance of subsidiaries.

Keywords: financial performance; effective tax rate, parent-subsidiary links

JEL Code: M41, H25

1. Introduction

Researchers as well as policy makers try to find the answer to a fundamental question, whether accounting income and tax profit shall be aligned or treated separately. Companies' income is distributed both to owners and government; therefore the calculation of distributable income shall follow similar principles in both systems to avoid capital erosion (Hicks 1946). A contrary view is that accounting and taxation serve different purposes and the merging contradictory goals into a single concept of income will harm

either users of financial statements or threaten the tax collection. The real systems of corporate taxation and financial reporting are always independent at some extent (Procházka and Molín 2016). However, the dichotomy of both systems opens the gates for opportunistic behaviour of managers, who are able to boost company's profit in financial statements directed to capital market participants and simultaneously to reduce significantly profits reported in their tax fillings, as shown on example of real companies engaged in accounting scandals around 2000 by (Desai 2005) and (Whitaker 2005). More robust evidence of increasing spread between accounting and tax profits is provided by (Manzon and Plesko 2001), (Mills, Newberry, and Trautman 2002) and (Dyreng, Hanlon, and Maydew 2008). (Frank, Lynch, and Rego 2009) indicate that there are insufficient compliance costs that would ensure a trade-off between accounting and tax aggressiveness. In fact, companies are able to exercise a strong financial as well as tax reporting aggressiveness – they manage book income upwards alongside with decreasing their taxable profit. The calls for a higher book-tax conformity (i.e. for a tighter link between accounting and tax profit) seem to be a logical response to tackle the double-opportunistic behaviour of companies (Desai 2005).

Several studies, although, cast doubts, whether alignment of tax profits with accounting income can prevent companies from the aggressive tax behaviour (Ali and Hwang 2000), (Hanlon and Shevlin 2005), (Hanlon, Laplante, and Shevlin 2005), (Hanlon, Maydew, and Shevlin 2008), (Atwood, Drake, and Myers 2010). Regardless whether the approaches relying on the tight book-tax conformity are vital or not, the existence of tax avoidance is a matter of fact. (Watrin, Ebert, and Thomsen 2014), investigating consolidated as well as separate financial statements of companies from 27 EU-countries, provide evidence about earnings management both in countries with high and low level of book-tax conformity, despite the extent of earnings management is lower for the first group. The complexity of problem increases with the presence of multinational enterprises (MNE) in the local economy. International mobility of capital facilitates the evasion of corporate taxation (Diamond and Mirrlees 1971). The companies with international activities and subsidiaries distributed worldwide can quite easily transfer profits from one country to another via transfer pricing and other within-the-group transactions. The tax optimisation within the MNEs can also be eased by adoption of International Financial Reporting Standards (IFRS). Using data from the EU-based companies for period 2001 to 2010, (De Simone 2016) identifies a significant 16.2 per cent tax-motivated change in reported pre-tax profits following the IFRS adoption by multinational entities, in comparison to no material change in opportunistic tax behaviour of companies reporting under local accounting standards. The IFRS adoption has alleviated the tax discipline.

The tax avoidance by MNEs can be a serious problem for the tax collection by small open economies, with significant share of foreign entities on the ownership of domestic companies. The parent can pursue either value-creation (positive) or value-exploitation (negative) goals, when acquiring (foreign) subsidiary (Yang, Mudambi, and Meyer 2008). If the first case is relevant, a positive impact on the subsidiary's performance can be expected (Birkinshaw and Hood 1998), (Delios and Beamish 2001), (Fang et al. 2007), (Gaur, Delios, and Singh 2007), (Fang et al. 2010), especially if the parent is domiciled in a developed country and the subsidiary is operating on an emerging market. The transfers (know-how, staff, and technology) from the parent and its commands usually reshape the organizational structure of the subsidiary and improve its performance (Fey and Björkman 2001), (Luo 2003). In many cases, such subsidiaries are largest companies in the local economy (Albu, Lupu, and Sandu 2014), creating thus benchmarks for other

companies not only in terms of financial performance, but also regarding corporate governance, including tax discipline.

The Czech Republic is a typical example of an open small economy with significant share of foreign investors. Thanks to its suitable geographic location, skilled labour force and great tradition of manufacturing industry, the Czech Republic is an attractive place for foreign companies to establish the major plants in the country. According to (Ernest 2014), companies under foreign control generate around 50% of Czech industrial output. The significant share of these subsidiaries is owned by parent companies, which securities are traded at capital markets. Listed companies are required by investors to generate reasonable returns on investments; simultaneously they are under pressure to ensure a high level of corporate governance within the group. However, capital markets do not always operate in an effective manner. Any notion of a weak enforcement can incite companies to manage the key performance indicators opportunistically. The unclear incentives of the parent's management can have unpredicted effects on the activities and performance of subsidiaries (Capon, Farley, and Hoenig 1990), (Berman et al. 1999), (Orlitzky, Schmidt, and Rynes 2003). Furthermore, the reaction of subsidiaries to the institutional duality (Kostova and Roth 2002) is not predictable (Oliver 1991). The value flows within "parent-subsidiary links" can thus capture various motivations, not distinguable by outside parties.

Building on findings of (De Simone 2016) and (Watrin, Ebert, and Thomsen 2014) about the rise in tax avoidance of European listed companies after the IFRS adoption, the aim of this paper is to assess (a) financial performance of Czech private companies, which are subsidiaries of EU listed firms, (b) the relation between financial performance and effective tax rates (ETR) of these subsidiaries. The aim is motivated by findings of two recent studies. Firstly, (Procházka 2016b) identifies differences in reported performance of Czech companies under foreign control measured by return on assets (ROA) compared to return on equity (ROE). Whereas ROA figures are distributed relatively evenly regardless the domicile of the parent, ROE averages differ significantly depending on the jurisdiction of parents. Furthermore, the average values of ROA are higher than ROE, suggesting that Czech subsidiaries are engaged in profit shifting within the tax structures of MNE groups. The findings of this study lead to a conjecture that profits are transferred from the Czech subsidiaries abroad. However, this finding does not fully correspond to the results of another study on effective tax rates of Czech subsidiaries under foreign control. Using individual corporate data and macroeconomic time series, (Procházka 2016a) unveils a wide dispersion in the effective tax rates both below and over statutory legal rate, suggesting the existence of two-way profit transfers – both into and out of the Czech Republic. Some supportive evidence that the Czech tax regime can be regarded as favourable for certain parent companies is provided by (Kučera 2015). In 2014, the net difference between dividends paid out to abroad and received from abroad was 214 billion CZK, in relative terms 5% of GDP, which is the third largest share among the EU countries after Malta and Ireland.

The paper is organised as follow. After the introduction combined with the literature review, Chapter 2 outlines research hypotheses and describes the sample selection. Chapter 3 deals with the methodology and presents and discusses the results. The final chapter concludes.

2. Research design

Based on the literature review, the paper's goal is concretised into following research hypotheses:

H1: The domicile of parent company (listed at EU capital markets) does not have effect on the financial performance of the Czech subsidiaries.

H2: There are no differences in effective tax rates of the Czech subsidiaries, because of different domicile of parent company (listed at EU capital markets).

The domicile of parent companies is expected to have influence both on the financial performance and effective taxation of Czech subsidiaries, as evidenced by previous studies described in the literature review.

Regarding the sample composition, several sources are utilised. The information on the Czech subsidiaries of EU listed companies is obtained from Amadeus Bureau Van Dijk database. There are several imperfections using the Amadeus for this purpose. Firstly, data on financial institutions are not included; secondly the database regards as listed only the issuers of shares, but not for the bond issuers despite these have to also comply with the Regulation (EC); thirdly, regulated market of the RM-System is not screened for the inclusion of listed companies; fourthly, there are a quite a lot mistakes in the identification of companies. Using manual checks against the Business Register and manual searches in the PSE and the RM-System, the number of Czech companies under control of the EU listed companies is determined to be 1,347. The Albertina database is used to generate an extract from the financial statements of identified Czech subsidiaries. The sample selection is presented in Table 1.

Table 1: Czech subsidiaries under control of the EU listed companies

Type on entity	Count
EU listed companies (non-financial, equities traded)	7,851
Czech subsidiaries of EU listed companies according to Amadeus	1,629
Czech subsidiaries of EU listed companies after manual correction	1,347

The analysis is processed for the period 2009-2014. The database contains 5,707 firm-year observations. Following eliminations were made to get meaningful interpretation of effective tax rates and return on equity/assets: 142 observations with positive corporate income tax expense; 455 observations with negative equity; 1 observation with negative assets. Furthermore, 57 observations without information on sales and 19 observations without earnings after taxation were dropped. The ultimate sample comprises of 5,033 firm-year observations.

If compared to macroeconomic totals, the Czech subsidiaries under control of EU listed companies have command over around 12% of assets employed by the firms operating in non-financial sector. Furthermore, they produce more than one quarter of aggregate output of Czech non-financial sector. Their macroeconomic importance is also confirmed by tax figures, as their share on corporate income tax collection is almost 20%. Such amount of taxes is generated by 1,347 companies only, which is less than 0.3% of all active Czech business enterprises. Aggregate figures highlight an economic significance of sample subsidiaries in case of taxation, but just descriptive statistics reveal huge discrepancies across companies. In total, there are 1,424 observations with zero income tax expense meaning that over 28% firms did not pay any taxes in given

year.[1] Negative earnings before interest and taxation (EBIT) are evidenced in 824 cases; negative earnings before taxation (EBT) occur in 965 observations; negative earnings after taxation (EAT) are present in 988 instances.

The assessment of financial performance is performed by applying two standard metrics of financial analysis: Return on Assets (ROA) and Return on Equity (ROE).

$$\text{ROE}_i = \text{EAT}_i/\text{Assets}_i \tag{1}$$

$$\text{ROA}_i = \text{EBIT}_i/\text{Equity}_i \tag{2}$$

The ROA of i-company is calculated as the share of Earnings after Taxation (EAT) on the company's assets. ROA is determined as the ratio between Earnings before Interest and Taxation (EBIT) and the firm's Equity. Similarly, the effective tax rate for i-company is computed as the ratio of Current Income Tax expense (CIT) divided by Earnings before Taxation (EBT)

$$\text{ETR}_i = \text{CIT}_i/\text{EBT}_i \tag{3}$$

3. Results

As already stated, to get meaningful results on ETR, all observations with either negative EBT and/or negative CIT are excluded. Similar eliminations are made in case of calculation of ROA and ROE. Finally, extremely high values of the resulting indicators (over 100% in absolute terms) were adjusted to avoid distortion, when summarising and interpreting the outcomes. In particular, if ROA, ROE or ETR is higher than 100%, then 100% is taken as the ceiling. Accordingly, if any of the three measures is below (100%), then (100%) is used as the bottom figure. The aggregate results per year are sketched in Table 2.

Table 2: Distribution of ROA, ROE, ETR

ROA (%)	2009	2010	2011	2012	2013	2014	Total
Median	6.78	7.22	7.10	7.25	6.90	7.89	7.15
Mean	9.45	9.51	9.54	8.94	8.60	11.20	9.43
SD	17.71	17.35	16.39	16.70	17.37	14.39	16.66

ROE (%)	2009	2010	2011	2012	2013	2014	Total
Median	11.37	12.62	11.83	12.90	12.11	14.50	12.20
Mean	11.24	14.34	12.50	13.33	12.91	17.47	13.42
SD	37.99	34.95	35.79	34.11	35.14	30.32	34.93

ETR (%)	2009	2010	2011	2012	2013	2014	Total
Median	16.26	16.11	17.73	16.41	16.80	17.48	16.77
Mean	12.46	13.53	13.53	14.40	14.32	14.82	13.77
SD	21.11	20.45	22.31	19.16	20.33	19.54	20.54

A median for ROA is pretty stable, oscillating around 7%; the average fluctuates from 8.6% to 11.2%. Similarly, the median of ROE is 12.2% and the average amounts for 13.4%. Contrary to previous research (Procházka 2016b), ROE is significantly higher than ROA, resulting thus in preliminary conclusion that profits of Czech subsidiaries might be

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[1]If unadjusted data are taken into account, then the share of non-payers reaches 35%.

taxed predominantly in the Czech Republic. However, the variability in ROE is double compared to the variability in ROA (see values of the respective standard deviations). The preference to tax the local profits (and potentially foreign profits as well) in the Czech Republic does not have to be an exclusive pattern for all MNE groups with subsidiaries in the Czech Republic. In this regard, the analysis unveils relatively stable development of ETR, both for mean and median, ranging from 12.5-14.8% in case of the mean and 16.3-17.7% in case of the median. Both average and median are significantly below the statutory legal tax rate, which is 19% (except for 2009, when the rate was 20%). Furthermore, the average ETR for the Czech subsidiaries under control of the EU listed companies is well below the effective tax rate of 26.5% computed for the total Czech economy (Svitlík 2015). The ETR figures indicate an opposite conclusion than the mutual relation of ROA and ROE, i.e. the parent companies manage earnings within the group to avoid taxation in the Czech Republic.

As the evidence from aggregate data is mixed, the analysis is to be refined. Individual data are investigated for the existence of any heterogeneity in terms of the domicile of the parent. The domicile of the parent is used as a sorting variable for three reasons described in the introduction. Firstly, the quality of enforcement regimes differ across countries, which may strengthen/impair the parent's incentives to boost performance of the group (Berger 2010). Secondly, taxation varies across countries as well; the parent's location is used as a proxy to control for this potentially different incentive to shift profits (Heckemeyer and Overesch 2013). Thirdly, capital markets are distinct in their size and economic importance across the EU countries (Procházka and Pelák 2015), which may increase/decrease motivation of the listed companies to manage earnings, e.g. through profit shifting within the group. For each year observation, ROA, ROE, and ETR are calculated according to Formulas (1) – (3); the results are rounded to one decimal place. Country averages are computed as simple averages for all corresponding values.[2]

The best ROA scores are reached by Czech subsidiaries having Spanish parents (6-year average of 12.7%), followed by firms under control of German and Swedish parents (average ROA of 11.9%). On the other hand, the worst performance is reported, if Czech subsidiaries have their listed parents at Malta, with negative ROA (2.7%), Portugal (0.4%), and Hungary 1.5%. Average scores of ROE display more variability than ROA figures on both sides of the spectrum. In particular, four subgroups report negative ROE, with the worst position of Maltese parents – negative 6-year ROE average of (35.7%), followed by Czech subsidiaries of Slovakian parents (9.7%) and Greek parents (9.1%). In contrast, superior performance is once again presented by companies with the parents located in Spain – positive ROE 21.3%, France 17.9%, and Sweden 17.7%. The minimum average ETR is achieved by Czech companies under control of listed companies at Malta – 6-year average ETR of 0.0%; with Portugal 2.5% second and Greece 4.1%. On the other hand, most taxed Czech companies belong to MNE groups with headquarters in Croatia 22.9%, Spain 19.6%, and Slovenia 18.7%.

One limitations of above analysis shall be mentioned: seven subgroups comprise less than 30 year-firm observations (namely Cyprus, Greece, Croatia, Malta, Hungary, Portugal, and Slovenia). The number of Czech entities under control of listed companies from those countries is relatively small. The individual observations – despite grouped together – can still be extreme outliners. If only groups with more than 50 observations are taken into account, the best performing Czech companies are subordinated to the parents in Spain, Germany, Sweden, and France. The worst performing subgroups are

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[2]Due to restrictions on the paper's length, the country averages are not presented in tabular form.

under control of the parents in Denmark, Luxembourg, Slovakia, or Austria. A factorial ANOVA test is run to verify, whether the differences across subgroups are statistically significant. The ANOVA analysis employs data only for subgroups with more than 50 year-firm observations (i.e. without seven country domiciles dropped, as described above). The restricted sample consists of 4,917 observations for 16 country-domiciles and 14 industries.

Table 3: Factorial ANOVA tests

ROA (%)	Df	Sum sq	Mean sq	F-statistic	P-value
Parent	15	32,336	2,155	8.607	0.000*
Industry	13	22,741	1,749	6.985	0.000*
Parent: Industry	111	119,125	1,073	4.285	0.000*
Residuals	4,777	1,196,432	250		

ROE (%)	Df	Sum sq	Mean sq	F-statistic	P-value
Parent	15	143,447	9,563	8.699	0.000*
Industry	13	59,860	4,604	4.188	0.000*
Parent: Industry	111	530,308	4,777	4.346	0.000*
Residuals	4,777	5,251,847	1,099		

ETR (%)	Df	Sum sq	Mean sq	F-statistic	P-value
Parent	15	33,104	2,206	5.380	0.000*
Industry	13	11,017	847	2.066	0.013**
Parent: Industry	111	89,511	806	1.966	0.000*
Residuals	4,777	1,959,729	410		

Source: own analysis using R; * 1% significance, ** 5% significance, ***10% significance

The results of factorial ANOVA test indicate that the domicile of the parent has a significant impact (at 1% significance level) on all three indicators. Similarly, industry variable is significant at 1% significance level (except for ROE, for which the association is significant "only" on 5% level). Finally, the interaction term between parents' domiciles and industry affiliation of the subsidiaries does matter as well. The analysis of variance therefore reveals heterogeneity in performance both across industries and parents' jurisdiction. Based on these results, both H1 and H2 can be rejected and the parent domicile does really influence financial performance of Czech subsidiaries as well as their effective tax rates.

4. Conclusions

The paper evaluates the financial performance of Czech entities under control of the EU listed companies and its association with effective tax rates. Using individual corporate data, the empirical evidence indicates a wide dispersion both in performance and taxation. The domicile of the parent has an impact on the subsidiary's effective tax rate. The effective taxation of Czech subsidiaries under control of foreign listed parents is significantly lower than for other Czech companies. Despite exhibiting certain tax avoidance, data reveal high variability in relative tax rates, suggesting that many foreign parents

from the bigger EU economies prefer to tax profits in the Czech Republic rather than to shift them elsewhere. On the other hand, empirical evidence shows that parents from the southern EU countries (especially Cyprus, Malta, Greece, and Portugal) search the way how to avoid taxation.

The paper's findings have two major practical implications. Firstly, the tax authorities shall draw intensive attention to those Czech companies having the parent in tax havens (such as Cyprus or Malta) or in countries with generally low tax morale and imperfect legal enforcement (such as Greece, Portugal). It seems that local tax practices of the parents are imported and utilised by their Czech subsidiaries as well. Secondly, policy makers shall continue in building a favourable tax infrastructure, as there are inflows of additional profit from abroad in those MNE groups, which are managed by parents located in richer (developed) countries. However, future research shall address, what are the main determinants of corporate taxation of Czech subsidiaries under foreign control and what factors are considered by the parents, when deciding whether to tax their profits in or out of the Czech Republic. Further research is also needed to detangle, whether transfer of practices from the parent to subsidiary is the main factor of better financial performance of affected subsidiaries and whether the better performance is accompanied with higher relative taxation. Or whether favourable Czech tax regime promotes the profit shifting to Czech subsidiaries and increased performance reported in financial statements is just an inevitable consequence, but without real grounds.

Acknowledgements

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20th International Scientific Conference
"Enterprise and Competitive Environment", March 9–10, 2017,
Brno, Czech Republic

Collaborative Real-Time Mobile Mapping

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Abstract

There are numerous situations when it is utmost important to share efficiently some spatial data among a group of people. Floods can be taken as an obvious example. Many stakeholders including mayor or rescue service workers must have actual information about the conditions in the terrain. And most importantly, all of these can contribute to the information. Among these situations involving the crisis management, we dare to mention especially the inventory process. Traffic signs, road lanes, trees, lights and many other different object must be regularly maintained. Most of the organizations use some kind of geographical information system to keep the information about the maintained property. Our article is focused on development of mobile application that allows to acquire spatial data that are later used in these information systems. Thanks to real-time data synchronization between multiple devices, field workers can cooperate and share data immediately to an operating center or with the other workers. We describe the design of our mobile mapping application, comparison with other existing solutions and problems of real-time synchronization between different devices. Finally, we provide details about application usage in different municipalities.

Keywords: mobile application, inventory, synchronization, mobile mapping, GIS, crisis management

JEL Codes: C88, M10

1. Introduction to Mobile Mapping

Every administrator must be aware of the actual state of maintained property. For instance, the governments and local administration must analyze the land use plans, crime rate and many other factors that have an influence on the life in the municipality. We can find numerous examples even from distant past (Wright, 1937; Barnes, 1929), but even in recent history, we can find many interesting analyses based on spatial data. Very similar tasks are carried out by executive officers of many companies, especially these that are connected with agriculture or forestry. We must keep records of tree growth, production of the fields, etc.

Certainly, many of these tasks are nowadays substantially simplified thanks to satellite navigation, remote sensing, GIS and many other information and communication technologies. Nonetheless, there is another important aspect. These tasks involve a broad group of stakeholders. Citizens want to participate in the urban management, decisions connected to land use planning involve many departments, many different forces must be coordinated during rescue operations, etc. (Ghosh, 2016) This places emphasis on fast and effective obtaining and especially sharing of spatial data that provide the basis for further decisions.

Spatial data can be obtained mainly through direct measurement (e.g. usage of a mobile device equipped with GPS in the terrain), from some specific sensor networks (meteorological stations), or indirectly from other spatial data (e.g. vectorization of satellite images, point clouds generated by LiDAR). (Puente, 2013) The last mentioned approach, derivation of information from existing spatial data, is of particular importance in the case of large area processing. The examples include preparation of vector map layer of the road network for navigation, already mentioned forest inventory (Mikita et al, 2016), evaluation of deforestation (Ramachandran, 2017), etc.

Nonetheless, we focus on direct data measurement in this article. Therefore, the situation when an operator with appropriate equipment must perform field measurement. This approach is necessary especially when detail data are required (e.g. precise vendor and the state of the public lights). We provide a brief review of existing solutions for mobile mapping and summarize their advantages and flaws. Further, we explain the design of our mobile mapping application and its implementation. Finally, we describe several examples of its usage for inventory of public property.

2. Review of Existing Solutions

There are a few existing solutions for mobile mapping on the market. We can find them on *Google Play* on *Android* or in *Apple store* on *iOS* platform. Frequently used are *Esri* tools that support their *ArcGIS* solution for GIS professionals (*Collector for ArcGIS*, *Explorer for ArcGIS*, *Survey123 for ArcGIS*, *Snap2Data*). There are however many good rated applications even from other companies in the application stores. We selected several applications that are close to our own application: *MapIt, Map Plus, Mappt, Map Plus, NextGIS* Mobile, *Wolf-GIS* or *LocusGIS* (Google Play, 2015; iTunes, 2015). Following comparison is based on documentation to the applications as well as on our own testing. During the testing, we focused mainly on the usability for field measurement and synchronization of the measured data into some service.

The *Explorer* for *ArcGIS* is aimed at viewing existing maps. The *Collector for ArcGIS* is focused, as is evident from its name, on data collection for maps. One of the key flaws is

that data structure editing is not supported in device. The *Survey123* application can be used for gathering information through forms. All mentioned applications are using *ArcGIS* online services for synchronization. Nonetheless, the synchronization is not bi-directional.

The *Map Plus* application supports data measurement, import, export, however, there is no synchronization. Similarly, the *NextGIS Mobile* does not support the synchronization too. In *Wolf-GIS*, one can create only polygons. This application is focused primarily on allotments mapping.

The *MapIt* application is most similar to our application. It allows creating map layers with objects described by different attributes directly in the mobile device. The spatial objects have colors and descriptions assigned but cannot have some specific custom symbols. The application user friendliness is generally on a high level. It supports offline maps and allows to export or import the data too. However, full synchronization is not supported.

Another very interesting application is *LocusGIS*. Although the project is still in a beta version (Jan 16), it supports map projects, layers and contains a lot of customization options, e.g. selection which attribute will be visible on the map. It has its own *Locus Store* with additions, materials, and functions, including synchronization functions. An external GPS module can be connected via Bluetooth. Many formats of spatial data are supported including KML, SHP, GPX and hundreds of different coordinate systems. The user interface is very friendly and intuitive. Once the application will be finished we will see how it will work and how the synchronization will be implemented.
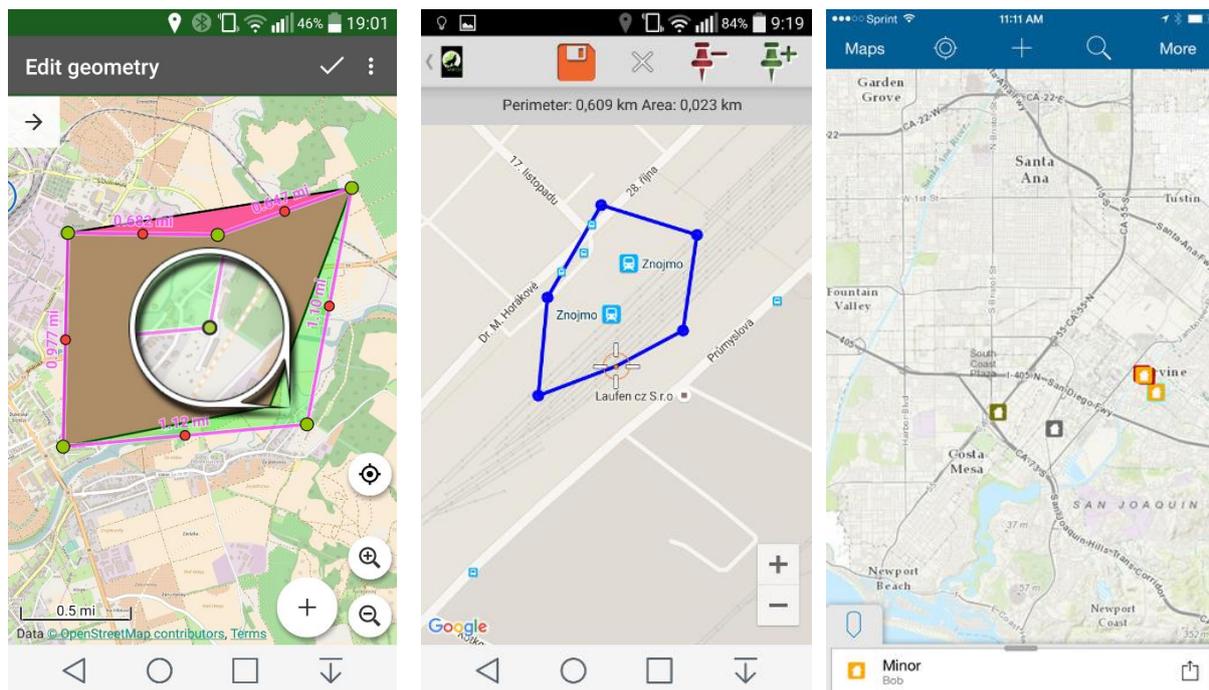
Figure 1: Left image presents the *LocusGIS* beta with intuitive user interface and many functions. The middle image shows the *Wolf-GIS* that is aimed at allotment mapping. The right image is from the *Collector for ArcGIS* that is focused on collecting data for maps.

All described applications communicate with some server; nonetheless, they are mainly oriented on viewing existing maps or collection of required data into prepared maps and forms. Possibilities of creating new maps or map layers in a mobile device are limited. The data synchronization is limited too – none of the described applications has real-time bi-

directional synchronization between multiple mobile devices. Our application, therefore, aims to overcome mentioned drawbacks. It supports management of map projects, map layers and spatial objects (points, lines, and polygons). All of these can be created or edited right on the mobile device. Most importantly, our application supports real-time bidirectional synchronization between multiple mobile devices and a server.

3. Methodology

Development of the mapping application has two fundamental aspects: design of the mobile application with the focus on high user experience and implementation of the service for synchronization of measured data.

3.1.   User Interface

All data in the application are divided into different map projects. Therefore, the user usually creates a new map project each time he/she wants to start a new field measurement. Each project is composed of map layers. A map layer is an overlay of a specified type (point, line or polygon). The layer has defined color, symbol, transparency level and required attributes. The layer consists of objects. Each object holds its attribute values and, if it is desired, a camera image. These map objects can be placed into the map layer manually by picking the appropriate location on the background map, or the users can put the new object on the position given by GPS. Created object, layers and maps can be later edited according to the user needs. This structure has been chosen because it is entirely compatible with the major geographical information system such as *Esri ArcGIS* and *QGIS*. Naturally, data exported into KML can be viewed even with common tools like *Google Earth*. The application interface was designed according to the design patterns for *Android* (Google, 2017) and *iOS* platform (Apple, 2017).
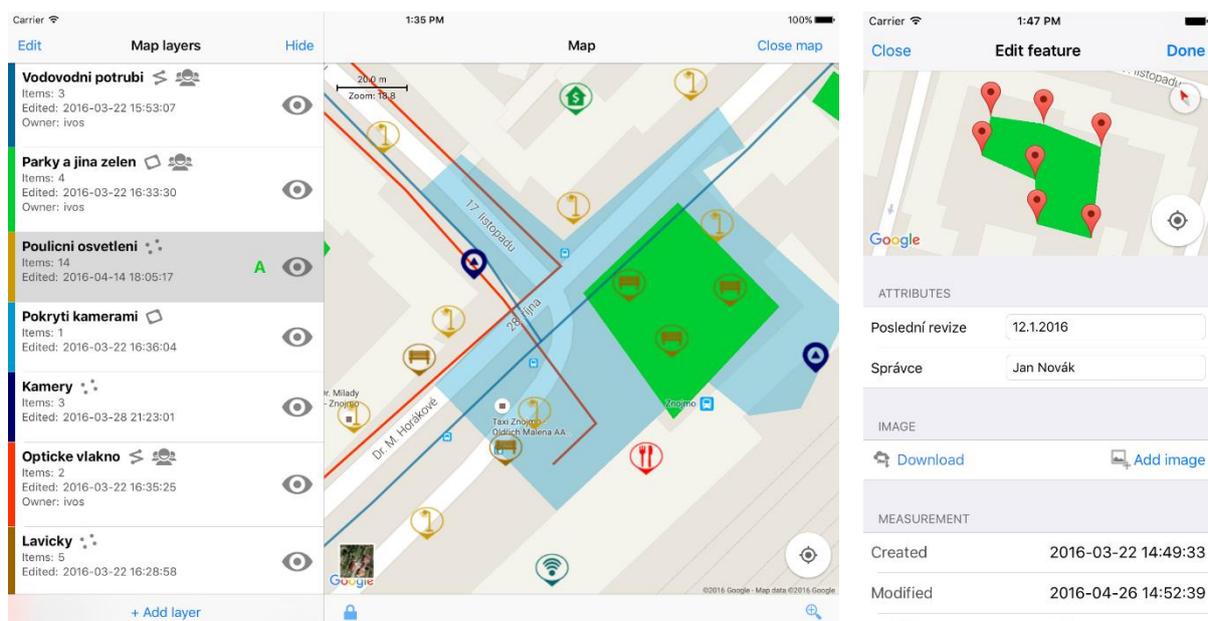
Figure 2: The left image presents an overview of a city property inventory. Each object on the map can have attributes like a date of the last revision or a name of the object's administrator. The right image shows the adjustment of a polygon shape. One can see also the adaptive behavior of user interface – the left image is from a larger screen on iPad, the right one is from a smaller screen on iPhone.

3.2. Synchronization

We use own server service for data synchronization. This feature allows keeping the data on all devices up to date even in case the users are working on the same map project or even with the same map layer. We designed two types of synchronization: full and differential one. The full synchronization is used during the first login of the user or if the user was not logged in for an extended period. The complete synchronization downloads all user data at once. On the other hand, the differential synchronization runs periodically. Its purpose is to download only changes in spatial data to spare the data traffic. The differential synchronization is run periodically in the defined interval (default is 30 seconds). All changes that are made on the device are usually uploaded immediately. Just in case of disconnection from the network, the changes are queued on the device and uploaded after reconnection.

When two or more users change or delete the same object, a conflict occurs. In our application, the rule of the first is used. Hence, the first change that arrives on the server is performed, the other is discarded and the user is informed.

Nonetheless, synchronization is not an obligatory function. Users can work in the socalled *offline mode* that provides the same functionality, just without the synchronization mechanism. Without synchronization data are stored solely in the device and can be exported to GeoJSON or KML format.

4. Results

Our target platforms are both *iOS* and *Android* operating systems. For *iOS* development, integrated development environment *Xcode* is used. The whole application is written in *Swift 3* language which is modern, safe and progressively developing language massively supported by *Apple*. For *Android* development, *Android Studio* and *Java* language are used. Both applications are therefore built as native applications based mainly on standard tools and libraries from *Apple* and *Google*. The server-side solution is based on *Python* language. The data are stored in the *PostgreSQL* database with *PostGIS* extension.

4.1. Testing in Real Use

We tested our application for over than year with the ENVIPARTNER company. The company is focused especially on local flood management plan preparation and related public property inventory. As mentioned, municipalities maintain plenty of properties. We can name trees in parks, public lights, town flats, parking places, etc. It is utmost important to have precise data about all these properties. Accurate and actual data can substantially simplify planning, maintenance, damage reporting, etc. Following two example describes deployment of our application for such property inventory.

4.2. Public Lights Inventory

The application was used for inventory of public lighting in the city of Odry. The existing solution was based on CAD drawings in DWG format. The users exported these drawings that described placement of individual lights into *ESRI Shapefile*. Using *QGIS* application, the exported data was connected with required attributes (initially stored in XLS format). Such map layers were then imported into our application. After that, our application was

used to update stored data in the field. The precision of GPS positioning varies a lot with different devices. To obtaining more accurate light positions, the mobile device with our application connected to *GNSS Spectra Precision Pro Mark 700* receiver (Spectra Precision, 2017). This solution allowed to achieve a precision of 70 cm without using any RTK (real-time kinetics) service. Better precision can be achieved using a RTK service, or by taking more measurements and subsequently averaging the point location on the map.

Therefore, the actual position of the individual light poles and switchboards was verified in the field. Further, attributes of each element were updated (used light source, power consumption, overall status, etc.) and photographs were added to each light. The application was mainly working in offline mode because of a vast number of elements in individual layers and mobile internet connection instability in some locations.

The updated information about public lights was exported in the KML format and then processed again in *QGIS* application. There took place the attribute control and data consistency verification. After this post-processing, the collected data were transferred into a *PostGIS* database for further usage.
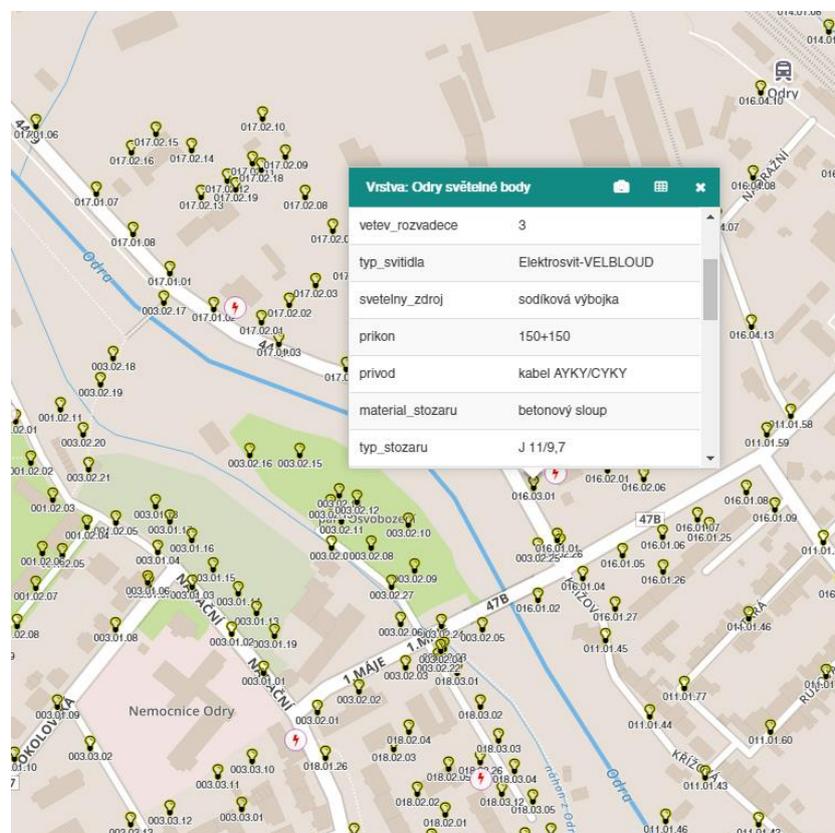
Figure 3: The image presents the final result of public lights inventory in the city of Odry. (Source: ENVI-PARTNER company)

4.3. Road Signs Inventory

Our second case study is the inventory of local roads and traffic signs in the village of Záryby. The village had no previous records of this kind, so the application was used to produce the records completely from the beginning. The data collection in the field consisted of mapping all traffic signs in the village. For each sign was registered its kind and further attributes. The records were supplemented with photographs. Measurements of local roads supplemented these traffic sign records. Similarly, to the previous case, states of the

road and photos were recorded. For the inventory a portable device was used. The device provided sufficient precision of measurements with integrated GPS module.

Collected data were later processed with *QGIS* application, which helped to verify and correct some inaccuracies. In the case of traffic signs, a mapping project has been created that includes symbology with road signs corresponding to reality. Local roads parameters were determined according to the act of public communications. The output of *QGIS* was a set of maps with roads and road markings in the scales of 1:1500 to 1:5500.
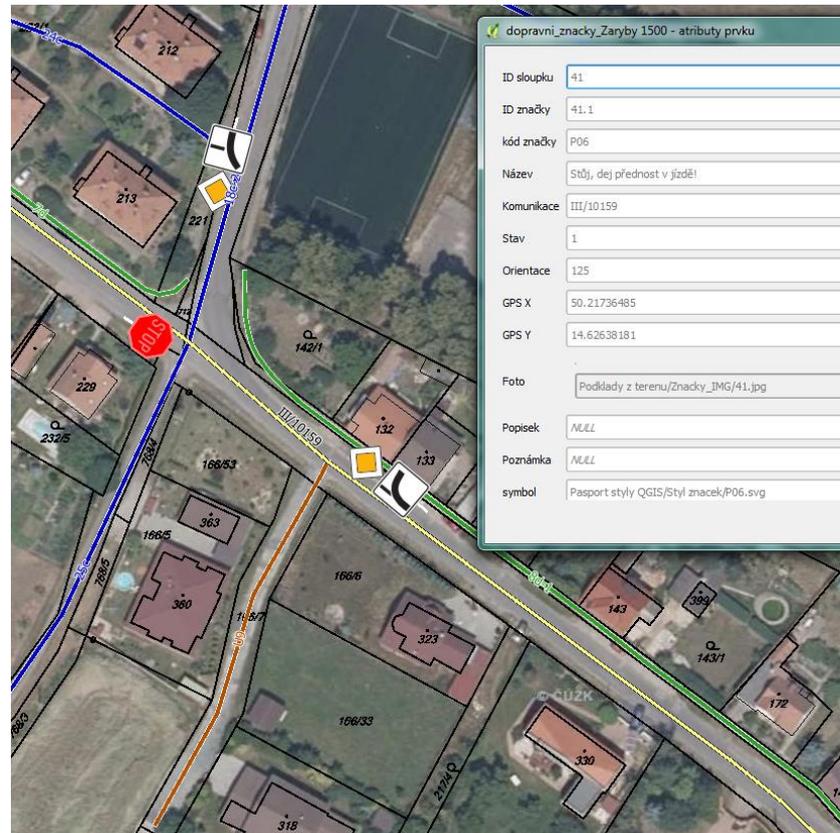
Figure 4: The image represents an example of road and traffic sign inventory in village of Záryby. (Source: ENVIPARTNER company)

5. Discussion and Conclusions

We detected several drawbacks during the testing period. Following text describes the key issues. First of all, manual adjustment of the object's geometry is quite uncomfortable on small screens. Although we made several improvements, it is still incomparable with precise work on a desktop computer. Next problem is related to cooperation of multiple users on the same project. They need to be informed about basic principles of data synchronization. Otherwise, they could overwrite data measured by other workers during a careless action. Hence, they should negotiate conditions before the start of the measurement. Finally, stable internet connection is required for trouble-free collaboration. Data are not lost in case of connection failure. However, after reconnection, many conflicts can occur. It can lead to confusion of workers and duplicated measurements.

Even though mentioned issues, our application can massively simplify the inventory process. It can save costs by improvement of data precision, shortening the time that is

necessary for collaboration of the stakeholders and the management decisions can be more precise and well-timed. The advantage of our solution is that all necessary hardware is multifunctional (common cell phones or tablets) and can be used for other purposes, or one can use devices that are already bought in the company. That reduces primary costs significantly.

Acknowledgements

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Solar potential evaluation from point cloud data

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Abstract

Solar business becomes one of the growing segments with an impressive growth potential. The solar technology requires substantial initial investment; however, many grants and tax incentives reduce the payback period to reasonable limits even for small companies or individuals. The decision-making process focused on deployment of solar technology involves many aspects, especially the size of a potential solar field, weather conditions and total energy received by an arbitrary area. Although the general principle of efficiency evaluation is well-known, it can be a time-consuming task. Therefore, we aim at a development of an application that helps current customers to evaluate the potential of his/her house rooftops. The application is also suitable for the entrepreneurs thinking about the usage of their roofs for the solar business. The algorithm used in proposed application consists of three key parts: (1) roof detection process from point cloud, (2) roof azimuth and tilt determination, (3) computation of the solar capacity.

Keywords: solar energy, decision making process, roof detection, RANSAC algorithm

JEL Code: Q420

1. Introduction

The company Google presented project Sunroof in recent years. It covers roughly 43M buildings in portions of 42 states and Washington DC. The main idea is the composition of Google Maps data with solar potential computation. In our work, we utilize the same idea without the limitation of the Google Maps data demand. Our proposed algorithm works with arbitrary point cloud in standard format (PLY, PCD, LAS, FLS and STL for triangulated surfaces).

1.1. Literature overview

The point cloud processing is well covered in the literature. Our work follows up the field of rooftops detection that is closely connected to the segmentation and reconstruction of urban 3D buildings. The authors of Chen (2014) offer an exhaustive overview. The modelling building rooftops are categorized into two main categories: model-driven and data-driven methods. The model-driven methods belong to the robust approaches; it uses predefined primitive templates and information as detected geometries from the data to map them against the most likely templates Tarsha-Kurdi (2007). Also, Zheng (2015) uses the model-driven method to roof detection that is based on the decomposition into nonintersecting and mostly quadrangular blocks. These blocks are used for the identification of the most probable prototypical roofs (seven classes). Nevertheless, one disadvantage occurs: the libraries do not contain a sufficient number of possible models.

The data-driven methods belong to developing research area in a recent year. The effort to automatically process the 3D data is improved extensively. We can name many novel methods in literature; region-growing algorithm was firstly published in Zhou (2008). Authors of Dorninger (2008) extended this method with mean shift algorithms to simultaneously accomplish the building detection and roof plane segmentation. We have to mention invariant moment technique in Maas (1999) and unsupervised clustering algorithm connected with a fast energy minimization process Poullis (2013). We follow data driven in our approach because of its simplest implementation and better computational complexity.

2. Solar potential computation – methodology and data

2.1. Rooftops detection

The first step in a roof detection process is a plane detection. In practice, we can choose some of the commonly used methods: region growing, Hough transformation and RANSAC. The Hough transformation can detect multiple instances of a model in a single pass, and it is robust to noise. However, the complexity of search time increases exponentially with the number of parameters. Our implementation is based on the RANSAC algorithm because of its implementation and computation simplicity. Google Project Sunroof (2017) also uses RANSAC algorithm, but moreover, they refine the data with Deep Learning Neural net in pre-processing step. In our case, we work with relatively small areas and the user control of the data eliminates the misleading objects (e.g. parts of bridges, large planar areas) so we omit other extension.

2.2. RANSAC algorithm

The main idea of RANSAC is the estimation of model parameters by random sampling of observed data. The input set of points consists of both inliers and outliers. The algorithm is clearly described e.g. in Tarasha-Kurdi (2008). We select three points randomly, and we calculate the parameters of the corresponding plane. Then we detect all points of the input cloud belonging to the calculated plane, according to a given threshold. Afterward, we repeat these procedures N times; in each one, we compare the obtained result with the last saved one. If the new result is better, we replace the saved result by the new one.

2.2.1. Convex hull algorithm

The solar potential computation necessarily requires the area of the roof. The result of the RANSAC algorithm is a set of points assigned to the particular roof planes. The solar potential computation necessarily requires the area of the roof so that the following step consists of the area computation. Nevertheless, the computational accuracy is not crucial, because we only need an approximate estimation. Therefore, we apply Andrew's monotone chain convex hull algorithm described e.g. in Andrews (1979). The complexity of algorithm is $O(n \log n)$. The algorithm consists of two steps. Firstly, we lexicographically order the points (first, by x-coordinate and in the case of a tie, by y-coordinate) and subsequently, we apply the 3D cross product to three subsequent points P_i, P_{i+1}, P_{i+2}. According to a sign of the third member in cross product, we evaluate the clockwise or counterclockwise orientation of the vectors $\overrightarrow{P_i P_{i+1}}$ and $\overrightarrow{P_i P_{i+2}}$. In the case of positive sign, the orientation is clockwise and we change the point P_{i+1} by point P_{i+2} and the testing continues with the triplet P_i, P_{i+2}, P_{i+3}.
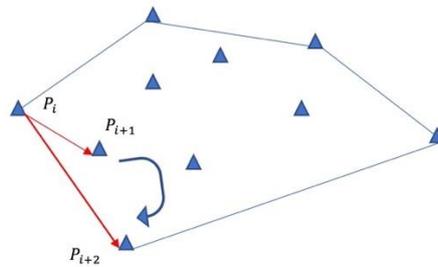
Figure 1: Andrew's monotone chain convex hull algorithm – positive sign in vector product means the clockwise orientation and point P_{i+1} is replaced by point P_{i+2} (points are blue triangles).

The area of the specified convex polygon is given by Gauss's formula:

$$S = \frac{1}{2} \sum_{i=1}^{n} x_i \, y_{i+1} - x_{i+1} y_i \qquad (1)$$

where (x_i, y_i) are ordered vertices of this polygon and $y_{i+1} = y_1, x_{i+1} = x_1$.

2.3. Azimuth and tilt determination

2.3.1. Normal estimation

Previous steps – RANSAC algorithm and Andrew's monotone chain convex hull algorithm – determines the plane points and its convex hull. The normal vector of these planes is evaluated as the average of the partial normal vectors. Triangular Irregular Network (TIN) can be proceed to detect the triangles in the plane points and subsequently their normal vectors. But this operation is time-consuming. We assume that the noise in data do not cause any significant difference in normal estimation so we chose only four control

corner points C_{ik}, $k = 1,2,3,4$ of the plane and the center S_i for i-th plane. The normal vector for this plane is computed as:

$$n_i = \frac{\sum_{j \in T_i} A_j n_j}{|T_i|} \tag{2}$$

The denominator $|T_i|$ is the number of triangles in i-th plane (triangle $T_i = \Delta S_i T_{ik} T_{i,k+1}, k = 1,2,3$), A_j is the area of j-th triangle in the plane and n_j is the normal vector of this triangle. The area of an arbitrary triangle $T_i = \Delta S_i T_{ik} T_{i,k+1}$ is computed by vector product:

$$Area_i = \frac{\left\| \overrightarrow{S_i T_{ik}} \times \overrightarrow{S_i T_{i,k+1}} \right\|}{2} \tag{3}$$

2.3.2. The influence of location

General recommendation for solar panel placement are given in dependence on the destination. Simplified setup to optimal tilt computation is: if the latitude is below 25 degrees, use the latitude times 0.87. In case the latitude is between 25° and 50°, use the latitude, times 0.76, plus 3.1 degrees. For latitude, higher than 50° there should be special computation depending on the area. For accurate automatic computation of the optimal tilt, Sun radiation, daily time of Sun light and other variables, we use the materials Photovoltaic Education Network (2017) and Djamiykov (2016). Figure 2 (left) shows the approximate values of optimal tilt in dependence of the latitude in Europe.
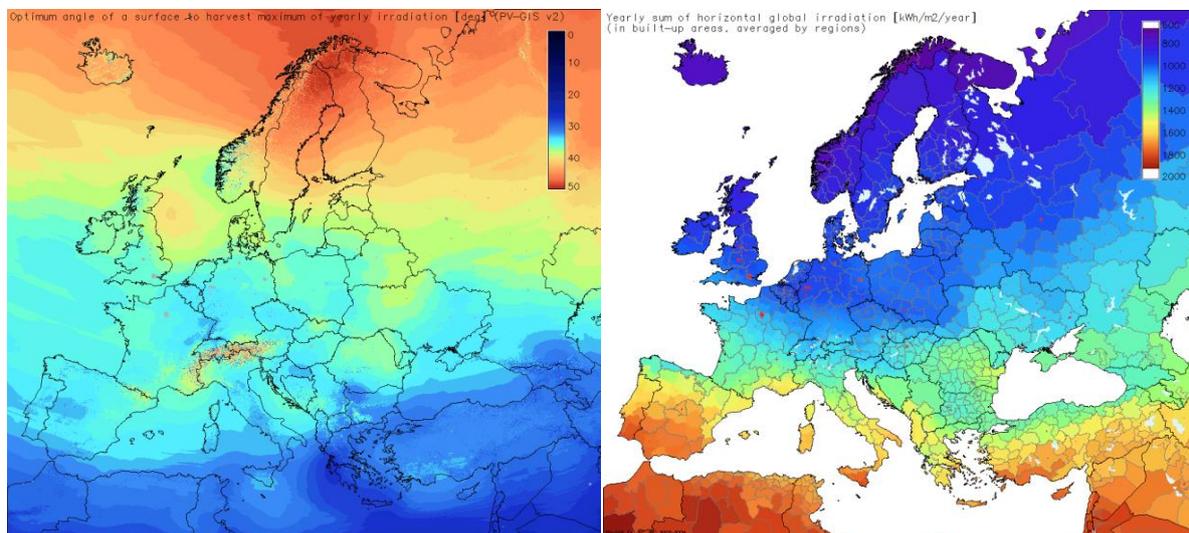

Figure 2: Optimum angle of a surface to harvest maximum of yearly radiation (left), yearly sum of global irradiation (right), source Šúri (2007).

2.4. The solar capacity computation

2.4.1. Solar panels

The increasing production of solar panels also improve the properties: modern materials, better efficiency, longer durability. Typical solar panels have the efficiency between 17-

25 percent; the top products have about 35 percent. This solar panel efficiency means how many percent of incoming Sun energy (in the Czech Republic it is approx. 800-1000kWh/m² per year, see Fig. 2 right) is changed to the electricity. For commonly produced panels (1.65 m²) the direct current output power under standard test conditions (STC) is between 100-365 Wp (Wat peak) in dependence on their efficiency. STC is an industry-wide standard that specifies a cell temperature of 25°C, the irradiance of 1000W/m² and the air mass 1.5 (AM 1.5) spectrum.

We have to take into consideration the negative factors which reduce the efficiency of solar panels: tilt, azimuth, geographical coordinates are the basic one.

Tilt: Optimal slope depends on the geographical coordinates. For example, in the Czech Republic is an optimal value equal to 35 degrees. The influence of the tilt is not essential, the values in interval 20-55 degrees result in the only 5 percent efficiency abatement. The horizontal placement of solar panels makes 10-15 percent reduction.

Azimuth: The optimal azimuth is based on the geographic locations throughout the World. The Sun is in a different place in the sky, so panels need to be directed according to this positioning. In Northern Hemisphere (Europe, North America) the proper direction is south and in Southern Hemisphere the preferred orientation is north. Difference ∓45°from optimal direction causes the efficiency reduction up to 5 percent. The difference ∓90° means the 25 percent decrease. It is also necessary to think about the utilization of the energy from solar panels. New research Rhodes (2014) recommends 8° to west from optimal orientation for Texas (USA) region, because of the higher electricity gain in the afternoon hours. The electricity market prices are typically higher in the mid to late afternoon hours in the USA because there is greater electricity demand in the households.

2.4.2. Solar calculation

The calculating of the value and the effect of solar placement is difficult. Solar radiation at the Earth's surface varies from the solar radiation incident on the Earth's atmosphere. The latitude of a location, cloud cover, air pollution and the time of the year can cause variations in solar radiance. Still, we have to take into account a lot of variables, and nevertheless, the results are only rough. For example, the effect of the wind, nearby trees or buildings is not inconsiderable. Every place is unique, and the real results can partially differ from calculated values. The indicative values denote the suitability of the place for solar panel location. The results give the owner or investor the first image of the potential energy utilization and contribute to the final decision.

In our approach, we use the computation method based on following key criteria:
1. Roof size
2. Panel specification (average value of efficiency is 250 kWp/year)
3. Geographical coordinates – some irradiation maps are available online (NASA data[1], SODA data[2])
4. Tilt
5. Orientation

These main parameters are sufficient for rough estimate of electricity gain and are appropriate for initial decision making process. More sophisticated methods are used in NASA calculators but the user has to understand a lot of technical details.

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[1]https://eosweb.larc.nasa.gov/cgi-bin/sse/sse.cgi?skip@larc.nasa.gov+s01#s01
[2]http://www.soda-pro.com/web-services/meteo-data/monthly-means-solar-irradiance-temperature-relative-humidity

2.5. Data

The testing data were obtained by ATOS CompactScan 2M scanner, made by GOM mbH, Braunschweig, Germany and ATOS Professional scanning software version V.7.5 SR2. For testing purpose, we use three testing buildings. The characteristics are in Table 1. The second model was house from the source on the Internet[3] in. las format. The visualization of this house in Google Maps is in Fig. 3.
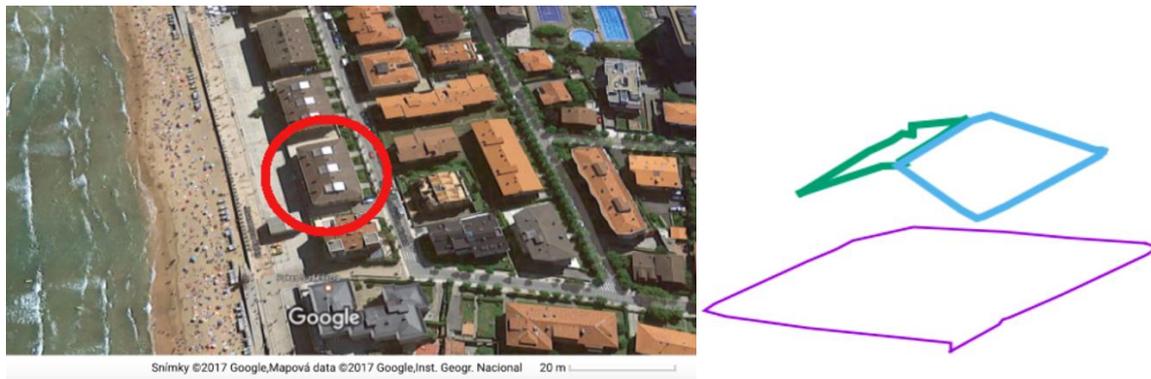
Figure 3: The testing house on Google Maps (left). The detected planes by our application (right)

Table 1: Point cloud characteristics

	Model 1	Model 2	Model 3
Number of points	35,000	1,400,000	20,000,000
Point density (points/m²)	50	200	2,000

3. Results

We developed a testing application implemented in C# language. The main screen of the application (Fig.4) consists of the interactive Earth map to choose the geographical coordinates. The coordinates can be also specified in text fields. For input point cloud describing a group of buildings, the application automatically computes the one-year gain of electricity in dependence on its size, position, the tilt of roofs and geographical coordinates.

Firstly, RANSAC algorithm detects the planes and in dependence on the slope of the plane (see Sec. 2.2.1.) we determine the roof segments. The planar planes of testing house are on Fig. 5. We use the data only of the building so the success rate is 100%. Our application is pointed to minor areas where the scanning is targeted and the noise do not cause any problems so that the algorithm works optimally.

Subsequently, we find the borders of the planes (see Sec. 2.1.2.) and compute the rooftop area. The accuracy of measurement depends on the density and quality of data. Our Model 1 (density 50 point/m²) achieves 2% difference from precise area and for the Model 2 (high density 200 point/m²) we get 1.3% difference in rooftop area in comparison to the real size of the roof.

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[3] http://b5m.gipuzkoa.net/url5000/en/G_22485/PUBLI&consulta=HAZLIDAR
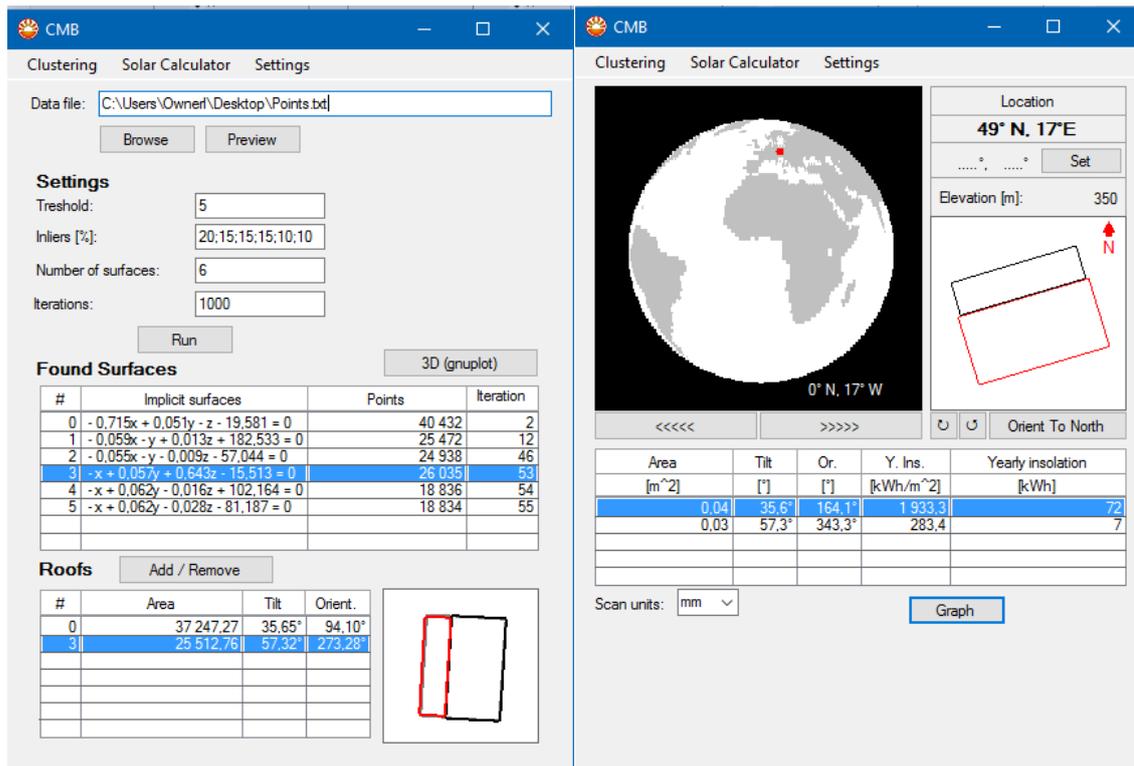
Figure 4: The application window, a model of the Earth is interactive, accurate geographical coordinate can be also set by Location box.
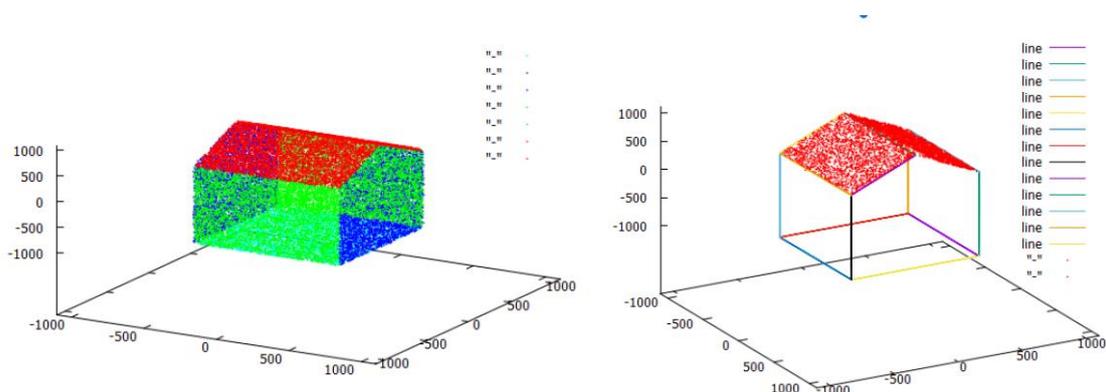
Figure 5: Detected planes on the testing building by RANSAC algorithm (left). Roof segmentation by normal estimation (right).

Finally, the application allows the user to set the geographical location (latitude and longitude) of the place and subsequently, the values of electricity gain are computed. The online available irradiance Word data are not available freely so we include our own computation for Sun irradiance in given location. We used the online portal Photovoltaic Education Network (2017) that covers the theory and computational techniques. The Fig. 6 illustrate the amount of solar insulation depending on the tilt and on the latitude. We computed all year values for roof in Model 1 (given tilt 45° and orientation, location Czech Republic, coordinates 49.8175° N, 15.4730° E) and the total year amount is 600kWh/m²/year in Fig. 7.
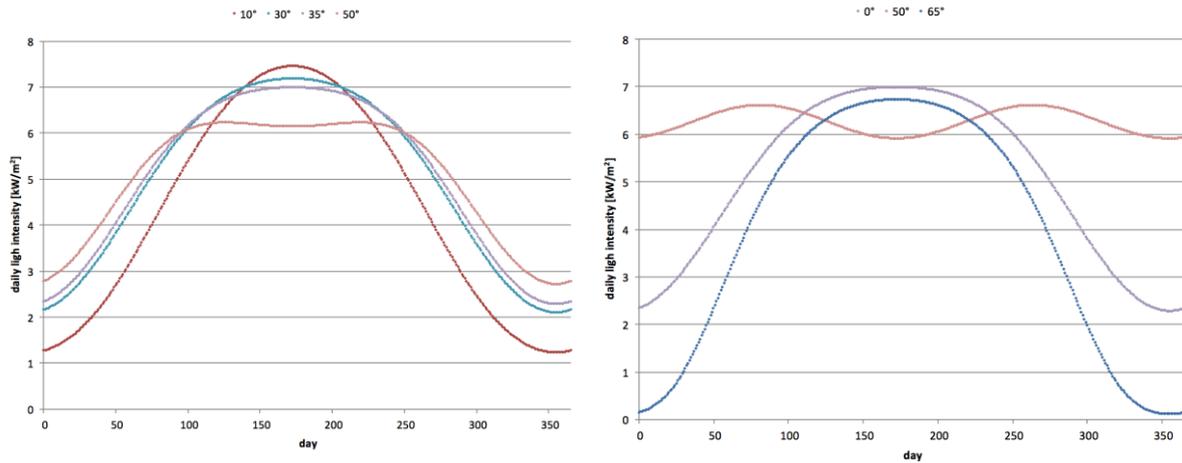
Figure 6: Amount of solar insulation depending on tilt (left), Amount of solar insulation depending on latitude (right)
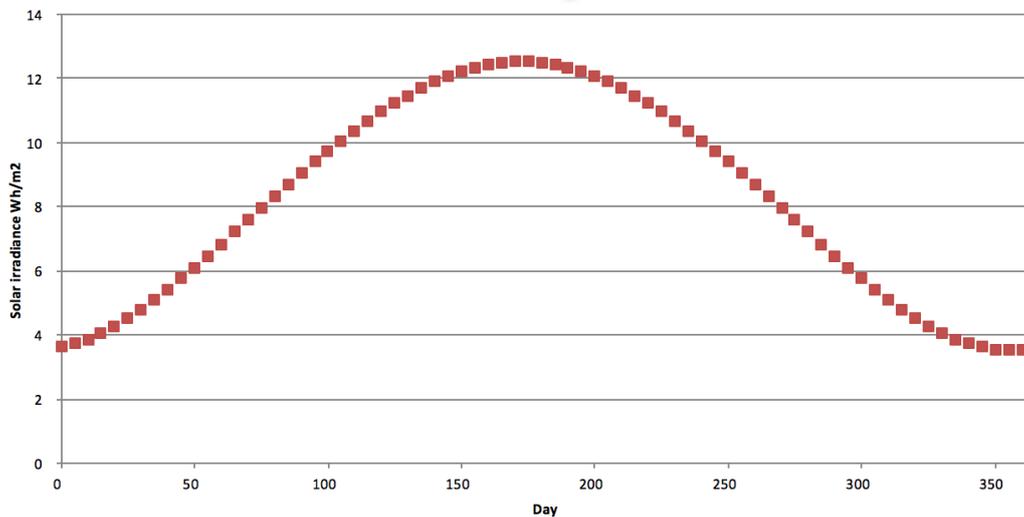
Figure 7: Total day irradiance values for the Czech Republic and testing Model 1.

The computed value means the rough figure of a potential electricity gain in first years. The payback period is affected by the usage years of solar panels. During first 12 years, the solar panel efficiency is guaranteed by a producer to 90%, but in 20 years' period, only 80% of gain is obtained. A calculation decides if the payback period is acceptable and the investment increases the value. We computed the payback period for two panel sizes with efficiency 25% for 100% home consumption (Pseudocode 1). The indicative prize of standard solar panel (1.65m^2) is 370 EUR. The prize of the panel can be changed in dependence on the country where the house is. We consider the 0.83% yearly decrease of the efficiency of the panel.

Table 2: Payback period (Czech Republic)

Panel size (m^2)	Efficiency (25%, kWh)	Panel prize (EUR)	Payback period (year)
1	150	200	8
1.65 (standard)	250	370	9

4. Conclusions

We can find many complex methods for point-cloud processing. Nonetheless, their computational complexity for processing of large data sets is usually substantial. On the other hand, there are many different solar calculators available on the Internet. They are able to calculate the potential solar gain. Mentioned project Google Sunroof covers only the parts of USA, calculator NASA contains only the computation of solar potential. Moreover, it is to complex and do not compute the payback period.

Our work tried to merge these two areas into a simple application that is able quickly compute the solar potential for given area. The calculation takes into account the geographical location of the roof as well as its slope and azimuth. On the basis of this information, it gives outlook of the solar potential. Our application is user-friendly and contains arbitrary location choice and automatically computes all important parameters. It also computes payback period in dependence on the use of electricity usage. It can be used by individuals as well as by companies that wants to extent their activity into the solar business.

Acknowledgements

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Prospects of Green entrepreneurship as a driver for sustainable and inclusive economic growth in rural Ghana

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Abstract

This paper examined the potential for Green entrepreneurship to create jobs and sustainability in rural Ghana. The country is noted by most international organizations, corporations, and investors to have the potential for economic growth and job creation. However, Ghana faces severe youth unemployment problem and it is estimated that about 300,000 such Ghanaians enters the labor market each year but a mere 2% find jobs with significant numbers of university graduates going to the informal sector and private sector. Green entrepreneurship therefore can be a powerful tool for tackling unemployment and capitalizing on positive economic trends in Ghana.

This paper through document content analysis methodology carefully analyzes the characteristics of green entrepreneurship that distinguishes it from regular entrepreneurship and factors that might hinder or stimulate green entrepreneurship in a transition economy like Ghana. This study was undertaken to better understand how to promote green entrepreneurship in Ghana, where there is limited policy and institutional support. The paper proposes a relationship model between green entrepreneurial characteristics, institutional environment and entrepreneurial innovativeness.

Keywords: Green Entrepreneurship, Rural development, Economic development, Ghana, Sustainability

JEL Code: L26, O15, P15

1. Introduction

The interest in entrepreneurship and new forms of entrepreneurship both by governments and researchers over the years has been increasing. This is because entrepreneurs

and their activities are seen to greatly contribute to economic growth, technological innovations, productivity increases coupled with revitalized social and productive networks.

According to OECD (2011) entrepreneurship has been shown to help revitalize regional identity, make the innovation process more dynamic, and create new job opportunities. However, there is great diversity in the definitions of what constitutes as entrepreneurship within the available literature and there is no general agreement on what is and what is not considered entrepreneurship (Carter and Jones-Evans, 2000). But the study of entrepreneurship in the contemporary sense started when Schumpeter defined entrepreneurs as "innovators, who use a process of shattering the status quo of the existing products and services to set up new products, new services" (Asunakutlu, 2014; Sharma et al., 2013; İyigün, 2015). Again Bolton and Thompson (2004) defined an entrepreneur as "a person who habitually creates and innovates to build something of recognized value around perceived opportunities" and they clarified, 'person' means 'personality and therefore, entrepreneur teams are included in this definition. This implies entrepreneurs can exist in SMEs to large firms depending on their entrepreneurial talent and they constantly spot new opportunities which they act upon.

In order to understand the role played by entrepreneurs in a developing an economy like Ghana, it is first important to understand the concept of entrepreneurship (Petrin, 1992). Therefore choosing an appropriate definition for entrepreneurship in the rural area context, it is necessary to consider the skills needed to improve the quality of life for individuals, and to sustain a healthy economy and environment, as conventional definitions have limitations when it comes to rural entrepreneurship. Hence, the most appropriate definition will be a combination, wherein, rural entrepreneurship can be defined as; a force that mobilizes other resources to meet unmet market demand (Jones and Sakong, 1980; Onwuka et al., 2015), the ability to create and build something from practically nothing (Timmons, 1989; Singer, 2014) and the process of creating value by pulling together a unique package of resources to exploit an opportunity (Stevenson, et al, 1985). Rural entrepreneurship has the potential to drive innovations that can increase access to food, create employment and reduce poverty.

However, the acceptance of entrepreneurship as a central development force by itself will not lead to rural development and the advancement of rural enterprises. An environment enabling entrepreneurship in rural areas is also needed, and the existence of such an environment largely depends on policies promoting rural entrepreneurship. According to Petrin (1994), the effectiveness of such policies in turn depends on a conceptual framework about entrepreneurship.

Also in light of the present growing need for developing economies to achieve green economy, entrepreneurship is again recognized as necessary for transition towards a more sustainable society. Current research in the field of entrepreneurship have been devoted to increasing attention to the interrelation between businesses and the environment, in particular to the role of entrepreneurs and their small and medium sized enterprises in the development towards a more sustainable commercial and economic system.

This paper seeks to deal with the following aims and objectives;

- First, to discuss the concept of green entrepreneurship and the many reasons why promoting green entrepreneurship as a force of economic change is necessary if many rural communities in the country are to survive.
- Secondly, to highlight the possible constraints and opportunities that may be faced by green entrepreneurs in rural Ghana and the initiatives that can assist their development.

2. Methodology

The methodological approach to achieving the above stated aims of this paper is document content analysis (Hsieh et Al, 2005; Bowen, 2009). Document analysis is a form of qualitative research in which documents are interpreted by the researcher to give voice and meaning around an assessment topic. According to Duriau et al (2007), document analysis is found to be rigorous for the exploration of important but difficult-to-study issues of interest.

The approach followed three stages of analysis. The first is preparation. This is the stage where the materials required for the analysis was identified and collected. This involved searching and identifying the possible source of the necessary data, mainly from publications from journals in databases like SCOPUS, Web of Science and magazines, newspapers, websites, public records, reports, policies, action plans by public bodies. Search words included; entrepreneurship, green entrepreneurship, green entrepreneurship and rural development, entrepreneurship and sustainability, green entrepreneurship and Ghana. The second stage involved material review and sorting, where the documents collected were studied in details and categorized with reference to the study objectives. The last stage involves the deductions and thematic write-up stage, as the approach of the paper is to make replicable and valid inferences by interpreting gathered information. During this stage, deductions were made from a detailed study of the documents collected, making inferences and drawing conclusions based on the views, opinions and findings from previous studies.

3. The concept of Green entrepreneurship

Simply put green entrepreneurship is a conscious choice of the entrepreneur who decides to implement environmental goals into his or her own business (Blue 1990). Berle (1991) introduced the term green entrepreneurship from his book; the green entrepreneur: Business opportunities that can save the earth and make you money, a practically oriented book that touches on topics such as recycling, nature preservation, and renewable energy implementation. The concept of green entrepreneurship has emerged out of the context of a green economy, as a way to mitigate market failures and promote social welfare through the exploitation of environmentally responsible opportunities (Meek, Pacheco, and York, 2010; Tandoh-Offin 2010).

The concept of green entrepreneurship has been referred differently by various researchers such as, enviropreneurship, ecological entrepreneurship, and eco-capitalism (Schumpeter, 1934; Isaak, 1999; and Larson, 2000, Tandoh-Offin 2010).

Despite the different ways that the concept has been described, a common theme that resonates is the fact that environmental entrepreneurship implies the idea of developing a business while at the same time demonstrating a concern for ecological and social needs of present and future generations (Schaper, 2002; Tandoh-Offin, 2010) and according to the Greenleaf Management International in 2002, the requirement for success include a cohesive planning process and idea development, creativity, innovation, and calculated risk-taking on the part of the individuals who initiate such programs. The three identified conditions that individually or may come together to explain ecopreneurial activities, includes (Larson, 2000; Sherief, 2008; Tandoh-Offin 2009);

- a deliberate strategy to shift the focus and mode of operations of business with the aim to reduce reasonably resource use and move production processes towards sustainability;
- the desire to devise better ways of carrying out business operations in the environment with high regard for sustainable resource use;
- the possibility of an 'incremental entrepreneurship' which is also about innovative thinkers who aim at cost reduction as a means to bring about some sanity into business operations in the environment.

Individuals or group of people who are engaged in such activities are also been referred to as ecopreneur, enviropreneurs and green entrepreneurs by researchers (Larson, 2000). In summary, green entrepreneurship has become a diversified market-based approach for identifying opportunities for improving the quality of life through sound environmental practices by encouraging individuals with the necessary know-how and interest to develop the tools to convert dreams and aspirations into realities.

4. Challenges and opportunities to green entrepreneurship

There are various factors or determinants that influence entrepreneurial activities anywhere. These determinants which can either be a challenge or opportunity includes; the regulatory environment, policy support, and market conditions, access to finance, knowledge/technology creation and diffusion, entrepreneurial capabilities and culture.

According to Newton (2005), the main barriers to green entrepreneurship or ecopreneurship development includes the lack of enforceable regulations, adverse environmental conditions, and resistance from potential consumer and users of the services provided by ecopreneurs to switch to alternative products and technology, and the inadequate protection of intellectual property rights. The activities of governments and environmentally-conscious pressure groups constitute a major hindrance to ecopreneurship development as far as restrictive regulations and legal environments are concerned, in most advanced societies (Newton, 2005). Also, the challenges related to financing for innovations by green entrepreneurs are among other factors as a major obstacle to the advancement of the concept (Pastakia, 1998).

These challenges or barriers can be classified as institutional, organizational and economic barriers as according to Sinding (2003), and as restrictive macro environmental hostilities, marketing, and competitive hostilities by Pastakia (1998). However, Post and Altman (1994), categorized the various problems to ecopreneurship development into compliance-based, market driven and value driven barriers, where compliance-based barriers consist of rules and regulations by national, regional and global cooperative arrangements and market-driven barriers are seen as alternatives to the regulatory measures to control environmental wrongs.

However, in terms of geographical location, rural areas and urban areas have a different type of challenges or barriers to the development green entrepreneurship. The rural areas are lacking in technology, knowledge, government support and innovation, as well as financial risks, can also be counted for the same. On the other hand, competition, incentives, lack of consumer support and lack of awareness of environment are key obstacles in case of urban areas. Lack of willingness to innovate is common for both the locations.

The opportunities for green entrepreneurship on the other hand, according to Bowen (2000), are seen to be contingent on several factors notable among which are the ability to transform environmental issues into productive green products through sound strategic business planning and marketing. These opportunities are also positive situations in the environment which are controllable along with the drive to take advantage of environmental opportunities as an intentional process which is driven by feasibility and perception of desirability (Krueger, 1998). Green entrepreneurs can, therefore, take advantage of what may seem initially as barriers, and convert them into opportunities through innovation and risk taking and long-range visioning and commitment. As Keogh and Polonsky (1998) argued that entrepreneurship centers on a vision that allows entrepreneurs to see beyond the limits placed by available resources and identify opportunities missed by others.

5. Promoting Green entrepreneurship in Ghana

In recent years Ghana has experienced positive economic growth rate. However, this has not directly translated in the creation of enough employment opportunities for the youth entering the labour market annually, especially in the rural areas. Also, the most important economic sectors in rural Ghana, which include tourism, fishery, craftsmanship, agro-processing and agriculture, are highly dependent on natural resources. Therefore the impacts of climate change and environmental degradation threaten economic activities and pose challenges to a well-functioning national labour market. Despite these risks, there are opportunities for the youth to become part of the unfolding green economy. These young women and men can take part in new sustainable business practices, such as green manufacturing, eco-tourism, the development of renewable energies, organic agriculture, and green services. Indeed, green business start-ups not only have a beneficial impact on the social and economic situation of young people but also on the protection of the natural environment.

Development of green entrepreneurship in Ghana will require a collaborative effort between the state and the private sector with well-defined role for either party. The responsibility of the state includes institutional and infrastructure development to create the needed environment for individuals, research organizations and businesses to innovate and create value. Besides implementing policies and regulatory frameworks that will encourage green entrepreneurship, the state should also engage in environmental innovations. The state can also provide state-sponsorships to institutions of higher learning and research centers to research into green entrepreneurships and eco innovations and findings of research and innovations made available to the general public and businesses that can adopt and convert these ideas into business and economic activities. Already there are institutions like the Council for Scientific and Industrial Research (CSIR) undertake research into innovative ways to improve agricultural production and agro-processing.

Also based on the fact that green entrepreneurship activities are seen to have the potential to generate economic development, it would be important for the state to undertake capacity and knowledge development through conscious effort. Activities such as trade fairs and eco-innovation exhibitions could focus on disseminating green entrepreneurship information and opportunities, encouraging functional linkages among critical stakeholders. The state should also create avenues for corporate entities to be able to engage in Research and Development (R & D) to stimulate eco-innovation.

In order to create a robust economy with a high focus on green entrepreneurship activities, it is necessary to develop and maintain an entrepreneurial ecosystem in Ghana (see Figure 1). The challenges in creating an entrepreneurial ecosystems vary dramatically from market to market, however, relevant literatures suggest that strong policies, financial support, a thriving market, innovations, research, mentorship, education and training are key themes across most salient entrepreneurial ecosystems.
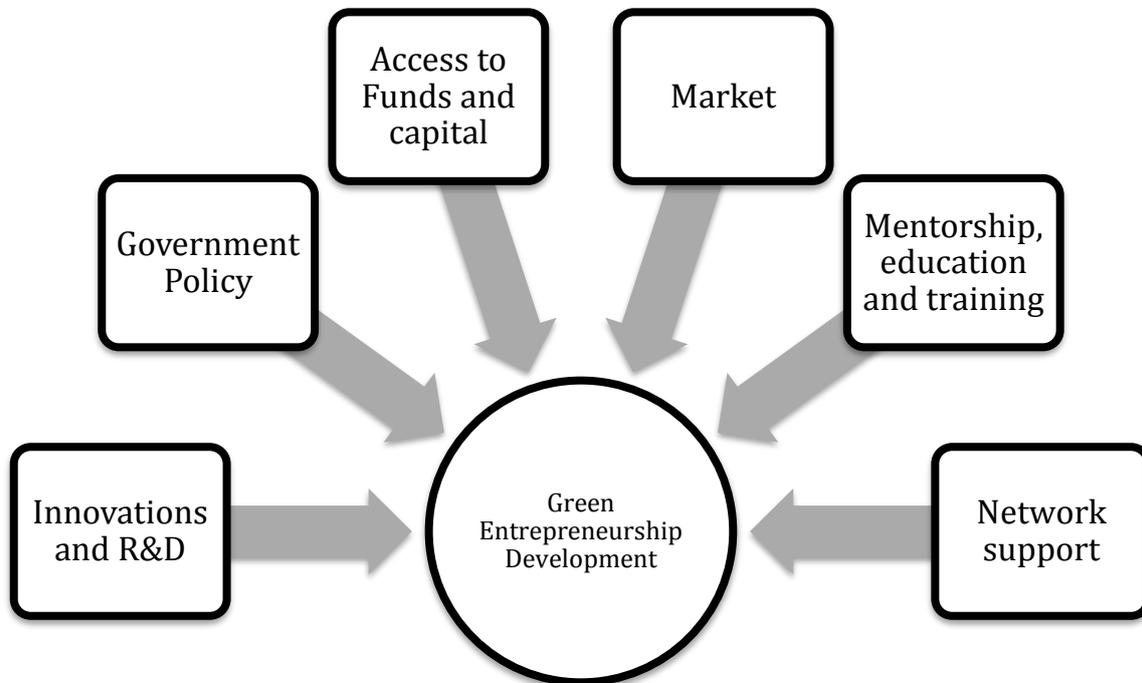
Figure 1: Components of a green Entrepreneurial Ecosystem

6. Conclusions

Literature on the subject of green entrepreneurship, three main groups namely governments and its various agencies, non-governmental groups, businesses and citizen or civic advocacy organizations constitute the key players in the development and policy formulation implementation and enforcement. Development of green entrepreneurs and entrepreneurship in general can be stimulated through a set of supporting institutions and through deliberate innovative action which stimulates changes and fully supports capable individuals or groups. The state therefore, should develop and implement policies and programs designed specifically for green entrepreneurship promotion, which can greatly affect the supply of green entrepreneurs and thus indirectly represent an important source of green entrepreneurship.

However entrepreneurial activities or endeavors are more likely to flourish in rural areas where the two approaches to rural development, the 'bottom up' and the 'top down', complement each other. The 'top down' approach gains effectiveness when it is tailored to the local environment that it intends to support. The second prerequisite for the success of any form of rural entrepreneurship, the 'bottom up' approach, is that, ownership of the initiative remains in the hands of members of the local community. With the right environment, individuals and businesses can be encouraged to engage in eco innovations

and ecopreneurial endeavors. Already in rural Ghana, there are so many private individuals and groups that engage in some forms of ecopreneurial endeavors especially in agroprocessing and other agriculture related business.

In summary, it is recommended that a systemic approach is necessary to promote green entrepreneurship activities in Ghana through;

- Nurturing green entrepreneurship culture and raising awareness amongst rural youth about opportunities arising from environmentally friendly business models.
- Creating an enabling environment which promotes and encourages green investments and entrepreneurship and,
- Supporting new and emerging entrepreneurs through the provision of business development services and other financial and technical support schemes towards green business.

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The Impact of Capital Structure on Profitability: An Empirical Analysis of Energy Sector in Czech Republic, Slovak Republic and Republic of Poland

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Abstract

The influence of the capital structure on profitability of companies is investigated in this contribution. Based on the theoretical research, debt resources have a significant impact on the profitability of companies. Considering fundraising in the Czech Republic, where companies are financing their activities primarily from the banking sector, the debt sources must be gained by the best possible conditions. This is supported besides by the trade-off theory. Based on previous studies and realized analyses the aim of the paper is to find out answer to question, whether there is any dependence between profitability and debt financing sources of Energy Sector companies in the Czech Republic, Slovak Republic and Republic of Poland in period 2007–2014. GMM is main method for our analysis and data have been taken from Amadeus database.

Keywords: profitability, debt resources, return on equity, return on assets, GMM

JEL Code: G30, G32

1. Introduction

The capital structure has a significant impact on the successful development of the company because it gives conditions of its prosperity and healthy financial development. The key role is founded in influencing of the financial risk of the business, profitability and financial freedom in the future. Above that, the capital structure of the company, let's say its correct settings, leads among the other important factors to the maximalisation of the market value of the company. Because of this reason, every company should intensively

focus on the capital structure. The capital structure setting means the discovery of the optimal composition of the equity and debt with the impact on the emphasis on the factors that have impact on it. The difficulty and importance of solving questions capital structure related are confirmed above that by Brealey and Myers (1992).

The aim of this article is evaluation of the functional dependency between used resources of financing and profitability of the energy companies of the selected countries that include The Czech Republic, Slovakia and Poland. For reaching the target, there was chosen the method "Generalized Method of Moments", further just GMM, that is specified in more details in the chapter 3 describing the methodology and the used data. The hypotheses which are related to the pecking order theory are tested too.

H1: The increase of the return on equity leads to the decrease of the use of the debt financial resources of financing, resp. bank credits.

H2: The increase of the return on assets leads to the decrease of using debt financial resources, respectively bank credits

2. Compilation of Hypotheses on the Basis of Current State of Knowledge

Finding of the optimal composition of the own capital and debt by tolerance of all the factors having impact on it, is a demanding economic discipline. Brealy and Myers (1992) consider the problem of the capital structure to be one of the unresolved financial problems. Nowadays, there is a wide range of literature describing this topic whereas the discussions about the capital structure of the company started in 1958 with the first capital theory Modigliani and Miller (1958) which caused a wide range of reactions and feedbacks.

According to Wöhe (1995) there are two rules building the base of the consideration by setting the capital structure. It handles about the rule for the vertical capital structure and the rule of the horizontal asset and capital structure, which can be divided into the golden rule of financing and the golden rule of balancing.

The size of the company capital depends on a few factors, Synek (2006) evaluates as the most important above all the size of the company – bigger the company, more capital is needed. The company which uses for its production a lot of techniques, needs more capital than the company which uses less of mechanization. In the case of the energy companies, the capital demand is very high. The capital structure of the company is considered to be the structure of the resources of which the company possession was bought and that we divide according to the owners of the capital on the own and external (Synek, 2002), according to the length of the using of the capital we can divide them to the long-term and short-term possession and according to the origin of the resources on internal and external. The rate of the own and the debt capital can differentiate in many companies and it depends on many factors, as for example business branch, structure of assets, the managers risk attitude, the yield of the company, stability of sale and income, rate of interest (Valach 2005). The pecking order theory (Myers, 1984; Myers a Majluf 1984, Valach 1985, Kislingerová 2010) stands in contrary of all of the theories of M&M and it is focused, contrary to the other theories, on the interest of the managers, instead of the company owners. It does not try to set the measure of the debts of the company but it states that the structure of the company is different in every single case, dependently on their needs. Due to this theory the most profitable companies use the least debt sources, because they are sufficiently supplied by finances from their internal

funds. Since the importance of financial decisions is according to Kislingerová (2010) on the place behind the decision about investment and operation, the companies prefer in this case the way of the lowest protest instead of effort about the financial decision. According to this theory the company prefers financing of long term actives by the resources in the following order Valach, (2005): Internal resources, Long term interest and emissions of long term obligations, Emissions of stocks. This order is based on the fact that the internal resources (as the held back gain) for financing of the long term property are for the company the easiest although it is not the cheapest. Using of debt financial resources (securities, stocks) increase the costs of emission, pressure on decreasing prices or an unfavorable impression on the public. Due to that is the share emission found to be the less convenient way of financing and takes the last place among all the options. This theory to Valach (2005) is a contribution to an explanation, why the companies with a good gain borrow money the least – they try to avoid emission costs and unfavorable consequences that are brought by the emission. One of the important characteristics of pecking order theory is the highlighting of the irrational factors (different from other theories) because not all the companies have the same information during their process of deciding. The companies decide not only according to the amount of the costs of particular variants of capital structure but also according to the irrational reactions of their environs. A diverse level of equipment of those companies builds an important pillar of this theory; the author is Stewart Myers at Kislingerová (2010).

Arguments that support the pecking order theory are brought also by the studies of Fama and French (2002), Hovakiman et al. (2001), Beattie et al. (2006) or Hernádi and Ormos (2012). The last mentioned study, made on 72 Czech companies, confirms that the managers prefer the resource of financing of the actives internals resources, doe to this fact these companies belong to the active users of packing order theory. According to the research Rasiah & Peong (2011) managers are willing to use the debt financial resources of the company only in the case of investments that shall bring an important additional valorization. In the Bradley et.al. (1984) there are the proofs, that companies, which have the sufficient non-debt shields show better D/E ratio than those that have the non-debt tax shields. This study was also confirmed by Titman and Wessel (1997) by discovering the negative and important influence of the total debt rate and the sum of capital (DER) on ROE. Gleason, Mathur and Mathur (2000) found out that the capital structure of the company has a highly negative impact on the indicators of the efficiency of the company ROA, the increase of the sales and EBIT. According to this study, because of that reason a high measure of company debt leads to the decrease of their efficiency. The others confirming by their studies the pecking order theory are Kormaz, Barasan a Gokbulut (2009) who researched the capital structure of companies in automotive industry.

On the base on that facts for testing there were chosen the indicators of D/E ratio (DER) a debt ratio (DR). D/E ratio is the rate of debt and own resources of financing and includes entirely used resources of financing. Regards to the orientation of the financial system, into the testing there is included the debt ratio too, that is a fraction of the bank credit in the companies to their total capital. Especially the orientation on the primary use of the gain leads to the choice of the independently variable quantities. ROE is a profitability of the own capital, that measures the efficiency of the company from the owner´s position. It is a portion of the net income and the own capital. The using of debt capital is found to be efficient only if the return on equity is being increased too. If we want to valorize our own gain, then we use ROA. ROA is the total profitability that is measured

in the company regardless of used resources of financing, calculated as EBIT divided by total assets.

3. Methodology and Data

The study is based on the data of particular companies from the energy industry of the selected countries that are the Czech Republic, Slovakia and Poland.

The reviewed period is 2007–2014, and the data on an annual frequency are taken from the database Amadeus. The reviewed example was cleaned from the unit of companies; their data showed the elements of incontinuity and did not fulfill the conditions of the time series. In the study appear the companies divided in categories: medium, big and very big companies. Small companies were sorted out because of not reaching the above mentioned conditions. The data set includes 172 companies from the Czech Republic, 63 from Slovakia and from Poland 163 companies, whereas the selection of companies contained in each country above 70% of whole sector.

For researching of the impact that explains the variable part for the explained part in this example it is the most convenient to use the model of panel data because there appear the elements of the analysis of the time series and also the elements of the regressive analysis. The panel is made of the set of units, let´s say companies, that are similar to each other because of their characteristic and that were continually researched. The disadvantage of the panel data is the fact, that the series of units – companies is not variable with the time, so they are set aside and they cannot be replaced.

The researched economic factors are dynamic and this is the reason why it was convenient to model them too. Prucha (2014) recommends using the method of coincident moments. According to him this method has been shown as the most convenient when the time series are shorter and by some subjects there are the crashes of values. He states the next convenience is that GMM method includes as an extra explaining variable part also the tempo of the increase from the previous periods of the variable part. Sarafidis and col. (2009) researches in his study the dependence between panels. He says that the application of the method GMM is convenient also by the situation, when the researched element builds the short time series, but the panel needs to be sufficiently wide. The analyzed element can reach this condition by its final amount of companies in the created element. This method of the dynamic model of the panel data is found to be to most convenient according to Cipra (2013) when he due to the low number of reviews he does not recommend to use the method of least squares.

4. Results of provided panel regression

When GMM model was used for the sample of companies as it was determined in this article introduction, an attention was paid to how a development of debt finances (DER) is influenced by achieving effectiveness of invested capital and by the use of debt finances within previous period. The relation is expressed by the following formula (1):

$$DER_{it} = \alpha_1 + \gamma_1 * DER_{it-1} + \beta * X_{it} + \varepsilon_{it} \qquad (1)$$

where endogenous dependently variable DER_{it} represents the development of debt/equity ratio i[th] variable in time t and evaluates the use of debt finances; exogenous

independently variables are delayed value debt/equity ratio of previous year DER_{it-1} and return on equity or total profitability X_{it}. The symbols α_1 and ε_{it} are the constants of the model and residual item in the GMM model. The selection of above mentioned indicators is based on already realized studies (e.g. Nivorozhkin (2005), Hernádi, Ormos (2012), Črnigoj, Mramor (2009), Růčková (2015), Růčková, Heryán (2015), Růčková (2016)), which reflected the specifics of European environment.

By Hrdý (2008), the debt financing and financing by the retained profit are still the cheaper forms of financing. In accordance with that, retained profit is then used as long as its amount sufficiently covers the company development. Under such financing, the company does not meet external investors at all. It should mean that if company´s effectiveness increases (measured by equity or total return), the use of debt finances decreases. This relationship is seen in the Table 1.

Table 1: Impact of return on equity (ROE) on the use of debt finances (DER as dependently variable) at power-producing companies in the selected countries

	Czech Republic	Poland	Slovakia
DER$_{(t-1)}$	0.0145***	−0.3715***	−0.3077***
ROE	6.0233***	−8.3269***	−2.0786***
Sargan/Hansen test	0.1344	0.2361	0.3365
DER$_{(t-1)}$	0.0061	−0.3758***	−0.3119***
ROA	−18.1545***	17.6702***	8.2842***
Sargan/Hansen test	0.7105	0.0367	0.2565

Source: own elaboration by database Amadeus, elaborated in vEviews 9
Note. *** Item is statistically significant at the level 1%. ** Item is statistically significant at the level 5%., *Item is statistically significant at the level 10%, without mark, the item is statistically insignificant

Out of the Table 1, it results that in all countries, the results can be considered statistically significant. At the same time, the models are in all cases robust because the results of Sargan/Hansen test are higher than 0.05 in all countries. If the relation between debt/equity ratio and return on equity in the Czech Republic would be evaluated, then, it can be said that with the increase of return on equity the use of debt financing increases as well. At the same time, if the companies used the debt finances within previous period, it did not limit them to use them in the following period. Impact of the previous use of the debt finances is significantly weaker because the coefficient is significantly lower. Considering the results of the Czech Republic, such explanation can be considered that for this particular sample of companies (172), accessibility of the financial means was not the problem. At the same time, regarding the financial system in the Czech Republic, it can be assume that the use of debt financing is for companies more accessible with increasing profitability. The reason to declare this fact is that banks evaluate profitable company in more positive way and interest costs can be thus lower and more attractive. This situation is more interesting in connection with the analysed period because within the monitored period takings of power-producing companies decreased mainly as the consequence of energy consumption by industrial companies within 2009 – 2014 (MPO, 2015). The analysed sample of companies thus do not prove possible trend towards the theories of hierarchic order. In Poland and Slovakia, the situation is rather different. In Poland, impact of return on equity increases on the use of debt finances has negative connection. It means that the increase of return on equity shows the decrease of the debt financing use in the monitored companies' sample (163 companies). At the same time, if the companies used the debt finances within previous period, ratio of them is not in-

creasing within the following period. In case of Polish companies, such trend can be connected with a managerial conservatism when making decision on financing way. Above that, the managers could be influenced by the development in power energy field because by the data of OECD and EUROSTAT (2016), a year-to-year tempo of increase reports declines within 2007 – 2009 and in 2012. Negative expectation could also influence the decision-making as for the use of debt financing. In any case, considering this independently variable, there is seen the tendency towards the theory of hierarchic order as applied e.g. in the studies of Harris and Raviv (1991), Frank and Goyal (2003) or Rashiah and Peong (2011). Similar results can be seen in the Slovak power-producing companies, where the impact of return on equity on the use of debt finances has also negative connection. Also in Slovakia, based on the sample of companies (63 companies), with the increase of return on equity the use of debt finances decreases. The only difference between Slovak and Polish power-producing companies is by OECD and Eurostat (2016) mainly in the decline in the performance – the Slovak companies reported the decline only in 2009. The other years do not show the decline. It means that the managerial conservatism can be considered or the "way of the lowest resistance" when gaining the financing sources. In our opinion, in case of power-producing companies, the decision-making could not be influenced by negative expectation as it comes to the developing trend. It could be assumed that the Slovak power-producing companies fulfill the model of the theory of hierarchic order because they prefer the use of own financing sources.

The further part of testing in the selected countries is focused on the use of return on total invested capital. The total return is calculated from the operational economic result, the financial operations are not included. On one hand, involvement of the only operational economic result is positive phenomenon because the main business activity arranges the profit creation. On the other hand, in the companies, which use the debt financing often, the financial operations can influence the generated economic results very significantly. If this indicator would be perceived from the liabilities side and if the performance is evaluated not considering the sources the business activity is financed by, then, in case of testing, in which ROA is dependently variable, no dependency should exist. If the testing would be provided reversely, as in this case, and will be based on the hierarchic order theory, then, with the increase of total return the use of debt financing should decrease. This dependency is the same as it is in case of ROE. The table 1 shows that the results are reverse comparing the return on equity. The results of Polish companies cannot be generalized because the model proved to be non-robust. Negative dependency is seen only in the Czech power-producing companies. Here, the increase of total return is connected with the decrease of the debt finances use. Contrary to that, as far as the Slovak companies are concern, the increase of the total return causes the increase of the use of debt financing. Regarding the fact that the total value of debt finances´ sources is included, the result can be influenced by the value of short-term and long-term liabilities. Attention should be paid to whether the situation would change if only bank credits would be included.

The financial system is in all selected countries focused on the banking and such sources being gained only from the bank sector. Thank to that, in bank-oriented financial system the long-term financing is to be of better provision than in market-oriented system because the creditors (banks) possess of information on long-term value of the company and do not need to react quickly to short-term fluctuation of their performance. Engagement of the banks in the industry (either directly or by huge financial credits) is very high; therefore, the banks tend to hold the shares of their debtors or to

have their representatives in the supervisory boards (Hučka, Malý, Okruhlica, 2007). Lee et al. (2012) states that bank-oriented systems tend to stress the positive banks´ influence as for the collection of financial information also when identifying the feasible and profitable projects. By this author, another positive aspect can be seen in the management of the risks and monitoring or the control of managers´ behaviour. This way, bigger influence of the bank sector in the developing economies can be explained.

The further testing thus included only the use of bank credits as the source of financing. The relation was again modeled in connection to the return on equity and the use of bank credits within previous period. This relation is expressed by the formula (2):

$$DR_{it} = \alpha_1 + \gamma_1 * DR_{it-1} + \beta * X_{it} + \varepsilon_{it} \qquad (2)$$

where the ratio of bank credits is dependently variable on the total assets DR_{it}, delayed value of the ratio of bank credits on the total assets in the previous period DR_{it-1} and return on equity or return on assets X_{it} are the independently variables. The symbols α_1 and ε_{it} are the model´s constant and residual item in GMM model. If the only bank credits (short-term and long-term) would be considered the debt finances, the results would be slightly different. The situation is shown in the Table 2.

Table 2: Impact of return on equity on the use of bank credits (DR as dependently variable) by power-producing companies in selected countries

	Czech Republic	Poland	Slovakia
DR$_{(t-1)}$	0.3447***	0.5351***	0.0507***
ROE	0.0029***	0.0104	−0.0199*
Sargan Hansen test	0.0761	0.1817	0.3471
DR$_{(t-1)}$	0.4100***	0.4557***	0.0722***
ROA	−0.3837***	−0.6118***	−0.1932***
Sargan Hansen test	0.0544	0.0921	0.2110

Source: own elaboration by database Amadeus, elaborated in Eviews 9
Note. *** Item is statistically significant at the level 1%. ** Item is statistically significant at the level 5%., *Item is statistically significant at the level 10%, without mark, the item is statistically insignificant

Out of the table 2, it is clear that when considering the use of bank credits, the impact of the achieving return on equity is significantly weaker. By the Czech Statistical Office, in the energy sector, the volume of bank credits is increasing very dynamically. While in 2007, the bank credits volume in this sector was 30.5 B. CZK, in 2014, this volume is 105.6 B. CZK (CZSO, 2016). As for the Czech power-producing companies, the dependency is positive, the same as it is by total debt finances. It means that with the increase of return on equity the use of bank credits increased. However, it is also seen at first sight that the influence is significantly weaker than at the previous testing and the model´s robustness is almost at the acceptability limit. The testing of Polish power-producing companies proved to be statistically insignificant thus the influence of the return on the use of bank credits cannot be generalized. The test result in the Slovak companies would be similar; statistical significance of testing the ROE as independently variable and DR as dependently variable was at the level of 10%. With such high level of statistical significance, a generalization of the results could be of misleading character.

If the independently variable would be exchanged for the total return, the results can be concluded in all monitored countries; however, in Poland and the Czech Republic, model´s robustness is almost at the acceptable value. All values are thus statistically significant at the level of 1%. In all monitored countries, power-producing companies re-

port the decrease of the bank credits use when the total return increases. So, it can be assumed that they would prefer different type of financing to the bank credits. Based on the data of Polish Statistical Office as well as Slovak Statistical Office (2017), the share of credits increases in the sector of non-financial institutions. Contrary to the Czech Republic, it was impossible to find out the credits location by NACE classification. It cannot be stated though that also the energy field uses the credits with increasing trend.

5. Discussion and Conclusion

The aim of this article was to evaluate the functional dependencies between the capital structure and the profitability of the selected energy companies. To reaching the targets, the GMM method was used and it corresponded the best with the structure of the studied data.

The researched data set, coming from the databases Amadeus, included 172 energy companies from the Czech Republic, 63 companies from Slovakia and 163 polish companies. The company data comes from the period 2007–2014.

Based on the review of the study researching the problematic of the capital structure, there were 2 hypothesis made. The first hypothesis – The increase of the return on equity leads to the decrease of the debt financial resources, resp. bank credits, it was confirmed in the case of Poland and Slovakia with the statistic importance of 1%. Compared to this, there was registered the difference between researched companies of the energy sector in Poland and Slovakia in the development of using the debt financial sources with the time. So reached results incline to the conclusions of Valach (2005) or Hernádi and Ormos (2012).While the companies running their business in Poland did not increase the fraction of the debt resources of financing, the companies on the Slovak market decreased the fraction of the resources. In both cases it was possible to observe the inclination to the theory of the hierarchic order and by both of the countries; it was possible to confirm the research of Rasiah and Peong (2011). It was proved too, that those companies used external resources of financing in the previous period, so it did not limit them to use the external resources in the following period. Regards the point of view of reaching their own capital, it was evident that the influence of reaching the own capital was strongly lower by the companies on the Czech territory it was really lower, with the increase of the return on equity, the use of bank credits increased too. It was not possible to make the clear conclusion in the cases of Poland and Slovakia. Regarding the Polish companies, the test of using bank credits for the increase of their own profitability was shown as statistically unimportant and by the Slovak companies there was proved the dependency up to 10% of the level of the importance. By so high level of dependency it would be already very misleading.

The second hypothesis – the increase of the return on assets leads to the decrease of using of debt resources, resp. bank credits, it was confirmed by the energy sectors of the Czech Republic by this fact the conclusion of the theory of pecking order theory was confirmed. By this way the given denominations did not confirm the conclusion of Gleason, Marthur and Marthur (2000).Their conclusions were proved by the example of the Slovak companies that in the comparison with the Czech Republic showed the contrary dependence. As for the Polish companies it was possible to generalize the results because of the low coherency of the model. By the change of debt financial resources for bank credits it was not anymore possible to deduce the results regards all the countries, although in the case of the Czech Republic and Poland the coherency of the model was at

the edge of the acceptability of the model. In all the countries, the energy companies noticed by the growth of the return on assets the decrease of using of bank credits on the level of 1% of the entire importance. This dependence confirms the theory of pecking order theory.

Our results are aggregated and it would be interesting to research the data in a more detailed way, for example the companies of the energy sector would be recommended to be analyzed in the capital structure way according to the size of companies. In addition it is possible to research if the companies incline to financing of their activities by their own capital. It would also be convenient to extend the data of further sectors and to research the attitude of getting financial resources on the base of profitability, by this way a rule could be verified – that the most profitable companies borrow the least financial resources because they have the stock in their own internal funds.

Acknowledgements

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Solving the Fraud Detection Problem

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Abstract

For all financial institutions providing retail credit loans, underwriting processes and
scoring models play the key role in the risk management. However, especially for very
big portfolios of clients, also the fraud management and post-approval portfolio moni-
toring becomes essential. Since the fraud patterns are often complicated, the analyses
become multi-variate and the number of hypotheses grows exponentially. Also the
number of observations in each segment decreases and the rate of frauds gets statistical-
ly insignificant.

This paper deals with two principle problems in fraud detection – identifying the seg-
ments with high default concentrations and finding these segments in a big data sample.
For the purpose of the identification, several methods are suggested and the proposed
expert binomial test is concluded to be the most relevant for this task. Then for finding
the segments the GUHA method is discussed and compared with the classification tree
method on a real set of data from the financial market. In this comparison the GUHA
method brings more comprehensive results containing all possible predictor combina-
tions, whereas the classification tree method was quicker and covered the most relevant
distinct segments.

Keywords: data mining, GUHA method, credit risk, fraud prevention, default concentra-
tions, classification tree

JEL Code: G32, G21, C55

1. Introduction

In this paper I deal with the field of banks and other financial institutions providing re-
tail loans to the customers, and focus on the area of credit risk. The loan approval deci-
sion often depends on the riskiness of the client – usually based on estimation of the
probability of default given the client's characteristics. Default is usually defined as a
violation of debt contract conditions, such as a lack of will or a disability to pay a loan
back. In the case of default, the creditor (e.g. a bank or other financial institution) suffers
a loss. The probability of default is then usually estimated using the logistic regression
models. The regression model, also called *scoring model*, assigns a score to each client,

which is then used as a key factor for automated approval or rejection of the loan application in the process, or as one of the main inputs for the following manual underwriting.

Even though scoring models are usually sophisticated and robust, no model can prevent the company from all potential losses; therefore, many further actions need to be taken. In this paper I present one concept to discover concentrations of defaults in the portfolio. The motivation is as follows – the risk of the client is evaluated by the models that are based on statistics. Specifically, a logistic regression-based scoring function combines the risk characteristics of the clients under the assumption of independence. This way it can happen that a specific combination of predictors leads to a very low estimation of the probability of default, even though there is a default concentration in the development sample. This could be further illustrated by the fact that even if this segment with very high delinquency is discovered and a binary segment indicator is created, this predictor would have a very low Gini coefficient value due to the low number of observations. This also means that such a predictor will not be selected to the final model, because the Wald tests would not reject the null hypothesis. For more details about scoring models and their quality measures I refer to (Hand and Henley, 1997) or (Řezáč and Řezáč, 2011).

Moreover, in reality it can happen that there is an organized group of applicants that uses the weaknesses of the underwriting scheme and intentionally provide the application data in the way that it increases the chance of approval or increases the credit amount the company is willing to lend (e.g. by providing fake information that is difficult to verify, or by increasing the expected profit by higher interest rate or insurance). This is considered as a *fraud behavior* and it is often connected with high delinquencies of this group (either because of repayment problems or because of no intention to pay at all). And vice versa, in reality a very high concentration of default often points to a fraud activity.

This is the main motivation for this paper. Whereas the underwriting process based on statistical models and other manual activities focuses on revealing fraudulent and insolvent clients prior approval to reject their loan application in time, there are other processes more oriented to discover fraud patterns and default concentrations after the loans are issued. For this purpose, clients' delinquencies are measured on daily basis, and concentrations on the most important dimensions (such as products, regions, branch offices, credit agents etc.) are reported by automated alarm systems.

However, in reality fraud schemes can be very sophisticated to avoid these basic concentration triggers, and the fraud is thus not detected by the alert system. Moreover, in a big portfolio the delinquency level can be "diluted" by a large number of good clients in the same category. As an example, imagine there is a fraud attack on one specific branch office for a particular product. However, since this branch office has a big portfolio of clients and products, the overall delinquency level of the office is not that high, and thus does not fulfill the conditions of the concentration trigger.

Therefore, one would like to find a method to discover these specific segments of the portfolio (represented by various combinations of clients' and products' characteristics) with very high levels of delinquency (i.e. a probable concentration of fraud).

This is an uneasy task that consists of two main questions – first, how to distinguish the high default rate segments; and second, how to search and find them.

Before answering the questions, I make the following denotations in the four-fold table 1 defined by the investigated segment and the number of defaults. In this table a is the number of defaults in the segment, b is the number of non-defaults in the segment, c

is the number of defaults outside of the segment, and d is the number of non-defaults outside of the segment. Then $k = a + c$, $l = b + d$, $r = a + b$ and $s = c + d$ are the marginal sums and $n = a + b + c + d$ is the total number of cases. Then obviously $\frac{a}{r}$ is the default rate of the segment and $\frac{k}{n}$ is the default rate of the whole portfolio.

Table 1: Four-fold table for segments

Segmentation	Number of defaults	Number of non-defaults	Total
Segment	a	b	r
The rest of portfolio	c	d	s
Total	k	l	n

2. Default Severity Measures

In this section I aim to solve the first question and provide some techniques to recognize the segments with high default rate and possible fraud. The problem is that the segments are generally small and a simple default rate is not sufficient (obviously, if we observe 100% default rate on one observation, we cannot conclude that there is a significant fraud). Therefore, I discuss several alternatives combining the default rate with the number of cases.

2.1. Basic Trigger

The simplest and most understandable way of selecting the severe segments is a trigger based on the default rate and the number of cases, i.e. fulfill the trigger if

$$\frac{a}{r} > q_1 \quad \text{and} \quad r > q_2,$$

or alternatively

$$\frac{a}{r} > q_1 \quad \text{and} \quad a > q_3,$$

where q_1, q_2 and q_3 are some pre-set constants.

The logic of this trigger is based on the fact that the higher default rate in a segment the more serious default or fraud we observe; combined with the requirement for a minimal sample size where the default rate is giving reliable information. Moreover, the more default cases in the segment, the higher loss can be potentially cured.

On the other hand, there are some disadvantages of this trigger. Apart from the fact that this trigger cannot order the data by fraud severity (i.e. there is no difference between 30% default rate on a 1,000 and a 10,000 segment), it is not even guaranteed that the triggered segments are really the most relevant in the portfolio. This can be illustrated by an example. Assume that a trigger is defined as $q_1 = 10\%$ default rate with at least $q_3 = 10$ defaults. Then a segment of 10 defaults out of 100 observations is triggered, whereas a segment with 9 observations and all of them defaults is not. From the rational point of view I would expect that a segment with 9 observations where all of them defaulted is more relevant or suspicious than the first segment.

Even though more advanced measures can be constructed, the basic trigger is very often used in practice for its simplicity and understandability for all the people involved in the system.

2.2. χ^2 and Fisher's Factorial Tests

The four-fold table 1 gives us a clear hint for testing the significance of the segment default rate. In most of the common statistics textbooks we can find the χ^2 independence test's variant for a four-fold table. It uses the fact that for independent identically distributed random variables the following formula has asymptotically the χ_1^2 distribution,

$$\chi^2 = n\frac{(n_{11}n_{22} - n_{12}n_{21})^2}{n_1.n_2.n_{.1}n_{.2}} \approx \chi_1^2.$$

This can be rewritten in the denotation of table 1 as

$$\chi^2 = n\frac{(ad-bc)^2}{rskl} \approx \chi_1^2.$$

Then it is advised that all of the numbers in the four-fold table have to be high enough (it is usually required greater than 5).

For the cases when this condition is not fulfilled, one can use the Fisher's exact factorial test as an alternative. However, in reality, Fisher's test is quite computationally intensive and is not implemented in some common data management tools (like MS Excel).

For both of these tests we can then use the p-value to order the data and select the most significant segments for investigation. Or we can construct a trigger as

$$\text{p-value}_{\chi^2} < q_4.$$

However, there is a disadvantage of this approach. The property of these tests is that they test the significance of the difference of the segment's default rate comparing to the overall data, which does not necessarily mean a higher proportion of fraud. As an example we can take the credit amount predictor with two categories (lower amount and higher amount) of similar category size. Then in the data we can observe that the default rate of the higher amount category is slightly higher compared to the overall portfolio. Then due to the fact that both categories have a high number of observations, the difference is very significant and the p-value of the test is small. However, this slight difference of default rate can be caused by people having problems to repay higher payments connected to higher credit amounts, and does not suggest a default concentration or fraud presence at all. This is the motivation for constructing the following test.

2.3. Expert Binomial Test

For this test I incorporate an expert evaluation of fraud severity and combine it with a statistical test. The merit of this test is as follows. An expert sets a value f to be a *fraud rate* or *fraud threshold*, i.e. such a value that any segment with default rate significantly exceeding this threshold will be considered as *affected by fraud*. This fraud rate has to be reflecting the portfolio characteristics (e.g. three times of the portfolio average) and the purpose of the particular analysis.

Additionally, I assume that if there is no fraud in the segment (i.e. the segment default rate is lower or equal to f), then the defaults happen independently with probability p. With this assumption, for a segment with an observed default rate $p_s > f$ I evaluate the probability that this segment is affected by fraud.

More rigorously, I construct a statistical test with $H_0: p = f$ and alternative $H_A: p > f$. Then if a is the number of defaults and r is the number of observations in the segment, I use the assumptions introduced in the previous paragraph to compute the p-value of the test. Under the null hypothesis I know that the defaults in the segment follow the binomial distribution with parameters f and r, $Bi(f, r)$. Then the p-value of his test is the probability that such or worse situation happens under the null hypothesis (by accident), i.e. that under the null hypothesis there will happen at least a defaults out of r events. Then using the binomial distribution the p-value can be computed as

$$\text{p-value}_f = \sum_{i=a}^{r} \binom{r}{i} f^i (1 - f)^{r-i}.$$

Here the p-value could be interpreted as the probability that such high default rate in the segment happened by accident. Therefore, the lower the p-value the more significant fraud suspicion we have. Then with the above definition we can interpret $1 - \text{p-value}_f$ as the probability that the segment is affected by fraud. Based on the p-value we can again construct a trigger

$$\text{p-value}_f < q_5.$$

If we consider this measure as a fraud indicator, we can order the segments by their relevance (unlike with the basic trigger). Moreover, we do not have any requirements on the sample size (unlike with the four-fold table χ^2 test), and we define our own fraud rate to prevent triggering small differences in default rate on very big segments (unlike with the χ^2 test and Fisher's factorial test). Therefore I see this measure the most relevant among the discussed approaches.

On the other hand, statistical tests and their p-values are not that simple to be well understood, and their usage can cause some interpretation difficulties.

3. Severe Segments Finding Method

Now I deal with the problem of searching and finding the high default concentrations in a big portfolio of data. First I discuss the use of the GUHA method and compare it to other methods theoretically, and then I compare the results on a real financial data sample.

Usually, the input for this task can be a table (e.g. in Excel or database) with a list of clients or loans in rows and a lot of categorized characteristics in columns. Moreover, for every client or loan there is a default indicator (e.g. 1 if the client defaulted on the first payment for more than 30 days past due, or 0 otherwise).

Then all segments are created as various combinations of the characteristics' categories. For each segment we can see the number of cases, the number of defaults and the segment's default rate. Then we can use the default severity measures from the previous section to decide, whether an evaluated segment satisfies the trigger conditions or not.

Now one could try to look for the affected segments manually, use some heuristic method like decision trees, or take advantage of some data mining tools. As this is a special case of supervised learning or anomaly detection, some kind of big data methods can be used. From the great variety of data mining tools, see e.g. (Fayyad et al., 1996), (Witten and Frank, 2005) or (Han et al., 2011), I take the GUHA method in association analysis. For more information about the big data topic I refer to (Baesens, 2014), (Mayer-Schonberger and Cukier, 2013) and (Zikopoulos et al., 2011).

3.1. GUHA Method Introduction

In this section I briefly describe the logic of the association analysis based on the *General Unary Hypotheses Automaton Method (GUHA).* Most information about this method and the used terminology is taken from (Rauch and Šimůnek, 2005a), (Rauch and Šimůnek, 2005b) and the manuals to the LISP Miner software (https://lispminer.vse.cz/).

GUHA is originally a Czech data mining method introduced in (Hájek et al., 1966). Its aim is to systematically formulate all hypotheses of a suggested structure and evaluate them using the given data sample and a pre-defined trigger condition. The hypotheses or *association rules* are expressions of the form $X \rightarrow Y$, where the fulfillment of the condition X (also called *antecedent*) tends to the result Y (also called *succedent*). From all the hypotheses only the rules with required *support* (i.e. number of cases of such property) and *confidence* (the percentage of cases of property X leading to result Y) are chosen into the final output.

More specifically, the four-fold table 1 can be now written in the form of table 2. Then a is the support and $\frac{a}{r}$ is the confidence of the association rule $X \rightarrow Y$.

Table 2: Four-fold table for GUHA method

Attribute	Y	$\neg Y$	Total
X	a	b	r
$\neg X$	c	d	s
Total	k	l	n

Then if we define the minimum required support and minimum required confidence, the method filters only those segments fulfilling this condition. Specific implementations of the GUHA method allow other conditions as well.

The GUHA method is based on the principle that all the relevant segments of data are systematically evaluated – "all" in the meaning that no segment fulfilling the trigger condition is omitted, and "relevant" in the meaning that the algorithm is optimized to skip the creation of segments that cannot possibly fulfill the trigger condition (e.g. the segment is already too small or has too few defaults that it makes no sense to split it according to any further categories). Moreover, the method can usually work with big data samples exploring millions of hypotheses.

3.2. Use in Fraud Discovery

The GUHA method thus gives us a good framework to discover default concentrations (possible fraud) hidden in some smaller segments of the data. For the succedent attribute we take the default indicated from the data sample and for the antecedent at-

tributes *X* we take all possible combinations of predictors up to some limitation (e.g. no more than 4 predictors to be combined in the same hypothesis).

The GUHA method is implemented for example in the 4ft-Miner procedure of the above mentioned LISP-Miner software developed at the University of Economics in Prague.

The LISP-Miner software allows the user to define additional settings of the task including various modifications of the trigger conditions and ways to combine and merge the predictors' categories (e.g. combine only the neighboring categories of ordinal predictors etc.). Moreover, any follow-up tasks can be done in MS Excel, including ordering by the values of the expert binomial test.

3.3.　Difference to Other Methods

Now what makes this method different from the more commonly used methods such as discrimination analysis, logistic regression or classification trees? Mainly it is the fact that these methods are designed to work well on the whole sample and thus use the strongest predictors in the terms of the overall discrimination power (often represented by the Gini coefficient or lift). As an example, we can say that the predictor gender would be selected to the scoring model, whereas the predictor of business branch name wouldn't (since it can have thousands of small categories quite impossible to categorize into bigger reasonable segments). Moreover, for many models the predictors are not easily combined and selected combinations have to be driven manually.

From the perspective of finding the interesting "outlying" segments, a good help can be expected from the classification tree model, where there are small segments found in the leaves. However, the regression three algorithm is a heuristic method growing the tree according some predefined measure, and thus cannot check all possible combinations (as the GUHA method does). Therefore, it can happen that the tree is right in the root divided into several branches according to some predictor (e.g. gender, mentioned above) and a significant fraud segment (which can be independent on that predictor) is then cut into smaller pieces that are not significant anymore (due to their size).

So it is the direct focus on outliers and the comprehensiveness of the search which makes the association analysis a good tool for discovering small very dangerous fraud segments of various kinds in generally big data samples.

4. Data Illustration

In this section I aim to compare the suggested GUHA method with the classification tree model on a real financial data sample. The data for this purpose is provided by a financial company operating on a foreign consumer finance market. Some of the original characteristics and labels are not provided.

4.1.　Data Structure

The provided sample contains the data about more than 160,000 approved loans, where for each loan we have the target variable (i.e. 30 days past due default on the first payment) and 18 categorized predictors. Any missing data is categorized as a special category. See table 3 for details.

Table 3: Data structure

Predictor	Number of categories
Age	9
Credit amount	9
Distribution channel	2
Down payment	6
Family state	3
Goods type	6
House type	5
Income	7
Insurance	2
Price	9
Region	29
Term	9
Undisclosed predictor 1	2
Undisclosed predictor 2	2
Undisclosed predictor 3	5
Undisclosed predictor 4	2
Undisclosed predictor 5	3
Undisclosed predictor 6	2
All 18 predictors	112

On this data sample I run the GUHA method and the classification tree to find the default concentrations.

4.2. GUHA Method

For this comparison I used the GUHA method implemented in the 4ft-Miner procedure of the LISP-Miner software developed at the University of Economics in Prague. For the purpose of this analysis, the LISP-Miner was set to try all the possible combinations of 1–4 out of the 18 predictors.

Then the model evaluated 4,047 combinations of predictors with over 900,000 relevant hypotheses and returned over 5,000 segments with the required confidence of 10 defaults and support at the level of three times the portfolio average. The whole task took 16 minutes on a common laptop.

4.3. Classification Tree

For this comparison I used the classification tree method implemented in the HPSPLIT procedure of SAS 9.4., where I selected the maximum tree depth 4 (to be in line with 1–4 predictors in the GUHA method), the maximum number of children per node 30 (to enable the split to individual regions) and the decrease in entropy as the splitting criterion.

After less than 30 seconds SAS returned a tree with 4 levels, 770 nodes and 3,178 leaves. Among these leaves and nodes there were 30 segments with the required confidence of 10 defaults and support at the level of three times the portfolio average.

4.4. Comparison

I exported the outputs of both methods for further evaluation in MS Excel, were I also computed the p-value of the binomial test to identify the most relevant segments.

The two most relevant segments from the classification tree analysis contained 49 and 79 defaults and were the fifth and the tenth most relevant segments found in the GUHA analysis. However, when analyzing the most relevant segment of the GUHA method containing 99 defaults, 98 of these defaults were included in the first two association tree segments. Therefore, I conclude that the most severe fraud pattern was identified by both methods.

Whereas the GUHA method identified the fraud pattern more precisely and with a proper setting of the selection and category combining criteria it can give us a comprehensive and 'assuring' information about all the possible fraud patterns in the portfolio, the classification tree method runs much faster and provides cleaner output organized in distinct leaves.

From the results several important patterns were identified – such as a specific combination of region, credit amount category, down payment and goods type. This was an example where a hidden factor (or fraud pattern) was found by combining the predictors' categories even though it was not directly included in the set of predictors.

5. Discussion and Conclusions

The aim of this paper was to react on the probability-of-default-based scoring models and propose a solution to the practical problem of discovering fraud patterns in big portfolios of data. Once those concentrations are found, the underwriting process can be adjusted to prevent further losses.

For this purpose I suggest several measures that can be used for evaluation of the significance of the default rate in each segment. Here the definition and use of the expert binomial test for the purpose of default concentration identification I consider as novel and most matching the problem needs.

Then for the task of finding the segments with default concentrations, robust data mining tools can bring more reliable results than the classical approaches of the discrimination analysis, logistic regression or decision trees. Here the GUHA method has been shortly described as a representant of the supervised machine learning techniques, and the LISP-Miner as a convenient free-ware software where this method is implemented.

Finally, the GUHA method and the classification tree method were applied on a sample set of financial data. Here the application shows that both methods managed to discover suspicious default concentrations successfully. Comparing these two methods the user needs to choose between the GUHA method's assurance that really all the potential segments are discovered, and speed and simplicity of the classification tree.

In the financial practice the problem of fraud discovery is a very important and closely watched topic for all credit providing institutions, and all innovations, tools and results that positively affect the fraud prevention mechanisms are well accepted.

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Eco-innovation performance and selected competitiveness issues perceived by managers in the EU member states – a cross-country analysis

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Abstract

This paper analyzes links between eco-innovation performance and selected competitiveness issues perceived by managers in the 26 EU member states. Different dimensions of eco-innovation performance in individual EU member states were examined based on the Eco-Innovation Scoreboard. The country-specific data on selected competitiveness issues were obtained from the survey of business leaders carried out by the IMD World Competitiveness Center. The data on the Summary Innovation Index applied in the European Innovation Scoreboard were also used. The results of the cross-country analysis indicated that overall eco-innovation performance is strongly correlated with ethical practices, social responsibility of business leaders, health, safety and environmental concerns, as well as with corporate values. In addition, it was found that the lack of pollution problems affecting economy, credibility of managers in society, environmental laws that do not hinder competitiveness of businesses and sustainable development being a priority in companies are of particular importance in achieving better eco-innovation performance.

Keywords: eco-innovation, competitiveness, European Union

JEL Code: M14, O31, Q55

1. Introduction

Eco-innovation is a key area of economic activities that take account of the requirements of sustainable development, especially in its economic and environmental dimension (Baran et al., 2015). For this reason, identification and analysis of eco-innovation determinants is an essential challenge, both theoretically and practically. The aim of such efforts is to assist policy-makers in planning and implementing effective instruments

stimulating eco-innovations on the one hand, and entrepreneurs – in efficient management of eco-innovation processes – on the other.

Eco-innovation is the production, assimilation or exploitation of a product, production process, service or management or business method that is novel to the organization and which results in a reduction of environmental risk, pollution and other negative impacts to relevant alternatives (Kemp and Pearson, 2008). The European Commission defines eco-innovation as any form of innovation resulting in or aiming at significant and demonstrable progress towards the goal of sustainable development, through reducing impacts on the environment, enhancing resilience to environmental pressures, or achieving a more efficient and responsible use of natural resources (European Commission, 2011).

The existing research proves that the decision to introduce eco-innovations is influenced by a variety of factors. Therefore, various approaches to eco-innovation determinants can be found in literature. Horbach et al. (2012) indicate four groups of the main determinants of eco-innovation: the technology push, the market pull, the regulation/policy factors and the firm-specific factors. A distinction is usually made between internal and external drivers to eco-innovation (del Río, 2009). Thus, Bossle et al. (2016) point out internal factors (i.e. cost savings, adoption of certification, environmental capability, environmental managerial concern, human resources, environmental leadership and culture) that companies can manage in order to adopt eco-innovation and external factors (i.e. regulatory pressures, normative pressures, market demands, changes in technology) over which companies have little or no control.

The research of del Rio et al. (2016) shows that some drivers play a more prominent role as specific determinants of eco-innovation, and these are public policies and internal capabilities. In addition, many drivers to general innovation are likely to be shared by eco-innovation. Consequently, policies supporting general innovation may also lead to eco-innovation. However, eco-innovation has distinctive features, which are mostly related to the double externality problem (Rennings, 2000) and the role of public policies as a main driver to these innovations. This means that policy-makers willing to promote eco-innovation should take these different drivers into account if they want not only to support innovation as such, but to foster eco-innovation in particular. Therefore, environmental and innovative policies must be considered in an integrated way.

With regard to internal capabilities which might facilitate an eco-innovative approach, top level management commitment, technological competency, financial and human resources are highly relevant. Chen et al. (2012) distinguish the following internal origins of eco-innovations: environmental leadership, environmental culture and environmental capability. Nevertheless, factors such as resources, competence and dynamic capabilities have so far been underrepresented in the empirical literature on eco-innovation (del Rio et al., 2016). This also includes the role of general management practices, as well as managers' and employees' values, attitudes and concerns.

The above-mentioned factors can affect both the enterprise competitiveness and propensity to eco-innovate. It is worth noting, as indicated by Brunnermeier and Cohen (2003), that eco-innovations are more likely to be adopted in competitive environments. This concerns the specificity of individual sectors and industries as well as individual countries, which means that country-specific differences (e.g., management practices, values, attitudes, environmental awareness, environmental consciousness of consumers) might partly account for different eco-innovation performance. Thus, comparative cross-country studies can be of tremendous value, both from the theoretical and the practical point of view.

This paper comprises an analysis aiming to: present and compare eco-innovation performance between the EU individual member states, present and compare selected competitiveness issues perceived by managers in the EU member states and, above all, to identify the relationships between eco-innovation performance and selected competitiveness issues and determine the strength of these correlations in the countries under consideration.

2. Methodology and Data

In order to achieve the goal of the research, the following data sources have been used: the Eco-Innovation Scoreboard, the World Competitiveness Yearbook and the European Innovation Scoreboard.

Overall eco-innovation performance and its different dimensions have been analyzed based on the Eco-Innovation Scoreboard (Eco-IS) and the Eco-Innovation Index (Eco-I-Index), which assess and illustrate eco-innovation performance across the EU member states. They aim at capturing different aspects of eco-innovation by applying 16 indicators grouped into five dimensions:

- E1 – Eco-innovation inputs (comprising financial and human resources investments aiming to trigger eco-innovation activities, i.e. governments environmental and energy R&D appropriations and outlays, total R&D personnel and researchers, and total value of green early stage investments),
- E2 – Eco-innovation activities (illustrating to what extent companies in a specific country are active in eco-innovation, i.e. firms having implemented innovation activities aiming at a reduction of material input per unit output, firms having implemented innovation activities aiming at a reduction of energy input per unit output, and ISO 14001 registered organizations),
- E3 – Eco-innovation outputs (quantifying the outputs of eco-innovation activities in terms of eco-innovation related patents, academic literature and media coverage),
- E4 – Resource efficiency outcomes (putting eco-innovation performance in the context of a country's resource efficiency, i.e. material productivity, water productivity, energy productivity, and GHG emissions intensity),
- E5 – Socio-economic outcomes (illustrating to what extent eco-innovation performance generates exports of products from eco-industries, employment in eco-industries and circular economy, and revenue in eco-industries and circular economy).

The Eco-I-Index shows how well individual EU Member States perform in different dimensions of eco-innovation compared to the EU average (Giljum et al., 2014).

The data on selected competitiveness issues perceived by managers have been obtained from the survey carried out by the IMD World Competitiveness Center. The IMD conducts a yearly Executive Survey to complement the statistics used in the World Competitiveness Yearbook (WCY). The survey is focused on issues fundamental for competitiveness of countries that are not easily quantifiable, for which hard data are unavailable. It is sent to top and middle managers representing a cross-section of the business community of each WCY country. The respondents assess the competitiveness issues by answering questions on a scale of 1-6. The obtained data are then converted to a 0–10 scale (IMD, 2014).

For the purpose of the analyses presented in this paper, 15 issues concerning management practices, attitudes and values as well as environmental concerns have been selected out of 118 variables describing competitiveness issues within the WCY. They comprise statements as follows:

- C1 – Adaptability of companies to market changes is high,
- C2 – Ethical practices are implemented in companies,
- C3 – Credibility of managers in society is strong,
- C4 – Corporate boards supervise the management of companies effectively,
- C5 – Auditing and accounting practices are adequately implemented in business,
- C6 – Customer satisfaction is emphasized in companies,
- C7 – Entrepreneurship of managers is widespread in business,
- C8 – Social responsibility of business leaders is high,
- C9 – Health, safety & environmental concerns are adequately addressed by management,
- C10 – Flexibility and adaptability of people are high when faced with new challenges,
- C11 – Value system in your society supports competitiveness,
- C12 – Corporate values take into account the values of employees,
- C13 – Sustainable development is a priority in companies,
- C14 – Pollution problems do not seriously affect your economy,
- C15 – Environmental laws and compliance do not hinder the competitiveness of businesses.

The analyses also make use of the Summary Innovation Index (SII), which is a composite indicator used in the European Innovation Scoreboard (European Commission, 2016a). It measures overall innovation performance of each EU member state and distinguishes between 3 main types of indicators (Enablers, Firm activities and Outputs) and 8 innovation dimensions, capturing 25 indicators in total. The indicator is used to identify possible differences in correlations between variables describing selected competitiveness issues and indicators concerning eco-innovation and overall innovation performance.

For the purpose of this study, data on 26 EU member states have been obtained. Due to the fact that Malta and Cyprus are not covered by the WCY framework, the presented analyses do not take the two countries into account.

In order to quantify the correlations between the variables under consideration, the Pearson correlation coefficients have been applied.

3. Results

The indicators characterizing the overall Eco-Innovation Index (Eco-I-Index) and its particular dimensions (E1-E5), and the Summary Innovation Index (SII) for the analyzed EU member states are presented in Table 1.

The presented indicators show that Denmark takes the top position with regard to the overall Eco-I-Index. The next places in the overall eco-innovation performance area are taken by Finland, Ireland, Germany and Sweden, while Bulgaria, Poland and Croatia come last. Considering individual dimensions of eco-innovation performance, it should be emphasized that Denmark and Ireland have by far the greatest achievements with respect to Eco-innovation inputs (E1). When it comes to Eco-innovation activities (E2)

and Socio-economic outcomes (E5), the best results belong to the Czech Republic. Luxembourg comes first in the Eco-innovation outputs (E3) and the Resource efficiency outcomes (E4).

Table 1: Indicators characterizing eco-innovation and innovation performance in the EU member states

Country	Eco-I-Index	E1	E2	E3	E4	E5	SII
Austria	107.78	97.64	126.00	135.51	106.80	73.05	0.591
Belgium	97.18	89.45	116.00	110.65	98.38	70.59	0.602
Bulgaria	48.62	18.77	71.00	27.48	45.70	81.13	0.242
Croatia	66.72	21.48	100.00	89.03	80.03	48.76	0.280
Czech Republic	98.68	62.83	181.00	47.38	65.71	147.32	0.434
Denmark	166.93	368.16	71.00	157.48	107.66	86.09	0.700
Estonia	79.59	78.46	129.00	52.72	47.56	100.40	0.448
Finland	140.18	182.43	152.00	190.28	76.82	120.21	0.649
France	114.84	111.44	110.00	108.08	108.49	137.83	0.568
Germany	128.64	154.14	162.00	139.95	106.85	87.29	0.632
Greece	71.98	57.16	37.00	101.21	78.18	60.88	0.364
Hungary	80.83	72.00	98.00	27.27	80.93	125.93	0.355
Ireland	133.60	310.27	135.00	64.65	104.48	62.91	0.609
Italy	105.92	74.60	118.00	116.86	115.75	101.20	0.432
Latvia	74.94	43.07	60.00	94.81	69.93	108.93	0.281
Lithuania	73.09	42.88	94.00	58.61	80.62	86.86	0.282
Luxembourg	124.04	106.14	115.00	205.14	131.46	59.94	0.598
Netherlands	98.11	66.08	77.00	106.06	124.44	108.09	0.631
Poland	58.56	39.66	54.00	58.44	62.41	76.56	0.292
Portugal	101.56	79.03	167.00	82.98	85.62	98.55	0.419
Romania	81.73	38.53	138.00	53.48	64.19	119.87	0.180
Slovakia	71.64	37.56	101.00	51.50	78.25	87.37	0.350
Slovenia	96.14	73.97	92.00	97.91	77.87	142.18	0.485
Spain	106.18	94.25	134.00	102.36	111.75	105.42	0.361
Sweden	124.49	120.93	154.00	159.74	102.38	93.05	0.704
United Kingdom	105.87	126.07	116.00	73.63	126.33	87.22	0.602

Data source: European Commission, 2016a; European Commission, 2016b

An analysis of the Summary Innovation Index (SII) indicates that Sweden, Denmark, Finland and Germany reach the best values in this area. For Romania and Bulgaria the SII is by far the lowest.

The presented results of the Eco-I-Index and the Summary Innovation Index prove that the same four countries, though in a slightly different order, are characterized by the highest level of both eco-innovation and general innovation of all the EU member states.

The indicators characterizing selected competitiveness issues perceived by top and middle managers in the EU member states under analysis are presented in Table 2.

Considering the opinions expressed by managers in the analyzed EU member states in response to the survey on individual selected competitiveness issues, the following categories were assessed the highest: Adaptability of companies (C1) – in Denmark, Ireland and Germany; Ethical practices (C2), Credibility of managers (C3) and Auditing and accounting practices (C5) – in Finland and Denmark; Corporate boards (C4) – in Finland

and Luxembourg; Customer satisfaction (C6) – in Romania, Ireland and Poland; Entrepreneurship (C7) – in Poland, Lithuania and Estonia; Social responsibility (C8) and Sustainable development (C13) – in Denmark; Health, safety & environmental concerns (C9) – in Denmark and Sweden; Flexibility and adaptability (C10) and Value system (C11) – in Ireland; Corporate values (C12) and Pollution problems (C14) – in Denmark and Sweden; and Environmental laws (C15) – in Sweden and Ireland.

Table 2: Indicators characterizing selected competitiveness issues in the EU member states

Country	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15
Austria	6.70	7.22	6.22	6.64	7.47	7.59	6.63	6.34	7.58	6.08	5.40	6.85	7.15	7.89	6.30
Belgium	6.19	7.04	6.30	6.15	7.85	7.13	6.08	6.00	7.19	5.93	5.15	6.63	6.04	6.11	4.85
Bulgaria	3.82	3.45	3.16	4.07	4.51	6.91	5.21	3.68	4.43	4.36	4.71	4.57	5.24	4.69	4.74
Croatia	2.79	3.83	3.14	3.30	5.37	5.16	4.45	3.51	4.07	3.79	3.39	4.53	3.66	6.14	5.16
Czech Republic	5.93	5.44	5.33	5.07	6.72	6.38	6.18	5.24	5.81	6.04	5.16	5.93	4.89	6.37	5.09
Denmark	7.70	8.28	7.70	6.82	8.36	7.87	6.13	7.54	8.47	7.54	6.07	7.74	7.97	8.92	7.05
Estonia	6.74	5.89	5.57	5.72	7.72	7.75	6.95	5.33	6.36	6.46	6.32	6.46	7.12	6.55	5.89
Finland	6.35	8.44	7.41	7.14	9.12	7.33	5.80	6.94	8.04	6.35	6.48	7.22	7.37	8.55	7.14
France	4.66	7.02	6.13	5.13	7.27	6.65	5.26	5.64	6.61	4.55	4.46	5.93	5.61	6.98	6.19
Germany	7.40	8.09	5.63	6.48	8.21	7.69	6.78	6.92	7.89	6.18	6.88	7.49	7.38	8.35	6.16
Greece	4.42	4.64	4.50	5.23	5.74	6.68	5.69	4.72	5.29	6.00	4.64	4.79	5.10	6.11	4.87
Hungary	5.13	5.13	3.96	5.12	6.59	6.68	5.58	3.81	4.53	4.31	4.00	4.45	4.96	6.08	6.43
Ireland	6.04	7.79	6.98	6.88	7.23	8.13	6.72	6.38	7.87	8.75	7.83	7.00	6.29	8.54	7.57
Italy	5.88	5.23	5.35	5.06	5.81	6.54	5.03	4.95	5.88	6.45	4.67	5.75	4.88	5.75	4.74
Latvia	7.05	5.60	6.01	6.05	7.58	7.52	5.88	5.09	5.28	6.74	6.29	5.89	5.26	7.93	7.05
Lithuania	6.67	5.64	5.32	6.16	8.17	7.84	7.02	5.51	5.33	6.60	5.50	5.70	4.69	6.17	6.26
Luxembourg	5.63	7.17	6.96	6.96	7.81	7.62	6.77	6.81	7.48	5.85	6.56	6.91	6.82	7.28	6.04
Netherlands	6.49	7.85	6.35	6.05	7.31	7.14	5.75	6.47	7.54	6.89	6.35	7.28	6.66	6.91	6.54
Poland	6.50	4.39	4.42	4.75	7.04	8.12	7.14	4.41	5.19	7.35	5.08	3.92	6.08	5.80	5.04
Portugal	5.00	5.02	4.85	5.12	6.30	6.25	4.86	3.91	4.74	6.43	4.85	4.82	4.80	6.86	6.40
Romania	4.86	4.35	5.56	4.89	6.06	8.51	6.06	4.93	7.02	6.67	4.63	5.13	7.75	5.24	5.06
Slovakia	5.35	5.08	5.55	5.37	7.17	6.69	6.19	4.65	6.35	6.26	5.58	5.23	5.15	6.08	5.31
Slovenia	4.26	4.18	3.20	2.32	4.83	6.32	4.99	4.24	5.51	3.94	4.06	4.69	4.67	5.90	4.65
Spain	5.08	5.07	4.65	4.49	6.65	6.19	4.92	4.30	5.57	5.81	4.81	5.05	5.53	6.90	6.44
Sweden	7.14	8.06	6.76	6.58	8.00	7.77	5.89	6.90	8.23	6.52	6.20	7.72	7.23	8.68	7.60
UK	6.32	7.53	6.40	6.28	7.62	7.24	5.44	5.93	7.77	6.70	6.88	5.93	5.18	7.54	6.04

Data source: IMD, 2014

In contrast, the following categories were assessed as by far the lowest: Adaptability of companies (C1), Corporate boards (C4), Customer satisfaction (C6), Entrepreneurship (C7), Health, safety & environmental concerns (C9), Flexibility and adaptability (C10), Value system (C11) and Sustainable development (C13) – in Croatia; Auditing and accounting practices (C5) – in Bulgaria; Ethical practices (C2), Credibility of managers (C3) and Social responsibility (C8) – in Bulgaria and Croatia; and Corporate values (C12) – in Poland.

The correlations (based on the Pearson correlation coefficients) between indicators characterizing eco-innovation/innovation performance and selected competitiveness issues in the EU member states are presented in Table 3.

Table 3: Correlation between indicators characterizing eco-innovation/innovation performance and selected competitiveness issues in the EU member states (Pearson correlation coefficients)

Indicator	Eco-I-Index	E1	E2	E3	E4	E5	SII
C1	0.49*	0.47*	0.15	0.34	0.27	0.01 *	0.53**
C2	0.82***	0.70***	0.32**	0.65***	0.63*	−0.06**	0.90*
C3	0.75***	0.66***	0.27*	0.59*	0.52*	−0.06**	0.71*
C4	0.59**	0.55*	0.22	0.49*	0.43*	−0.26*	0.61*
C5	0.57**	0.49*	0.26	0.50*	0.35	−0.05*	0.60*
C6	0.24	0.36	0.01	0.13	0.01	−0.13	0.21
C7	0.10	0.21	0.02	0.05	−0.07	−0.23	0.17
C8	0.79***	0.68***	0.24**	0.70*	0.55*	−0.11**	0.83*
C9	0.78***	0.67***	0.33*	0.61*	0.56*	−0.06**	0.82*
C10	0.37*	0.51*	0.10	0.11	0.21	−0.23	0.28
C11	0.52**	0.57*	0.22	0.33	0.34	−0.21*	0.58*
C12	0.78***	0.64***	0.35**	0.66*	0.52*	−0.08**	0.84*
C13	0.57**	0.52*	0.22	0.50*	0.19	−0.03*	0.52*
C14	0.81***	0.75***	0.30**	0.64*	0.50*	−0.10**	0.75*
C15	0.61***	0.60*	0.24	0.38	0.36	0.01*	0.51*

Note: * p < 0.05; ** p < 0.01; *** p < 0.001

The correlations between the Eco-I-Index and the indicators related to the analyzed competitiveness issues turn out to be statistically significant for most variables. In particular, strong correlations have been found between the Eco-I-Index and Ethical practices ($r_{Eco-I-Index\&C2}=0.82$), Pollution problems ($r_{Eco-I-Index\&C14}=0.81$), Social responsibility ($r_{Eco-I-Index\&C8}=0.79$), Health, safety & environmental concerns ($r_{Eco-I-Index\&C9}=0.78$), and Corporate values ($r_{Eco-I-Index\&C12}=0.78$).

For indicators characterizing individual components of the Eco-Innovation Scoreboard and the competitiveness issues under analysis, the correlations are weaker and their statistical significance is smaller.

The relationships between Eco-innovation inputs (E1) and competitiveness issues are in most cases statistically significant and relatively strong. In particular, this concerns – in terms of the correlation strength – Pollution problems ($r_{E1\&C14}=0.75$), Ethical practices ($r_{E1\&C2}=0.70$) and Social responsibility ($r_{E1\&C8}=0.68$). Considering the relationships between Eco-innovation outputs (E3) and competitiveness issues, the strongest correlations occur in relation to Social responsibility ($r_{E3\&C8}=0.70$), Corporate values ($r_{E3\&C12}=0.66$), Ethical practices ($r_{E3\&C2}=0.65$), and Pollution problems ($r_{E3\&C14}=0.64$). Moreover, statistically significant, mean correlations have been identified between Resource efficiency outcomes (E4) and a few indicators related to competitiveness issues, of which – based on the relationship strength – Ethical practices ($r_{E4\&C2}=0.63$), Health, safety & environmental concerns ($r_{E4\&C9}=0.56$), and Social responsibility ($r_{E4\&C8}=0.55$)

can be distinguished. It may come as a surprise that in relation to Eco-innovation activities (E2) and Socio-economic outcomes (E5) no statistically significant correlations are found with any of the analyzed variables concerning competitiveness issues.

The characteristic thing is that the analysis of correlations between the Summary Innovation Index (SII) and indicators related to the competitiveness issues under consideration indicates that the correlations are generally stronger than in the case of the Eco-I-Index. This concerns Ethical practices ($r_{SII\&C2}$=0.90), Corporate values ($r_{SII\&C12}$=0.84), Social responsibility ($r_{SII\&C8}$=0.83), and Health, safety & environmental concerns ($r_{SII\&C9}$=0.82) in the first place. Only in relation to Pollution problems ($r_{Eco-I-Index\&C14}$=0.81, $r_{SII\&C14}$=0.75), Credibility of managers ($r_{Eco-I-Index\&C3}$=0.75, $r_{SII\&C3}$=0.71), Environmental laws ($r_{Eco-I-Index\&C15}$=0.61, $r_{SII\&C15}$=0.51) and Sustainable development ($r_{Eco-I-Index\&C13}$=0.57, $r_{SII\&C13}$=0.52) are the correlations of the aforementioned variables with the Eco-I-Index stronger compared to those with the SII.

4. Discussion and Conclusions

The main aim of the analysis presented in this paper was to identify the relationships between eco-innovation performance and selected issues taken into consideration while making an assessment of competitiveness of individual countries.

The analysis results indicate that statistically significant and strong correlations occur between indicators characterizing eco-innovation performance in the 26 EU member states and indicators describing the perception of selected competitiveness issues by business leaders in those countries.

In particular, the presented cross-country analysis shows that: the more ethical practices are implemented in companies, the higher the business leaders' social responsibility, the more adequately health, safety & environmental concerns are addressed by the management and the more corporate values take account of the employees' values – the higher overall eco-innovation performance is achieved. The analysis also indicates that the relationships between indicators characterizing competitiveness issues and overall innovation performance are even stronger. This confirms the observations made in previous studies (del Rio et al., 2016), which suggest that many drivers to general innovation are likely to be shared by eco-innovation, and that policies supporting general innovation also lead to eco-innovation.

However, it has to be emphasized that for some competitiveness issues their correlations with the Eco-I-Index turn out to be stronger than those with the SII. The identified relationships indicate that the lack of pollution problems affecting economy, high credibility of managers in the society, environmental laws that do not hinder competitiveness of businesses and sustainable development being a company's priority are of particular importance in achieving better eco-innovation performance.

Considering the issues discussed above, it may be stated that they should be shaped both by the policy-makers involved in the development of instruments supporting eco-innovations and by the entrepreneurs deciding to implement them.

The policy-makers' activities should therefore be focused on implementing instruments that will eliminate pollution problems, creating at the same time adequate environmental laws. According the Porter Hypothesis, properly designed environmental regulation can trigger innovation and even may partially or more than fully offset the costs of complying with them (Porter and van der Linde, 1995). In addition, there is

growing evidence for the importance of "smart" and innovation-friendly framework of environmental regulation (Jaenicke, 2008).

The entrepreneurs' task, on the other hand, is to take care for their managers' credibility and follow corporate strategies that take account of sustainable development. Thus, managerial mindset in organizations should be shaped by green organizational identity and based on environmental organizational legitimacy and widely shared system of environmental norms, beliefs, and values (Chang and Chen, 2013).

The conclusions concerning the correlations between the analyzed competitiveness issues and particular dimensions of eco-innovation are also interesting. The strongest relationships occur for Eco-innovation inputs and Eco-innovation outputs. This means that the stronger the intensity of selected competitiveness issues, the higher the government's environmental and energy R&D appropriations and outlays, the bigger the number of the total R&D personnel and researchers and the greater the total value of green early-stage investments. On the other hand, this also generates a bigger number of patents and academic publications related to eco-innovation.

If there are no statistically significant correlations of the analyzed competitiveness issues with Eco-innovation activities, it suggests that they have no influence on the percentage of companies that have implemented innovation activities aiming at a reduction in material input per unit output, the percentage of companies that have implemented innovation activities aiming at a reduction in energy input per unit output and the number of ISO 14001 registered organizations. Nevertheless, it has to be stressed that the percentage of companies that have implemented eco-innovation activities does not fully cover the scope and impact of eco-innovation. It seems more important how many eco-innovations are implemented, what is eco-innovation speed (i.e. firm agility to eco-innovative product launching and new environment friendly processes development) and what is eco-innovation quality (i.e. novelty and eco-efficiency of eco-innovative products and processes) rather than how many companies actually implement any eco-innovations (Ryszko, 2016). Moreover, eco-innovation number, speed and quality may indirectly result from Eco-innovation inputs and Eco-innovation outputs.

It has to be noted that the research results presented in this paper should be viewed as a preliminary stage of exploration of issues in the area under analysis. They require a more thorough identification of the problems discussed above and more complex statistical analyses are necessary to confirm the drawn conclusions. In addition, the examined relationships between the indicators analyzed herein are likely to be influenced by other variables (e.g. innovative policy, institutional structure, market structure and demand, technological characteristics, innovation path dependency etc.), differing from country to country and more research is needed to fully understand the explored interactions.

Acknowledgements

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The Effect of Innovation on Growth Aspirations and Internationalization in Firms: Africa Compared to the Protestant Europe

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Abstract

The aim of the current study was to investigate if and how context accounts for differences in the innovation, growth and export in African firms compared to firms in protestant Europe. Data extracted and recoded from a sample of firms in 20 countries (7 Protestant Europe and 13 African countries) participated in Global Entrepreneurship Monitor (GEM) surveys from 2001 to 2013 and this yielded a sample of 10981 firms. Analyses were done applying hierarchical linear modelling (HLM) due to the use of variables in different levels of analysis (firm level and regional level). Interestingly, the results showed that African firms don't differ in terms of their innovation, growth and internationalization level with the Protestant world but, if innovate, African companies expect less growth and internationalization from their innovation. Indeed, the results indicated that innovation exerts a significant positive influence on growth expectations and internationalization of the firms. The paper contributes to the existing literature by contextualizing the interplay of firm innovation, growth and internationalization.

Keywords: Innovation, growth, export, internationalization

JEL Classification: O30, O43, B27, E02

1. Introduction

Along with the paradigm shift in entrepreneurship from the more business policy to the high-growth business policy, a huge body of research has shifted its attention to the growth in firms, its drivers, motivations, predictors and consequences (Coad & Rao, 2008; Thornhill, 2006; Corsino & Gabriele, 2010; Deschryvere, 2014; Wei, Yang, Sun & Gu, 2014; Coad, A., Segarra, A., & Teruel, 2016; Terjesen, 2016). Most of these studies refer to the Schumpeter (1942)'s framework in bringing growth to the firms following a creative destruction by the introduction of innovations. For the Schumpeter, markets were not in the static equilibrium situation as neoclassical theorists were conceptualized it. For him, the markets were dynamic processes in which the interaction of heterogenous firms lead to different product and process innovations facilitating firms' growth (Schumpeter, 1942; Audretsch, Coad, Segarra, 2013). In his views, when entrepreneurs set a new combination of production factors in a new production function, entrepreneurial profit stems from this innovation and lead to a new disequilibrium in the market (Reinert & Reinert, 2006).

However, studies have highlighted that in general, the firms hardly grow and internationalize and still a small number of firms are responsible for the major share of employment. Based on OECD-Eurostat Entrepreneurship Indicators Program only 3–6% or 8–12% of total population of the companies can be considered as high growth firms respectively based on the employment level or average turnover (OECD, 2010). It may even be harder for the African firms to grow and go global because, they face tremendous structural, cultural and contextual challenges specific to the African geo-economic area regarding to their internationalization (Ibeh, Wilson & Chizema, 2012). The concern for growth and internationalization of the firms in Africa seems much serious because while the share of some African firms has been raised in the global economy (Ibeh, Wilson & Chizema, 2012; Roberts and Thouborn, 2003; Ibeh, 2001), the share of Africa region in global export is diminished in recent years (Ibeh, Wilson & Chizma, 2012). As well, due to high transaction cost (both for investors and the firms), difficult operating environment (due to political instability) and lack of necessary resources for growth (Fukunishi, 2004, Ibeh, Wilson & Chizema, 2012), African exports are under dominance of the raw materials and commodities (Henson, Masakure, & Cranfield, 2011; Marco & Patterson, 2010) where the innovative, growth oriented entrepreneurial activity less prevails.

Economic activity is socially embedded (Granovetter,1985). This implies that context matters in the study of economic activity. Due to the highlighted scarcity of innovative growth and export in African context, there is a need to investigate innovation, growth and internationalization of African firms in terms of the nature, the antecedents and the mechanism by which they differ to the other innovative export oriented economies. This area of inquiry has been less investigated. The current paper presents an understanding and contributes to the African firms' growth and internationalization which is in accordance with persistent calls (Boso, Ibeh, Chizema & Adeleye, 2016) for the investigation of growth and internationalization of African firms. To shed light on this issue, the interplay of innovation, growth and export in Africa is compared with the protestant countries of Europe which contrary to Africa, are characterized with innovation driven economies (Martin, 2007; Schwab, 2010), the dominance of rational secular and self-expression values (Inglehart, 2008; Inglehart & Welzel, 2005), the well-established and enforced property right systems (Ferrantino, 1993; Blind, 2012; Chang, 2001), low rate of corruption and high economic transparency, higher levels of individ-

ualism, feminist values and lower levels of uncertainty avoidance and power distance (Hofstede, 2001; Hofstede, Hofstede and Minkov, 2010) and higher levels of social and interpersonal trust (Delhey & Newton, 2005; Gheorghiu, Vignoles, & Smith, 2009). This array of growth and innovation centered institutions have formed a kind of "*institutional thickness*" for the countries of protestant Europe (Amin & Thrift, 1995). The institutional thickness implies that regions with a greater number of growth related institutions are more likely to grow than regions where institutions are 'thin' or lacking (Amin & Thrift, 1995). It is believed that, the thickness of the institutions provides numerous pathways and alternatives to the growth and development (Beer & Lester, 2015) and because the economic activity of the firm is embedded in the social structure, this thin or thick institutions affect the economic activity. The aim of the current paper is not to investigate the effect of each of growth promoting institutions in protestant Europe and Africa separately but, the authors investigate how these two different contexts can influence the level and the interplay of innovation, growth and internationalization. This leaves a great area of inquiry for future studies to investigate the mechanisms of the effects of different contextual and institutional factors on firm innovation, growth and internationalization. We contribute to the existing literature in the following ways: 1. There are an increasing call from the researchers to contextualize entrepreneurship research (Welter, 2011; Wiklund et al., 2011; Zahra, Wright & Abdelgawad, 2014). In the current research, we investigate the effect of innovation on growth and internationalization of the firms embedded in the context. 2. There are some other calls from the researchers to include mixed models and encourage entrepreneurship research using more complex methods and combining different levels of analysis (Zahra, Wright & Abdelgawad, 2014; Garud, Gehman, & Giuliani, 2014; Wiklund et al., 2014; Steyaert & Landström, 2011; Bruton, Ahlstrom, & Obloj, 2008). In the current research a multi-level analysis will be applied. 3. Due to the large sample size and the number of countries of the current research, we produce reliable and generalizable results enriching the innovation, growth and international entrepreneurship literature.
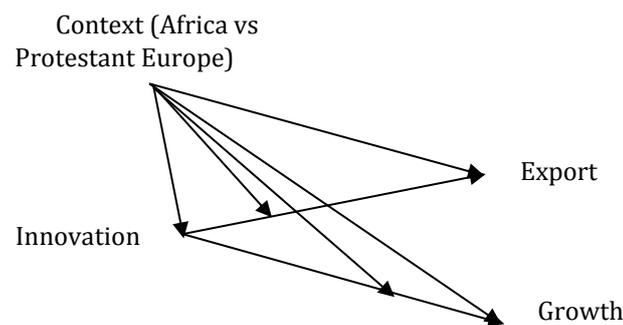

Figure1. Context affecting innovation, growth and internationalization

2. Theoretical Background and Hypothesis development

2.1. Growth affected by innovation

Since the necessity of innovation for the growth has been studied and emphasized both theoretically and empirically, there is no clear consensus in the research on the role of

innovation for firm growth. There are some studies reporting positive effects of innovation on firm-growth. In this regard, the studies of Akçomak & Ter Weel, (2009), Coad (2008) and Del Monte & Papagni (2003) are mentionable. As well, there are some other studies that don't report a significant positive effect of the innovation on growth (for example, Almus, Nerlinger & Steil ,1999; Bottazzi et al., 2001; Lööf and Heshmati, 2006). Some others also have reported a negative impact of innovation on growth (for example, Brouwer et al., 1993; Freel and Robson, 2004). The heterogeneity of the results of empirical studies on innovation-growth link may be partly due to the different measures which are used for measuring innovation and growth. As well, the research show that the return for innovations are very skewed in the firms with long pay-back time (Coad, 2008) making it difficult to study or attribute it to the innovation. As mentioned above, as the theoretical grounds prove that there may be a positive effect of innovation and growth, the empirical studies of innovation and growth are inconclusive. Based on the above-mentioned arguments, we propose the following hypothesis:

H1. Innovation exerts a significant positive effect on firm growth.

2.2.   Innovation affecting export

The resource based view considers the firms as a source of heterogenous resources which brings competitive advantage for the firm in the market (Dhanaraj & Beamish, 2003; Newbert, 2007; Roxas & Chadee, 2011). According to this theory possession of the resources having the following four characteristics can make the firms gaining competitive advantage over their competitors: 1. valuable enough to encourage and support the firm strategic orientation, 2. scarce enough so that the competitors hardly be able to access them, 3. non-substitutability so that it be irreplaceable by other resources, 4. complexity in order to not be imitable by the competitors. It has been assumed that having these resources make a competitive advantage for the firm over their competitors in gaining access to the international markets (see Roper and Love, 2015; Dhanaraj and Beamish, 2003). Regardless of the tangible and intangible resources, technological resources have been considered as a type of resource bearing the four main characteristics of the competitive resources (Rodil, Vence & Sánchez, 2015). These types of resources serve as the base and platform for innovations which can improve the speed, scope and the scale of the production and servicing and consequently extend them behind national borders. Based on the above statements the authors hypothesize that:

H2. Innovation exerts a significant effect on firm exporting.

2.3.   Context affecting innovation, growth and internationalization

The effect of socioeconomic context on innovation and growth can be investigated in terms of institutions. Research suggest that special forms of institutions both directly or in interaction with individual and firm characteristics have led to special growth and innovation performance for the firms. Bayat, Schott and Zali (2014) in a study found that the level of innovation is higher in the high-trust societies (like protestant Europe) than in the low-trust society. They also found that networking promotes innovation more in the high-trust society than in the low-trust society. In a large-scale study in 10 European countries concerning the adoption of innovation, Waarts & Van Everdingen (2005) found that national cultural highly significantly explain variance in adoption decisions in addition to the traditional micro and meso variables. Sun (2009) in a study on the influence of national cultures on innovation capability found that individualism, power dis-

tance and uncertainty avoidance are correlated with national innovation capability. Varsakelis (2001) found that countries with a strong patent protection framework invest more in R&D, and the national culture is correlated to the R&D investment. The effect of cultural values on innovation also can be explained by the effect of culture on size and diversity of networks around the entrepreneurs. Traditional culture (the dominant culture in Africa region) promotes entrepreneurs' networking in the private sphere, impeding innovation, whereas secular-rational culture (the dominant culture in protestant Europe) facilitates networking in the public sphere and this facilitates innovation in the firms (Schott et al., 2014). Schott and Cheraghi (2015) found that networks are smaller in traditional culture than in secular–rational culture. Also, they found that public sphere network benefits innovation, especially in traditional culture. Hovne, Hovne and Schott (2014) found a positive effect of individualism for taking advantage of education for innovation. Schott and Cheraghi (2014) in their study among 61 countries and 88562 entrepreneurs found that cultural traditionalism reduces diversity and overall networking and specifically networking in the work-place, professions, market and internationally, but enhances private networking. They found these cultural effects are even larger than effects of attributes of the entrepreneur. As stated before the effective institutional predictors of growth and innovation in the above studies are mostly relevant to the protestant culture where the abundance and large number of growth oriented institutions prevail and govern. This situation has made a kind of "institutional thickness" which according to the research is more likely to lead to the innovation and growth (Amin & Thrift, 1995). Therefore, we hypothesize that:

H3. The African firms are less innovative than the protestant Europe firms.

H4. The African firms grow less than the firms in protestant Europe region.

H5. The African firms benefit less from their innovation toward growth than protestant Europe firms.

H6. The African firms export less than the firms in Protestant Europe

H7. The African firms benefit less from their innovation toward exporting

3. Method

3.1. Data and Sampling:

The current research benefits from data collected by Global Entrepreneurship Monitor. The GEM consortium annually conducts two surveys in plenty of countries around the world namely Adult Population Survey (APS) and National Expert Survey (NES) measuring adult involvement in entrepreneurship and institutional framework conditions in each participating country respectively. Firm innovation, export and growth expectation have been measured in APS. Our data extracted from a sample of 20 countries (13 African and 7 protestant Europe countries) participated in GEM annual surveys in 2001–2013 and this yielded a sample of 10981firms. The countries participate in GEM surveys by self-selection annually. In the current research the data of the following countries extracted and coded for further analysis: *African countries:* Algeria, Angola, Botswana, Ethiopia, Ghana, Morocco, Namibia, Nigeria, Tunisia, Tonga, South Africa, Yemen and Zambia *Protestant Europe countries:* Sweden, Norway, Netherland, Iceland, Finland, Denmark and Germany

3.2.   Statistical Analysis:

Since the current study uses the data from country level and the firm level, Hierarchical Linear Modeling (HLM) is more appropriate than linear regression. HLM is quite similar to linear regression in that a path is tested via a coefficient (Woltman, Feldstain, MacKay & Rocchi, 2012). Also, using HLM for testing direct effects lets us to control for the variables of interest and add to the accuracy of the findings.

4. Results

In this section, we report the results of hierarchical linear modeling for the effects of innovation and growth on exporting. Table 1. Shows the results of correlation analysis between variables of interest in the current research. As the data shows, there are significant relationships between the variables, support the main idea of the research that growth and exporting in the firms is embedded in the context which the firm operate and the degree of innovation.

Table1. correlation coefficients between variables of the study

	Mean	Std.	Innovation	Growth	Export	Context
Innovation	1.50	0.499	1	.188**	.176**	.054**
Growth	0.86	1.001	.188**	1	.093**	-.219**
Export	1.99	1.46	.176**	.093**	1	.119**
Context [a]	0.195	0.396	–.054**	–.219**	.119**	1
Self-efficacy	0.87	0.341	–.070**	–.041**	–.015	–.002
Age	37.39	11.65	–.070**	–.180**	–.007	.297**
Household income	2.17	0.777	.011	.032**	.066**	.091**
Education	9.93	5.23	.172**	.079**	.200**	.297**
Risk-willingness	0.77	0.423	–.091**	–.047**	–.057**	.064**
Gender	0.58	0.494	–.010	.062**	.037**	.032**
Household size	5.50	3.83	–.079**	–.016	–.005	–.115**
Firm age	1.03	1.12	–.230**	–.436**	–.065**	.217**
Firm Size	0.638	0.896	–.015	–.374**	.130**	.159**
Opportunity Alertness	0.70	0.459	–.048**	–.012	–.020	–.151**
Number of Owners	0.315	0.541	.037**	.044**	.069**	.062**
Sole ownership	0.68	0.466	–.067**	–.082**	–.136**	–.121**

a Protestant Europe=1 & Africa=0

4.1.   Growth affected by innovation and context

Table 2 reports the effect of innovation and the geo-economic context (African vs Protestant) on the level of firm innovation (results of hierarchical linear modeling based on 10981 firms in 20 countries). As stated below the table 2, we have coded 0 for African countries and 1 for protestants. *Hypothesis 1* expected a significant positive effect of innovation on growth. As the table 2 shows, the effect of innovation on growth is significant indicating that the innovative firms expect more growth. *Hypothesis 4* expected a significant negative effect for the geo-economic context on growth. Results of the analysis didn't support the hypothesis 2. This indicate that there is no difference between the two regions in terms of innovation. In other words, the firms in the African context are as innovative as the firms in protestant context. *Hypothesis 5* expected a negative effect of African context on the benefit of the firms from innovation toward growth. According

to table 2, this hypothesis supported by the results indicating that compared to the firms in Africa, the firms in protestant Europe benefit more from their innovation toward growth.

Table 2. growth affected by innovation and context

	Main Effects		Interaction Effects	
	Metric coefficients	Standardized coefficients	Metric coefficients	Standardized coefficients
Innovation	.071**	.035**	.060#	.061#
Context [a]	–.481	–.190	.961#	–.180#
Innovation*Context	—	—	.322**	.063**
Self-efficacy [c]	.007	.002	.008	.002
Age [c]	.002**	.027**	.002**	.027**
Household income [c]	.101**	.078**	.101	.078**
Education [c]	.024**	.126**	.024**	.126**
Risk-willingness [c]	–.019	–.008	–.020	–.008
Gender [c]	.170**	.084**	.170**	.083**
Household size [c]	.011**	.045**	.011**	.044**
Firm age [c]	–.183**	–.205**	–.183**	–.205**
Firm Size [c]	–.384**	–.344**	–.384	–.344
Opportunity Alertness [c]	–.018	–.008	–.019	–.009
Number of Owners [c]	.261**	.141**	.260**	.141**
Sole ownership [c]	.067	.031	.069	.032

[c] control variables, ** significant at p<0.05, [a] protestant Europe=1 & Africa=0, #Significance not tested (significance not tested because the significance of the direct effects was tested in the first model)

4.2. Innovation affected by context

Hypothesis 3 expected a greater innovation for the firms in protestant countries than African countries. As it is reported in table 3, this hypothesis was not supported by the results. This indicates that there is no difference between firms in Africa and protestant Europe in terms of level of innovations.

Table 3. Innovation affected by context

	Metric coefficients	Standardized coefficients
Context [a]	–.176	–.069
Self-efficacy [c]	.023	.008
Age [c]	–.000	–.007
Household income [c]	–.021**	–.017**
Education [c]	.003**	.017**
Risk-willingness [c]	–.006	–.002
Gender [c]	–.016	–.008
Household size [c]	–.005**	–.019**
Firm age [c]	–.054**	–.060**
Firm Size [c]	.002	.002
Opportunity Alertness [c]	–.022	–.010
Number of Owners [c]	.063**	.034**
Sole ownership [c]	.008	.004

[c] control variables, ** significant at p<0.05, [a] protestant Europe = 1 & Africa = 0

4.3. Export (Internationalization) affected by context and Innovation

Hypothesis 2 expected a significant positive effect of the innovation on exporting. As table 4 reports, this hypothesis was confirmed indicating that the innovative firms export more.

Hypothesis 6 supposed a negative significant effect for the African context on the export in the firms. As table 4 reports, the effect of context (protestant Europe vs African context) is not significant on the firm exports. Therefore, the hypothesis 4 was not supported by the results of the study. As well, table 4 reports the interaction effects of context and innovation on the export level. As the table shows, this effect is significant and negative indicating that the firms in protestant Europe tend to benefit from their innovation for internationalization more than African firms. In other words, the African context causes the firms to less benefit from their innovation for exporting. Therefore, the *hypothesis 7* was confirmed.

Table 4. Export affected by innovation and context

	Main Effects		Interaction Effects	
	Metric coefficients	Standardized coefficients	Metric coefficients	Standardized coefficients
Innovation	.190**	.064**	.171#	.100#
Context [a]	.005	.001	-.889#	.014#
Innovation*Context	—	—	.627**	.084**
Self-efficacy [c]	.020	.004	.021	.004
Age [c]	–.001	–.013	-.001	-.012
Household income [c]	.005	.002	.005	.002
Education [c]	.022**	.081**	.022**	.081**
Risk-willingness [c]	–.128**	–.037**	-.130**	-.037**
Gender [c]	.028	.009	.028	.009
Household size [c]	.005	.013	.004	.012
Firm age [c]	–.085**	–.065**	-.085**	-.065**
Firm Size [c]	.155**	.094**	.155**	.094**
Opportunity Alertness [c]	–.015	–.004	-.018	-.005
Number of Owners [c]	.008	.003	.011	.004
Sole ownership [c]	–.202**	–.064**	-.195**	-.062**

[c] control variables, ** significant at p<0.05, [a] protestant Europe = 1 & Africa = 0, [#]Significance not tested (significance not tested because the significance of the direct effects was tested in the first model)

5. Discussions and Conclusions

Economic activity is socially embedded (Granovetter, 1985) and thus the study of the economic activity should be contextualized. Since contextualizing the research in recent entrepreneurship research is recommended and supported (see, Johannisson & Mønsted, 1998; Welter, 2011, Zahra, Write & Abdelgawad, 2014), the main objective of the study was to investigate if and how context accounts for differences in the innovation, growth and export in African firms compared to firms in protestant Europe.

Difference in export and growth expectations of innovative firms between the two contexts can be explained by the institutional settings and stylized facts of the competition and growth in the protestant Europe and Africa. As discussed earlier, there are radical differences in the two contexts in terms of the level of corruption, economic transparency, political stability, cultural tendencies, economy openness, the dominant econ-

omy, intellectual property protection and enforcement, trust, etc. in these two contexts. Based on the above differences, we expected a kind of institutional synergy between these institutional arrangements in predicting innovation, growth and exporting for the firms so that the authors expected less innovation, growth and internationalization for the African firms. Interestingly, our results indicated that generally, exporting, innovation and growth don't differ in the Protestant Europe and Africa (the direct effect of socioeconomic context didn't confirm) but, *if innovate*, the firms expect more growth and export more in the protestant Europe compared to the Africa.

One possible explanation for this variation may be in terms of the effect of networks and the networking type on the firm growth and innovation. As Hoops, Madsen and Walker (2003) truly point it: firm's network relationships may enable it to gain access over the value increasing or cost reducing resources thus leading to cost-effectiveness for the firm. On the other hands, networks may provide value to the firm by providing information about future opportunities for enhancing product quality. Linking this to the finding of our study, we can argue that this cost-effectiveness and access to the new international markets (opportunities) resulting from the possibility and greater size of networks (Schott & Cheraghi, 2015) causes the firms in protestant Europe to expect more growth and internationalization from their innovation. The unique access to these cost-lowering and value adding networks cause the firms in protestant Europe to gain competitive advantage over their peers in African context. This contextual heterogeneity may act as a kind of 'competitive heterogeneity' (Hoops, Madsen and Walker, 2003) for the firms in Protestant Europe enabling them to benefit more from their innovation toward growth and exporting. These differences also can be in investigated in terms of other institutional factors such as level of corruption, economic transparency, political stability, cultural tendencies, economy openness, the dominant economy, intellectual property protection and enforcement and trust. We leave this on the responsibility of future research.

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Evaluation of the impact of selected factors on consumer behaviour when purchasing local food in a particular region

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Abstract

The paper assesses selected factors which influence consumer behaviour when they purchase local/regional foods in a particular region. The research focuses on Prague and the Central Bohemian region. The data have been acquired using a personal interview questionnaire survey with consumers purchasing local products. The output data are initially compared at the regional level (2 monitored regions). Subsequently, they are evaluated overall and the dependence of selected factors which are assumed to influence consumer purchasing behaviour is tested. The results of the research indicate that there are insignificant differences between the regions. Only weak dependence between purchasing frequency and importance of food composition to consumers has been ascertained. The results also lead to a possible conclusion that the quality and labelling are not a priority for the surveyed consumers of local foods, and that other factors need to be emphasized when marketing these products.

Keywords: consumer, local food, region, dependence, preference, purchase, frequency

JEL: R21, M390

1. Introduction

Currently, there is no definition of the term "local product". "Local food is a movement which aims to connect food producers and food consumers in the same geographic region in order to develop more self-reliant and resilient food networks (Feenstra, 2002). One common definition of "local" food is food grown within 100 miles (160 km) (Roosevelt, 2006) or a 400-mile distance (Congress of the United States of America, 2008) of its point of purchase or consumption. Ittersum et al. (2003) defines a regional product as one whose quality and/or renown is connected with the region, and whose marketing is based on using the name of the region of its origin. The region is understood as an area demarcated by administrative borders of the region, as a higher territorial self-governing unit (Musil, 2010). One of the factors that influences the term "local" is for example population density or climate (Martinez, 2010).

In recent years, regional labelling of food has been rapidly developing in European countries as a reaction to interest of the consumers searching for an alternative to global products (McEntee, 2010). Likewise, Czech consumers have moved their demand to food products with higher added value; they put more emphasis on perceived quality, longer durability and special product characteristics (Turčínková and Stávková, 2009). Turčínková and Kalábová (2011) conclude that emphasizing the local origin of food can be its competitive advantage. As a result of these preferences, local food products have started to appear in supermarkets at a greater extent. Popularity of farmers' markets is also increasing (Dodds, et al., 2014).

Consumers prefer local food products for several reasons. Their consumption has become a certain sign of "local patriotism" and a way of "fighting" against the omnipresent globalisation. By preferring them, the consumer helps local producers and domestic economy (Keeling-Bond, et al., 2006). Local food products appear fresher, more palatable, safer, and reach higher quality and safety than those produced on the opposite side of the world (Conner, et al., 2010; Roosen et al., 2003; Schupp and Gillespie, 2001). In addition, consumption of local foods is often claimed to be connected with organic food (Hempel and Hamm, 2016). Some authors discuss a specific brand of regional foods (for example Chalupová et al., 2012), support of local economy (Writhgen, 2008) or a specific local product (D'amico, M., et al., 2014).

However, as the attributes of local foods can connect with a consumer on multiple cognitive and emotional levels (Delind, 2006), it becomes important to further examine which cognitive processes or emotional states most influence consumer connectedness to, and willingness-to-pay for, local food products (Campbell et al, 2014). Understanding customer motivation and behaviour (while purchasing local food) is a prerequisite for lasting customer relationships (Starzyczna et al., 2013).

The purpose of the paper is to indentify factors which influence general food-purchasing behaviour of consumers who express their positive relationship with local food products in a selected region. These factors were focused on: price of the product, product composition, expected quality of the product, country of origin, designation of the product with a logo or a symbol representing its regionality.

The research questions are as follows: (1) With respect to predefined factors, are there significant differences in purchasing behaviour of consumers from Prague and Central Bohemia? (2) Is it possible to confirm the following hypotheses?

H1: The consumer's purchasing frequency is not influenced by the importance of food composition.

H2: Consumer purchasing behaviour is not influenced by preference for qualitative parameters and food composition.

H3: The consumer's place of residence does not influence preference for qualitative parameters and importance of food composition when making a purchase.

2. Methodology and Data

Since there appears no standard for what "local food" is, consumer research tends to define the term relatively narrowly as purchasing from farmers' markets, purchasing groceries with some logo/label such as „Regionální potravina" (Regional Food), Klasa (national label for a quality product), Český výrobek/Česká potravina (Czech product/Czech Food), Biozebra-biopotravina, (organic food with a logo of the national inspection institution), protected geographical indication, protected designation of origin and traditional speciality guaranteed.

The data have been acquired using a personal interview questionnaire survey between October and November 2015 in Prague and Central Bohemia. The respondents from Central Bohemia and Prague were selected due to demographic and economic similarities of the regions, while Prague does not have its own brand of regional foods. Nevertheless, Praguers can statistically be characterized by the highest purchasing power. Central Bohemian residents often work in Prague and its surroundings which suggests their higher purchasing power (and lower product price sensitivity) than for instance of Southern Moravian residents, their attitudes also tend to be similar to those of residents of Prague. On the other hand, a positive attitude to rural areas should also be evident here as well as closer access to regional producers. Both regions express greater interest in organic foods than residents of other regions in the CR. The place of residence and the degree of urbanisation is emphasized for example by Lobb et al. (2006), purchasing power by for instance Schupp et al. (2001).

The questionnaire was developed based on comparison of available materials and surveys focusing on an analogous area of research. A structured questionnaire contained 20 questions, out of which 13 were closed, 5 semi-open and 2 open. The survey questions focused on purchasing frequency, preferences when selecting foods (price, composition, labelling) and awareness of logos and food brands related to their localness, whether directly or the way they are associated with in consumers' conscience. The respondents were selected based on their active participation in purchasing food, purchasing local food, while their place of residence was in one of the monitored regions.

One-dimensional and multi-dimensional tools for analysis of categorical datasets were used to analyze the questionnaire survey. The basic analysis of individual values of variables was derived from calculation of relative frequency, which expresses the ratio of the number of occurrences of the values of one category of statistical units to the total range of the dataset, and it is most frequently presented in percentage when the results are interpreted.

The multi-dimensional analysis was based on the analysis of dependence of two variables which were described based on contingency tables. Frequencies are recorded in these for such pairs of categories of variables, in which one of the categories appertains to the first variable and the second category to the second variable. Contingency tables created this way served as the basis for testing the hypotheses and for calculating the degrees of the intensity of dependence. The chi-square test for independence of attributes was used for testing in contingency tables. The precondition for using this test is

that expected frequencies in individual cells must not be lower than 5 at least in 80% of cells, and in the remaining cells theoretical frequencies must not be lower than 1. Whenever the preconditions failed to be fulfilled, Fisher's exact test was used to test independence (Pecáková, 2008). For the test of statistical hypotheses and the following analysis the significance level $\alpha = 0.05$ was used. The practical calculations were made with MS Excel and the statistical software SPSS version 23.

3. Results

3.1. Basic comparison

The final data matrix comprised responses from 170 respondents. Approx. 70 % of respondents were from Prague, 30% respondents were from the Central Bohemian region. There are 58% of women and 42% of men. Secondary education (35 %) and higher education (25%) predominated. Since the questions were interconnected and some of them were only complementary or explanatory, the following text contains interpretation of the most important responses and information related to the research questions.

The first part focuses on a simple analysis of the factors in terms of the selected regions which might influence the consumer when selecting and purchasing food.

Regarding purchasing frequency, 2–3 times a week or every day were the most frequently stated responses. The conducted comparison suggests that there are no significant differences between the regions in terms of purchasing frequency. Logically, Praguers have better access to shops, therefore frequency "every day" or "2–3 times a week" is slightly higher than with the Central Bohemian consumers who tend to make purchases once a week or once a fortnight.

Regarding the factors which might play a vital role in the selection and purchasing of food, its price, composition, origin (the country of origin) and labelling with a logo or a symbol with direct or indirect evocation of localness of the food origin were monitored. Although there are frequent discussions about consumer preferences for the quality to price, food price remains extremely important to important to approximately 98% of the respondents in both regions (please see table 1 in percentage).

Table 1: Proportion of population of the selected regions in terms of importance of price when making a purchase (%)

Region of residence	Importance of price when purchasing food			
	extremely important	important	unimportant	total
Prague	15.26	80.92	3.82	100
Central Bohemia	25.65	71.79	2.56	100

Food composition is one of the qualitative indicators. It can be represented for example in per cent proportion of meat in meat products, mainly in ham, proportion of cocoa mass in chocolate, and contents of additives. The results indicate that food composition is important in a purchase. This factor is "important" to almost 50% of the respondents in both groups when making a decision about food, and it is even "extremely important" to further approximately 40% of the respondents in both groups (please see table 2).

Table 2: Proportion of population of the selected regions in terms of importance of food composition (%)

Region of residence	Importance of composition when selecting food			
	extremely important	important	unimportant	total
Prague	38.93	49.62	11.45	100
Central Bohemia	41.03	46.15	12.82	100

When comparing the regions, there are no significant differences in this parameter. The item "extremely important" slightly prevails in Central Bohemia.

Due to the already emphasized interest of consumers in local/regional/national foods and to the past negative cases connected with foreign foods (for example de-icing road salt from Poland), "the country of origin" factor may be assumed important in the respondents' consumer behaviour. However, this parameter has so far demonstrated itself as the least important to the respondents from both regions (please see table. 3). While the price was unimportant only to two to three percent, composition amounted to eleven to twelve percent, and the country of origin amounts to as much as approximately 26%.

Table 3: Proportion of population of the selected regions in terms of importance of the country of origin of food (%)

Region of Residence	Importance of the country of origin when selecting food			
	extremely important	important	unimportant	total
Prague	22.14	53.44	24.42	100
Central Bohemia	20.51	51.28	28.21	100

Further research then focuses on monitoring the importance of labelling food products with a logo or a symbol designating regional/local food (see Table 4). This labelling is important or extremely important to nearly 70% of the respondents in both groups. The labelling is studied when selecting foods slightly more often in Central Bohemia than in Prague. On the other hand, it might be stated that this factor of food selection is rather important or unimportant rather than extremely important. The consumers do express their interest in the regional or local food, however, this is not their major priority. Similar behaviour has been demonstrated with "the country of origin" factor, which is also an indicator of interest in regional food products. "Extreme importance" as well as "unimportance" was selected by approximately the same proportion of the respondents.

Table 4: Proportion of population of the selected regions according to importance of labelling food with a logo/symbol (%)

Region of residence	Importance of labelling food with a logo or with Regional food, Klasa, Czech product label when selecting food			
	extremely important	important	unimportant	total
Prague	11.45	57.25	31.30	100
Central Bohemia	10.26	61.54	28.20	100

The conducted survey implies that these logos are important to both groups of respondents when selecting food, even though they do not pay the greatest attention to these.

3.2. Testing hypotheses

This part of the paper focuses on a more detailed two-dimensional analysis of relations between selected indicators, the purpose of which is either to confirm or to reject the working hypotheses H1, H2 a H3.

The first precondition H1 is the fact that consumers who make a purchase more frequently tend to be more interested in the quality of food, mainly in terms of its composition. As is evident from table 5, 71.7% of the respondents who make a purchase 2–3 times a week consider it extremely important to examine food composition while making a purchase. Consumers, who are purchasing daily or several times a week usually buy groceries for the family and they can pay more attention to freshness, balanced composition or absence of additives. It may be different from consumers buying less often, for example, who are more likely to eat away from home. Frequency of purchase is an important marketing factor. Dependence of frequency of purchase and monitoring food composition can be used in marketing campaigns or within the merchandising in the store.

Table 5: Importance of food composition in connection with purchasing frequency (%)

Importance of food composition in selecting food	How often do you usually purchase food?				
	every day	2–3× a week	1× a week	1× 14 days	total
Extremely important	20.9	71.7	2.9	4.5	100
important	26.5	51.8	21.7	0.0	100
unimportant	40.0	35.0	20.0	5.0	100
Total	25.9	57.6	14.1	2.4	100

Formulation of hypothesis H_0: Consumers' purchasing frequency is not influenced by importance of food composition. H_A: non H_0. The hypothesis was tested using Fisher's exact test due to the fact that the preconditions for using the chi-square test for independence failed to be met. The results of the test suggest (P value = 0,000) that at the significance level 0.05 the null hypothesis has been rejected, and the connection between purchasing frequency and importance of food composition has been verified. The degree of the dependence, the calculation of which is based on establishing Cramer's V = 0.245, can be regarded as weak.

It might be expected that a consumer who examines food composition, considers this fact important in terms of evaluating the assumed quality requirements (for example the content of meat in meat products). Therefore, the consumer who selects and purchases food products according to their qualitative parameters will also consider their composition important. The second working hypothesis H2 focused on examining the dependence between preference of qualitative parameters and importance of food composition to consumers when making a purchase.

Formulation of null hypothesis:

H_0: Food composition does not influence consumers' purchasing preferences.

H_A: non H_0.

The table 6 contains the data from responses to the questions connected with importance of food composition when making a purchase and with interest in qualitative

parameters. The mentioned facts suggest that there are insignificant differences in the distribution of percentage frequencies in individual categories of monitored indicators, which has also been confirmed by the test.

Table 6: Importance of food composition in connection with qualitative parameters (%)

Importance of food composition when selecting food	You purchase and select food based on its qualitative parameters		
	yes	no	total
Extremely important	10.6	11.4	11.2
Important	61.7	56.9	58.2
Unimportant	27.7	31.7	30.6
Total	100.0	100.0	100.0

Using the chi-square test for independence (P value = 0.847), no dependence between preferences for qualitative parameters and importance of food composition to consumers when making a purchase has been confirmed at the significance level 0.05.

Food origin or its localness was the following parameter examined and assumed to be an important factor when selecting food. The final hypothesis H3 was thus connected with preferences for foods with a logo designating or associating its localness with regard to the place of residence (see Table 7). This concerned primarily the products labelled with a logo/symbol Regionální potravina (regional food), Klasa, Český výrobek (Czech product), biopotravina (organic food), protected geographical indication, protected designation of origin and traditional speciality guaranteed and the region of the consumer's residence.

Table 7: The consumer's place of residence in connection with the selection of foods (%)

Region of residence	When selecting food, do you prefer products labelled with these logos?			
	yes, always	yes, sometimes	no	total
Prague	16.8	69.5	13.7	100
Central Bohemia	17.9	69.3	12.8	100

Formulation of null hypothesis:

H_0: The consumer's place of residence does not influence his or her preferences in purchasing foods with defined logos.

H_A: non H_0.

Using the chi-square test for independence (P value = 0.979), no dependence between preferences for foods labelled with a logo/symbol and the consumer's place of residence has been confirmed at the significance level 0.05. Therefore, the null hypothesis cannot be rejected. The test has not verified any dependence between preference for food labelled with a logo/symbol such as regional food, Czech product, organic food, protected geographical indication, protected designation of origin and traditional speciality guaranteed, and the region of the consumer's residence.

4. Discussion and Conclusions

Preference for local products and consumers' return to regional producers is currently a global trend which is a response to the market being saturated with industrially produced food. However, the definition of local food has not been unified.

The authors' attempt was to indentify factors which influence general consumer purchasing behaviour in Prague and the Central Bohemian region when they select food and who express a positive relationship with the local food. The factors investigated included purchasing frequency, product price, declared or perceived quality, food composition, and labelling food products with a logo or a symbol related to their localness and regionality of their origin.

The results of the research indicate that there are insignificant differences between the regions. The differences deriving from purchasing frequency in individual regions correspond with the demographic context and lifestyle in these areas. The behaviour of the consumers from Central Bohemia when purchasing local foods is almost identical as of those from Prague. Schupp et al. (2001) has demonstrated that it is more affluent people who express interest in regional brands. It is interesting that despite the fact that both of these regions are characterized by the highest income levels in the CR (CSO, 2017) and for example by the greatest demand for organic food (which could be regarded as an alternative to local food), the price of products when selecting food is still extremely important or important to 90% of the respondents.

Regarding the importance of labelling food with symbols or logos identifying regional foods, slight predominance of the respondents in Central Bohemia is evident from the survey for whom such labelling is important when selecting food. According to Lobb et al. (2006), consumers from rural areas prefer local foods more than people from cities. Typically rural areas are not prevalent in the Central Bohemian region, nevertheless, rural influence is still slightly evident. Furthermore, it is probable that the negative influence of education on selection of products is evident (Teuber, 2010), as it might be assumed that there are more consumers with completed higher education in Prague.

On the contrary, food composition, an important factor in terms of perceiving the product quality or designation of origin (Czech food vs. foreign) and an important aspect of quality (declared or perceived), has been considered important by only 50% of the respondents.

The remaining tests of dependence of possible relationships demonstrate only weak dependence between purchasing frequency and the importance of food composition to consumers. The more frequently the consumer purchases food, the more important food composition is to them. It is debatable whether more frequent purchases relate to care for a household with children in a family or not, which would explain greater interest in food quality and its origin (Marsden and Smith, 2005).

On the contrary, no dependence has been confirmed between preferences for qualitative parameters and importance of food composition to consumers in the particular regions. This fact is rather interesting, since food composition is one of the fundamental aspects of quality and provided that the consumer is interested in good quality products, they should also examine their composition. At the same time, no dependence has been ascertained between preferences for food labelled with a logo or a symbol expressing or evoking localness or regionality of the product and the region of the consumer's residence. Since consumers from the Central Bohemian region express slightly greater interest in these logos and symbols, dependence was assumed with regard to the degree of urbanization as well. However, this has not been confirmed.

The conducted research and its results in Prague and in the Central Bohemian region in terms of purchasing power of their residents are important predominantly for marketing. Further factors which (except for sensitivity to price) are important in this area in order to support local foods need to be investigated. Further research should thus be aimed at this area.

Acknowledgements

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The Effect of Funding Sources on Liquidity of Companies in Selected Sectors in the Czech Republic

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Abstract

The aim of this paper is to determine the effect of funding sources on liquidity of companies in selected sectors in the Czech Republic from 2000 to 2015. With the purpose to fulfill the aim, we examine existence and character of relationship between selected financial factors (debt equity ratio, return on equity, share of fixed assets to total assets, share of earnings before interest and taxes to total assets) and liquidity of the companies in sectors such as mining and quarrying, manufacturing, construction, service sector and energy sector. The existence of relationship between financial factors and liquidity of companies is tested by correlation analysis and regression analysis. The results show that there is the negative impact of share of fixed assets to total assets on liquidity of companies in service sector in the Czech Republic. The liquidity of companies was positively influenced by the return on equity and negatively influenced by debt equity ratio in energy sector in the Czech Republic.

Keywords: correlation, debt equity ratio, fixed assets, leverage ratio, liquidity of companies, regression analysis, return on equity

JEL Code: G32, G34, G39

1. Introduction

Myers (2001) argues that agency effects of various kinds may create important reasons for holding liquid assets with the further implications of different patterns of corporate liquidity depending on capital structure or other firm characteristics. He believed that holding liquid assets will be important for companies facing growth opportunities and the expected return fluctuates over time. Given that the decision on liquidity associated with the debt structure of companies, each of them needs to monitor its liquidity relations following the decision of debt. Liquidity is a key financial indicator to measure whether the company is able to meet its debt obligations based on short-term debt ratio,

long-term debt ratio and total debt ratio without causing undesirable losses. Stulz (1990) argues that firms with high leverage and losing their financial flexibility, may have difficulty in finding new funds to finance their projects. Šarlija and Harc (2012) suggest that liquidity is a characteristic of the company's assets that can be quickly converted to cash. Firms hold a certain amount of liquidity in during their activities to be able to meets its obligations on time. For this reason, Saleem and Rehman (2011) argues that liquidity management is very important for each company in order to maintain the ability to pay its obligations properly and on time.

The aim of this paper is to determine the effect of funding sources on liquidity of companies in selected sectors in the Czech Republic from 2000 to 2015. With the purpose to fulfill the aim, we examine existence and character of relationship between selected financial factors (debt equity ratio, return on equity, share of fixed assets to total assets, share of earnings before interest and taxes to total assets) and liquidity of the companies in sectors such as mining and quarrying, manufacturing, construction, service sector and energy sector.

The first part of this article will include a literature review. The second part of this article will focused on methodology and data. The third part of this article will contain results and discussion. Last part of this article will conclude results.

2. Literature Review

Williamson (1988), Schleifer and Vishny (1992), Anderson (2002) believe that more liquid companies are less costly to monitor and liquidate therefore higher liquidity growth leverage. On the contrary, De Jong et al. (2008), Lipson and Mortal (2009), Šarlija and Harc (2012) argue that more liquid companies are less indebted, because they could use the additional liquidity to internally finance their activities.

The aim of this paper is to determine the effect of funding sources on liquidity of companies in selected sectors in the Czech Republic. For this reason, it would be appropriate to mention a study focusing on the liquidity of companies in the Czech Republic. Unfortunately, there are few studies focusing on the liquidity of companies in the Czech Republic. For this reason, the literature review will be supplemented with additional relevant studies focusing on the liquidity of companies in other countries.

Anderson (2002) examined the relationships among the firm's financial structure, its choice of liquid asset holdings and growth on UK and Belgian companies. Using regression analysis he examined the factors determining liquid asset holdings and the link between firm liquidity and capital structure using the following variables: liquidity (dependent variable, sum of cash, bank balances, and investments in current assets divided by total assets) and independent variables such as cash flow (earnings before taxes and interest divided by total assets), long term debt, medium term debt, short term debt, R&D expenditures and market value to book value. The results revealed positive associations between leverage and liquid asset holding.

One of funding sources are depreciation that are related with fixed assets. For this reason, it is appropriate to examine the relationship between liquidity of companies and depreciation through fixed assets. Unfortunately, there is only minimum specific studies that focus on this relationship. For this reason, study of Mehar (2005) was selected to the literature review. He examined whether equity financing plays a central role in determination of the liquidity position of a companies in Pakistan. The relation between the equities and working capital has been observed. He analyzed relation between liquid

assets (dependent variable) and independent variables such as fixed assets at historical cost, net profit after tax and retained earnings. There was found that liquidity is positively correlated with fixed assets. An increase in the fixed assets will lead to the increase in depreciation expenditure, so, availability of the funds will be increased without a decline in the cash balance. He found that depreciation fund has been classified as a source of liquidity. The long-term debt may deteriorate the liquidity position of a firm. The results shows that profit and liquidity have significant positive relation where relation between liquidity and retained earnings was found as negative.

Shah (2012) examined relationship between profitability and liquidity trade off through the application of working capital analysis in India. This study undertakes the identification of the key variables that influence the working capital management and its impact on profitability and liquidity of pharmaceuticals manufacturers. He examined the relationship between liquidity (dependent variable, including current ratio) and independent variables (components of working capital) such as gross operating cycle period and quick ratio. It has been found that there is a positive relationship between liquidity and variables such as quick ratio and gross operating cycle period. He examined the relationship between liquidity (current ratio) and profitability (earnings before depreciation, interest, and tax as a percentage of assets). It has been found that there is a negative relationship between liquidity and profitability.

Šarlija and Harc (2012) investigated the impact of liquidity on the capital structure of Croatian firms. Pearson correlation coefficient was applied to the test on the relationship between liquidity ratios and debt ratios, the share of retained earnings to capital and liquidity ratios and the relationship between the structure of current assets and leverage. The results showed the existence of a statistically significant negative correlations between liquidity ratios and leverage ratios. The results showed that there are statistically significant correlations between leverage ratios and the structure of current assets. The relationship between liquidity ratios and the short-term leverage is stronger and negative than positive relationship between liquidity ratios and the long-term leverage. The more liquid assets firms have, the less they are leveraged. Long-term leveraged firms are more liquid. Increasing inventory levels leads to an increase in leverage. Furthermore, increasing the cash in current assets leads to a reduction in the short-term and the long-term leverage.

Trippner (2013) analyzed the relationship between liquidity (cash ratio, current ratio and quick ratio) and profitability (return on assets – ROA, return on equity – ROE) in the Polish companies from 2002 to 2012. Using correlation analysis it has been found that there is a positive and negative relation between liquidity and ROA and ROE.

Miloś (2015) analyzed the determinants of capital structure of the Romanian companies using panel data. He used variables including ratio between total debt and total liabilities, profitability (return on assets), liquidity (ratio between current assets and current liabilities), tangibility (ratio of tangible assets divided by the total assets) and size (natural logarithm of total sales). The results show that there is a negative connection between liquidity and leverage. The results suggest that less liquid companies obtain the necessary capital by borrowing. Companies often prefer and use a short-term loans when there is a lack of liquidity.

Růčková (2015) analyzed the impact of liquidity and profitability on use of deb finance sources of companies in manufacturing industry in V4 countries. She examined the relationship between using debt sources (debt/equity ratio) and liquidity. The study results showed a positive relationship between liquidity and using debt sources in the

Czech Republic. It can be stated that the increasing liquidity of companies is also increasing the using debt sources.

3. Methodology and Data

Given that the article focuses on liquidity of companies in Czech Republic, it is appropriate to mention that various sectors of the economy are involved to varying degrees in the consumption and production of the national economy. The sectors such as mining and quarrying, manufacturing, construction, service sector and energy sector represent the largest proportion of the performance of Czech economy. For this reason, the article focuses on determine the relationship between the funding sources and liquidity of companies in mining and quarrying, manufacturing, construction, service sector and energy sector.

All financial data are taken from Ministry of Industry and Trade in Czech Republic. The dataset cover the period 2000–2015. All data and time series are on annual frequency. The data are the basis for the application of correlation analysis and regression analysis.

The aim of this paper is to determine the relationship between funding sources and liquidity of companies in selected sectors in the Czech Republic from 2000 to 2015. With the purpose to fulfill the aim, we examine existence and character of relationship between selected financial factors (debt equity ratio, return on equity, share of fixed assets to total assets, share of earnings before interest and taxes to total assets) and liquidity of companies in sectors such as mining and quarrying, manufacturing, construction, service sector and energy sector.

We can define relationship between liquidity of companies and funding sources based on the above studies and formulated goals. This relationship will be identified for various sector (mining and quarrying, manufacturing, construction, service sector and energy sector). We will examine how funding sources affect liquidity of companies.

Correlation analysis, regression analysis and OLS method is used to determine the relationship between liquidity of companies and funding sources. First, we can determine the relationship between liquidity of companies and funding sources using correlation analysis. The correlation can be expressed using the following equation (1):

$$K_{XY} = \frac{cov(X,Y)}{\sigma_X \sigma_Y} \tag{1}$$

where *X* is the mean value matrix of liquidity of companies and *Y* is the mean value matrix of debt equity ratio, return on equity, share of fixed assets to total assets, share of earnings before interest and taxes to total assets. This indicator should be in the interval from –1 to 1. Values closer to the value of 1 would suggest that with increased liquidity of companies is growing debt equity ratio, return on equity, share of fixed assets to total assets, share of earnings before interest and taxes to total assets. Values closer to the value of –1 would suggest that with decreased liquidity of companies is growing debt equity ratio, return on equity, share of fixed assets to total assets, share of earnings before interest and taxes to total assets. Values which are zero signal independent of one another.

I will draw from the study Anderson (2002) to construct the regression model. The relationship between liquidity of companies and funding sources will be estimated using the following equations in general form (2):

$$L_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} \ldots\ldots\ldots\ldots\ldots\ldots + \beta_n X_{nt} + \varepsilon_t \qquad (2)$$

In consistent with studies Anderson (2002), Mehar (2005), Trippner (2013) and Růčková (2015), variables include debt equity ratio (DER), return on equity (ROE), share of fixed assets to total assets (FATTA) and share of earnings before interest and taxes to total assets (EBIT).

The dependent variable L_t is an indicator of current liquidity (L3) of companies in the Czech Republic at time t, X_{nt} are other factors that represent funding sources and which may affect the liquidity of companies in the Czech Republic. These factors include debt equity ratio (DER), return on equity (ROE), share of fixed assets to total assets (FATTA), share of earnings before interest and taxes to total assets (EBIT). β_0 and ε_t is model constant and the residual component in the model.

Table 1: Description of used variables

Variables	Calculation	Expected relationship
Liquidity (L3)	Current assets/ current liabilities	Dependent variable
Debt equity ratio (DER)	Debt/equity	–
Return on equity (ROE)	Net profit/ equity	+
Fixed assets (FATTA)	Fixed assets/total assets	+
Earnings before interest and taxes (EBIT)	Earnings before interest and taxes/total assets	+/–

Source: Authors' calculations

Table no 1 represents description of used variables. The funding sources are represented through the four variables (debt equity ratio, return on equity, share of fixed assets to total assets, share of earnings before interest and taxes to total assets). The five ratios (variables) are used to determine relationship between funding sources and liquidity of companies. The choice of variables is based on the above studies.

The liquidity ratio is very important indicator because liquid company only is able to pay its payables. If the company has a sufficient amount of funds for payment of its current liabilities, the company will be liquid. An excessively high value of liquidity is usually accompanied by lower values of equity (return on equity) that is associated with a conservative approach. On the other hand, companies that have too low levels of liquidity typically use debt sources for financing their activities.

Debt equity ratio (leverage) measures debt sources to equity. The higher value of the debt equity ratio, the higher ratio of debt sources to equity. This fact can indicate a higher risk for creditors. The value of debt equity ratio 1 indicates that equity and debt sources are involved in the financing of companies in the same amount. Higher debt represents a higher level of risk of companies. On the other hand, higher debt may mean a larger volume of funding sources because the costs of external funding tend to be cheaper than costs of equity. Companies that have too low levels of liquidity typically use debt sources for financing their activities. For this reason, we can expect a negative relationship between liquidity of companies and debt equity ratio. This fact is consistent with study Miloś (2015) who found negative relationship between liquidity and debt equity ratio.

The return on equity (ROE) is important especially for the owners of the company or competing companies. The return on equity shows how efficiently a company uses its own equity (funds of owners of company). Return on equity can also affect the costs of

external funding (debt sources). Positive relationship between liquidity of companies and return on equity is expected based on the study of Trippner (2013). More profitable companies are the ones that can use their retained earnings in order to finance their investment projects.

A higher value of fixed assets always requires a higher value of liquid assets. An increase in the fixed assets will lead to the increase in depreciation expenditure, so, availability of the funds will be increased without a decline in the cash balance. Fixed assets present a crucial role in ensuring the necessary collateral for bank borrowing and raising secured debt. A low level of fixed assets could decrease the volume of debt that the company may achieve. A high level of fixed assets may ensure cheaper debt resources and lowers the risk taken by the creditor. On the other hand, the companies rely more on short-term debt than on long-term debt in which case the collateral is not so important. The companies with high-valued fixed assets rather use their retained earnings or issue equity than finance their activity by increasing indebtedness. Another explanation could arise from the fact that usually, in emerging economies, companies rely more on short-term loans rather than long-term ones, consequently the importance of collateral is reduced. In consistent with this fact, there is expected a positive relationship between liquidity of companies and share of fixed assets to total assets.

Companies with higher earnings and less volatility in earnings are the ones that have greater indebtedness, due to the increased credibility in front of potential creditors. Moreover, they have more income to shield from taxes. On the other hand, more profitable companies are the ones that can use their retained earnings in order to finance their investment projects. An excessively high value of liquidity is usually accompanied by lower values of profitability that is associated with a conservative approach. On the other hand, Trippner (2013) found a positive and negative relation between liquidity of companies and share of earnings before interest and taxes to total assets. In consistent with these facts, it is not clear what relationship can be expected. Therefore, the resulting relationship will be determined using regression analysis.

4. Results and Discussion

This part focuses on the results of correlation analysis, regression analysis and their comments. First, we can determine the relationship between liquidity of companies and funding sources using correlation analysis. The following table (2) reflect the degree of interdependence of monitored parameters in selected sectors in the Czech Republic.

Table 2: Correlation between liquidity of companies and funding sources in selected sectors and funding sources

	Liquidity L3	DER	ROE	FATTA	EBIT
mining and quarrying	Liquidity L3	0.327676	−0.213947	−0.727376∗	−0.309519
manufacturing	Liquidity L3	0.141195	0.271813	−0.423893∗∗∗	0.216988
construction	Liquidity L3	−0.391987∗∗	0.206347	−0.100032	0.160306
service sector	Liquidity L3	−0.133967	−0.196059	−0.304793	−0.296926
energy sector	Liquidity L3	−0.473280	0.388364	0.254006	0.320249

Source: Authors' calculations
Note: ∗ denotes significance at 1% level, ∗∗ denotes significance at 5% level, ∗∗∗ denotes significance at 10% level

Table 2 presents correlative relationship between liquidity of companies (dependent variable) and independent variables such as debt equity ratio, return on equity, share of fixed assets to total assets, share of earnings before interest and taxes to total assets. From this table (1) is evident that correlation is different for all variables and selected sectors in the Czech Republic.

The relationship between liquidity of companies and debt equity ratio (DER), return on equity (ROE) and share of earnings before interest and taxes to total assets (EBIT) appears as uncorrelated in all selected sectors. The correlation is close to 0. In this fact, the most significant correlation was observed in the energy sector. The correlation coefficient is –0.473280 for relationship between liquidity of companies and debt equity ratio. This means that there is a negative correlation between liquidity of companies and debt equity ratio (DER). This result suggests that with a decrease in debt equity ratio increases liquidity of companies in mining and quarrying in Czech Republic. The results also suggest that the correlation coefficient is (+) 0,388364 for relationship between liquidity of companies and return on equity (ROE) and (+) 0,320249 for relationship between liquidity of companies and share of earnings before interest and taxes to total assets (EBIT). There is a positive correlation between liquidity of companies and variables such as return on equity (ROE) and share of earnings before interest and taxes to total assets (EBIT). This means that with increase in return on equity and share of earnings before interest and taxes to total assets increases liquidity of companies in energy sector in the Czech Republic.

The results suggest that the relationship between liquidity of companies and share of fixed assets to total assets (FATTA) appears as uncorrelated in manufacturing, construction, service sector and energy sector. Within mining and quarrying, the negative correlation was observed between liquidity of companies and share of fixed assets to total assets (FATTA). The correlation (–0.727376) is close to –1. It can be stated that with a decrease in share of fixed assets to total assets (FATTA) increases liquidity of companies in mining and quarrying in Czech Republic.

Despite the above, it is necessary to take into account the fact that the correlation is statistically significant only for three relation. There was recorded negative significant correlation at 1% level for relationship between liquidity of companies and share of fixed assets to total assets (FATTA) in mining and quarrying. The correlation was about –0.727376. There was recorded negative significant correlation at 10% lever for relationship between liquidity of companies and share of fixed assets to total assets (FATTA) in manufacturing. The correlation reached about –0.423893. There was recorded negative significant correlation at 5% lever for relationship between liquidity of companies and debt equity ratio (DER) in construction. The correlation was about –0.391987

Using correlation analysis we found that there is a positive, negative and no relationship between liquidity of companies in selected sector in the Czech Republic and independent variables (funding sources). Regression analysis and Ordinary Least Squares (OLS) method will be used to determine, how significant will be the relationship between liquidity of companies and funding sources. This relationship is expressed by the following equation (3).

$$L_t = \beta_0 + \beta_1 \cdot \text{DER}_{1t} + \beta_2 \cdot \text{ROE}_{2t} + \beta_3 \cdot \text{FATTA}_{3t} + \beta_4 \cdot \text{EBIT}_{4t} + \varepsilon_t \qquad (3)$$

We used econometrics software EViews 9. First, it is it is necessary to test the time series for the stationarity before estimating the model. We used Levin, Lin and Chu test to test the individual variables for the existence of the unit roots. The result of the test indicates that the variables are not stationary on the values. So that the null hypothesis

of a unit root can be taken. For this reason, it was necessary to use the fist difference. Then, all times series are stationary and can be used in regression analysis. Ordinary Least Squares (OLS) method has several prerequisites. First, for correction of heteroscedasticity is used White test. Using this test the heteroscedasticity was rejected and the error term is homoscedastic. For detecting multicollinearity we used correlation coefficient. The correlation matrix showed that any variables are not correlated together. We also found normality of the error term, thus the prerequisite that the residual must have normal probability distribution. The absence of autocorrelation of the error term is determined by the Durbin-Watson test. The Durbin-Watson statistic (DW) is used for testing autocorrelation in the residuals.

Table 3 presents the resulting relationship between liquidity of companies (dependent variables) and funding sources (independent variables).

Table 3: Estimation results between liquidity of companies and funding sources in selected sectors

	Energy sector		Service sector	
	Coefficient	t-statistics	Coefficient	t-statistics
Constant	0.004798	0.104066	−0.019634	−0.425631
DER	−0.624761∗∗	−2.516879		
FATTA			−2.612102∗∗	−2.138445
ROE	3.869004∗∗	2.758368		
R-squared	0.634676		0.397842	
Adjusted R-squared	0.472310		0.156979	
F-statistic	3.908916		1.651734	
Prob(F-statistic)	0		0	
Durbin-Watson stat	1.893395		1.821626	

Source: Authors' calculations
Note: ∗ denotes significance at 1% level, ∗∗ denotes significance at 5% level, ∗∗∗ denotes significance at 10% level

From this table (3) suggests that different variables affect the liquidity of companies in selected sectors in the Czech Republic from 2000 to 2015. The selected sectors include mining and quarrying, manufacturing, construction, service sector and energy sector. We examined the relationship between liquidity of companies and funding sources in all selected sectors. The statistically significant variables were found only in two sectors (energy sector and service sector). For this reason, table no 3 represents results of these two sectors. We estimated the relationship between liquidity of companies and independent variables such as debt equity ratio, return on equity, share of fixed assets to total assets, share of earnings before interest and taxes to total assets. Some of the independent variables were not statistically significant, thus we are not able to confirm the impact of these variables on liquidity of companies in the Czech Republic. For this fact, table no 3 indicates only statistically significant variables that have impact on liquidity of companies in the Czech Republic.

As regards the energy sector, the empirical analysis shows that there is a negative impact of debt equity ratio (DER) on liquidity of companies. The table shows that the increase of debt equity ratio of unit decreases the liquidity of companies of 0,624761 units. This impact is confirmed in the studies of Miloś (2015) who found negative relationship between liquidity of companies and debt equity ratio. Less liquid companies obtain the necessary capital by borrowing. Companies often prefer and use a short-term

loans when there is a lack of liquidity. We can argue that the more liquid the firm is, it is the less leveraged.

The results also suggest that there is a positive impact of return on equity (ROE) on liquidity of companies. The results suggest that the increase of return on equity of unit increases the liquidity of companies of 3,869004 units. This result confirm the findings of Trippner (2013) who found positive relationship between liquidity of companies and return on equity (ROE). More profitable companies are the ones that can use their retained earnings in order to finance their investment projects. We can argue that the more liquid the firm is, it is the less leveraged.

As regards the service sector, the results indicate that there is a negative impact of share of fixed assets to total assets (FATTA) on liquidity of companies. The share increase of fixed assets to total assets of unit decreases the liquidity of companies of 2,612102 units. This result is not confirmed by any of the above study. The resulting relationship can be explained in the following argument. Assets of the company can be divided into fixed assets and current assets. The liquidity of companies consists of current assets. Liquidity growth should be accompanied by an increase in current assets. From this argument it shows that the growth in current assets is accompanied by a decrease in fixed assets. From this fact can be inferred negative relationship between liquidity of company and fixed assets.

All identified resulting relationships correspond with the conclusions of correlation analysis through which we determined what relationship exists between liquidity of companies and independent variables.

On the other hand, it is also necessary to take into account the significance of the model, which is primarily low in the service sector. R-squared value is about 40 % and Adjusted R-squared is about 15%. In the energy sector, there is R-squared value about 63% and Adjusted R-squared about 47%. The table no 3 reveals that the explanatory power of the model is low. Based on the results it is evident that the liquidity of companies is also affected by other factors (variables) that have not been tested. Based on this fact, we can provide another area for any further exploration in the future.

5. Conclusions

The aim of this paper is to determine the effect of funding sources on liquidity of companies in selected sectors in the Czech Republic from 2000 to 2015. With the purpose to fulfill the aim, we examine existence and character of relationship between selected financial factors (debt equity ratio, return on equity, share of fixed assets to total assets, share of earnings before interest and taxes to total assets) and liquidity of companies in sectors such as mining and quarrying, manufacturing, construction, service sector and energy sector.

We estimated the impact of funding sources (debt equity ratio, return on equity, share of fixed assets to total assets, share of earnings before interest and taxes to total assets) on liquidity of companies in mining and quarrying, manufacturing, construction, service sector and energy sector in the Czech Republic.

All identified resulting relationships correspond with the conclusions of correlation analysis through which we determined what relationship exists between liquidity of companies and independent variables.

We found that the liquidity of companies was positively influenced by the return on equity (ROE) in energy sector in the Czech Republic. This means that with increase in

return on equity increases liquidity of companies in energy sector in the Czech Republic. On the other hand, debt equity ratio has a negative impact on liquidity of companies in energy sector. It can stated that with decrease in debt equity ratio increases liquidity of companies in energy sector in the Czech Republic. We can argue that the more liquid the firm is, it is the less leveraged. Completely different situation was recorded in the service sector. There was observed the resulting relationship between liquidity of companies and share of fixed assets to total assets. The results show that there is the negative impact of share of fixed assets to total assets on liquidity of companies which means that with decrease in share of fixed assets to total assets increases liquidity of companies in service sector in the Czech Republic.

Impact of other variables on liquidity of companies in other selected sectors was not statistical significant, thus we are not able to confirm the impact of other variables on liquidity of companies in other selected sectors in the Czech Republic such as mining and quarrying, manufacturing and construction.

Acknowledgement

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20th International Scientific Conference
"Enterprise and Competitive Environment", March 9–10, 2017,
Brno, Czech Republic

GDP versus health expenditure – is there any tendency? CEE countries case

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Abstract

The aim of this research is to analyse the long-term relationship between current expenditure on health (CHE) and gross domestic product (GDP) in selected countries of Central and Eastern Europe (CEE countries) – Czech Republic, Poland and Slovakia. We have posed the following research hypotheses: *H1: the ratio of CHE to GDP, in CEE countries, has non-stationary character*; *H2: there is a linear trend in CHE/GDP growth*. We have confirmed both hypotheses, as well as, we have estimated the linear trendlines, separately for each country, with R^2 higher than 0.6.

Keywords: current health expenditure, GDP, linear trendline, CEE countries

JEL Code: H51, E27, I15

1. Introduction

All developed countries deal with a problem of raising health expenditure (HE). Ageing populations, economic slowdown, technological progress, or even higher expectations, create pressure, forcing rationalization of social spending (Bem, & Ucieklak-Jeż, 2014a) and influencing financial situation of health care institutions (Bem, et al., 2017), (Bem & Michalski, 2015), (Michalski, 2016a), (Michalski, 2016b). Therefore, policymaker point out the particular importance of the problem of health spending growth's forecasting, in order to plan and control healthcare budgets. Most often the subject of the analysis is the relationship between the level of income and the level of expenditure on health – both

on macro and micro level. Among all, researchers try to estimate how intensely economic growth stimulate, if ever, the increase of HE. As a result, the relationship between the dynamics of gross domestic product (GDP), representing economy's income, and HE growth (total or per capita), still attracts the attention of researchers (Bem, et al., 2015), (Siedlecki & Papla, 2016).

Several studies confirmed the relationship between HE and economic growth - researchers usually hypothesize, that HE is a function of real GDP (Amiri & Ventelou, 2012) (also compare: Bem, et al., 2015; Bem & Ucieklak-Jeż, 2014b). Khan (2016) found, that income acted as a main determinant of HE, as well as Woller, Parsons and Rothärmel (1998) who proved, that national income was positively associated with health care expenditures per capita in USA, Germany and Canada. What more, Barros (1998) suggested, that GDP was the only factor, which explained the HE growth, while others – like aging population, or construction of health care system – were not significant, what was also confirmed by Okunade, Karakus and Okeke (2004). On the other hand, Devlin i Hansen (2001), as well as Amiri and Ventelou (2012), and Erdil and Yetkiner (2009) confirmed, that relationship between GDP and HE had bilateral character, what means that both a level of HE influence national income, as well as HE grew along with economy growth. On contrary, Wang (2011) found, that generally HE growth stimulated economic growth, but economic growth reduced HE growth (what suggests a non-linear relationship). This pattern was strongly influenced by the level of HE and the level of income – especially in the case of countries characterized by medium and high HCE, impact on economic growth was positive (Siedlecki et al., 2015), (Siedlecki et al., 2016). What more, Villaverde, Maza and Hierro (2014) confirmed, that GDP p.c. was a key factor, which explained the level of HCE p.c. (Clemente et al. 2004), and private spending adapted more quickly to GDP changes than public ones (Lago-Peñas, Cantarero-Prieto & Blázquez-Fernández, 2013), (Ucieklak-Jeż.et al. 2017).

Based on presents literature review, we can assume the existence of some relationship between GDP and HE. According to that, the aim of research is to analyse the long-term relationship between current health care spending (CHE) and gross domestic product (GDP) in selected countries of Central and Eastern Europe (CEE countries).

We have posed the following research hypotheses:

H1: the ratio of CHE to GDP, in CEE countries, has non-stationary character;

H2: there is a linear trend in CHE/GDP growth.

The analysis of HE/GDP stationarity is a first stage of presented research. We can assume, that if this relationship has stationary character, the joint probability distribution does not change when shifted in time, and, as a result, it is impossible to estimate a linear trendline, or any other tendency. According to the literature review, we expected non-stationarity of HE/GDP time-series (hypothesis H1): Baltagi and Moscone (2010) confirmed, that HE, as well as it's determinants, were non-stationary. Also Gerdtham and Löthgren (2000) detected not only non-stationarity of HE, and Fedeli (2015) concluded, that according to Wagner's law, that an increase in income stimulated higher HE (see also: Clemente et al. 2004). Despite this, the interpretation of results should be rather prudent, because Carrion-i-Silvestre (2005) suggested, that non-stationarity of HE per capita could be affected by structural breaks, what may chance final results and conclusions (compare: Jewell et al., 2003).

In the case of H2 hypothesis we have assumed, that if H1 hypothesis can be confirmed, we could expected some tendency, which can be both of linear or non-linear character.

Choosing research sample, we've been inspired by Van Der Gaag & Barham (1998) who claimed, that the problem of HE was of special importance in countries which had went through economic transition, but also our own experience. We can observe, that CEE countries are especially "fragile" from the point of view of social problems. On the other hand, although relatively many studies were devoted to analyses of GDP/HE relationship in OECD countries, very few included CEE countries – mainly because of lack of reliable date from the period before 1995. Finally we have investigated 3 countries: Czech Republic, Poland and Slovakia.

2. Methodology and Data

Researchers who engage in the problem of relationship between GDP and HE, usually analyze, separately, time series, representing the real GDP per capita and HE per capita, especially the stationarity of time series. If the hypothesis of non-stationarity cannot be rejected, it is possible to search the relationship between time series, by formulating the hypothesis of cointegration or seeking for a trendline (for example linear or logarithmic).

Carrion-i-Silvestre (2005) signalized, that when one deals with the problem of non-stationarity, two approaches were available – country by country analyse or panel data technique, in order to assess stochastic properties. Although the panel analysis offers stronger evidence, we have chosen country-by-country analysis, which allow to observe a country-specific effects (McCoskey & Selden, 1998).

Instead of two separate variables (for HE and GDP) we have studied the variable expressing ratio of current health expenditure (CHE) per capita to gross domestic product (GDP). Current health spending, according to OECD definition, include final consumption of health care goods, both private and public, excluding expenditure associated with capital formation[1].

In this research the following stages have been designed:

1) the analysis of stationarity of time series CHE/GDP – if CHE/GDP is non-stationary, we can expect a trendline or random walk about a mean;
2) the analysis of stationarity of the first differences estimator – used to address the problem of omitted variables in panel data – if first difference estimator is stationary, we can expect some trendline – linear of non-linear;
3) the modeling of development pattern.

The stationarity of time series have been tested using KPSS test (Kwiatkowski–Phillips–Schmidt–Shin test) for which a null hypothesis assumes, that given time series is stationary, around a deterministic trend, against the alternative hypothesis of a unit root.

Our research sample include data coming from 3 CEE countries: Czech Republic, Poland, Slovakia, covering the period 1995–2014 (1995 is the first year for which data is available). Data were obtained from OECD Health Data Database. We've used statistical tools, supported by Statistica 10 Package and Gretl.

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[1] Definition employed in "A System of Health Accounts, 2011"

3. Results

Even the initial analysis have shown, that CHE/GDP in selected countries of CEE are quite similar, while the gap between CEE and EU can be observed in the whole analyzed period (Figure 1). CHE in CEE countries, in 2014, varies from 6.35% GDP in Poland to 8.05% in Slovakia, while the average value for EU countries is equal to 10.04% GDP.
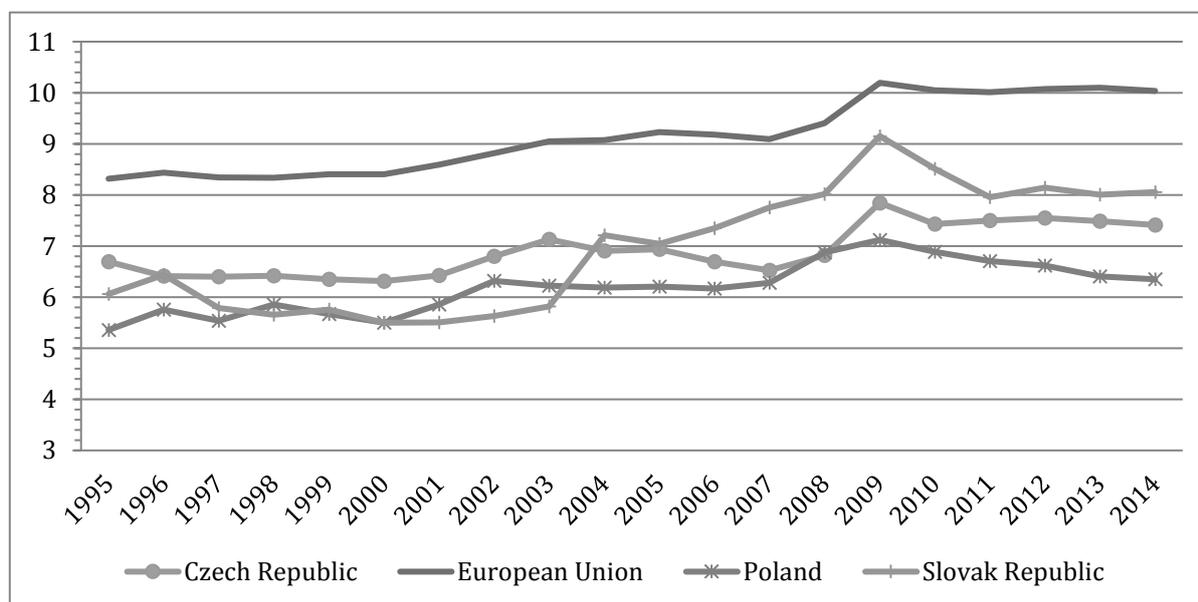

Figure 1: CHCE as %GDP, years 1995–2014

Those differences, have been statistically confirmed with non-parametric Mann-Whitney test, for which the null hypothesis assumes the lack of differences between analyzed independent groups (countries). We have confirmed, that CHE in Czech Republic, Poland and Slovakia are significantly different ($\alpha=0.01$) from CHCE in EU. We have also found, that there are significant differences between Poland and, both, Czech Republic and Slovakia, while the difference between Czech Republic and Slovakia are insignificant (Table 1).

Table 1: Results of Mann-Whitney U test for differences of CHCE/GDP

Country I	Country II	Sum of rangs I	Sum of rangs II	U	Z	p
Czech Republic	Poland	553	267	57	3.854638	0.000116***
Czech Republic	Slovakia	404	416	194	–0.14878	0.881731
Poland	Slovakia	346	474	136	–1.71768	0.085856*
Czech Republic	EU	210	610	0	–5.39649	0***
Poland	EU	210	610	0	–5.39649	0***
Slovakia	EU	227	593	17	–4.93664	0.000001***
* significance level α = 0.1, ** significance level α = 0.05 *** significance level α = 0.01						

In the first stage of the study, we have tested the hypothesis of CHE/GDP time-series stationarity. According to KPSS test results we have been forced to reject the null hypothesis, and adopt the alternative hypothesis, which assumes non-stationarity of

CHE/GDP. That shows, that CHCE/GDP relationship has non-stationary character in all analyzed countries, as well as in EU as a whole. *This also means the existence of trend or random walk around a mean* (Table 2).

Table 2: Results of KPSS test for CHCE/GDP

Country	Test statistic	Interpolated p-value
Czech_Republic	0.608757	0.026**
Poland	0.621621	0.024**
Slovak Republic	0.619524	0.024**
European Union	0.722709	less than 0.01***

* significance level $\alpha = 0.1$, ** significance level $\alpha = 0.05$ *** significance level $\alpha = 0.01$
Interpolated p-value (critical values): $\alpha = 0.1(0.358)$; $\alpha = 0.05(0.484)$; $\alpha = 0.01(0.694)$

Those results have allowed us to adopt the H1 hypothesis, which assumes non-stationary character of CHCE/GDP in a long time.

In the next part of research, we have examined the hypothesis of stationarity of time-series for first differences of CHE/GDP. Based on KPSS test, we haven't found any reasons to reject the null hypothesis, ego we have been forced to adopt the stationarity hypothesis. That suggest, that there is some trend (linear or non-linear) which characterize CHE/GDP relationship (Table 3).

Table 3: Results of KPSS test for first differences of CHCE/GDP

Country	Test statistic	Interpolated p-value
Czech_Republic	0.0957094	more than 0.1
Poland	0.177208	more than 0.1
Slovak Republic	0.130963	more than 0.1
European Union	0.0911126	more than 0.1
World	0.182243	more than 0.1

* significance level $\alpha = 0.1$, ** significance level $\alpha = 0.05$ *** significance level $\alpha = 0.01$
Interpolated p-value (critical values): $\alpha = 0.1(0.358)$; $\alpha = 0.05(0.485)$; $\alpha = 0.01(0.692)$

Results, presented above, have encouraged us to estimate the linear trend line for CHCE/GDP.

Table 4: Linear trend estimation for CHCE/GDP

Trend analysis	Czech Republic	Poland	Slovakia	European Union
Linear trend	y = 0.067x + 6.199	y =0.069x + 5.469	y = 0.1697x + 5.18596	y = 0.113x + 7.969
t-ratio/p-value for coefficient	6.017/0.00***	6.233/0.00***	6.702/0.00***	11.97/0.00***
R^2	**0.6679**	**0.6834**	**0.7139**	**0.9132**
KPSS test for residuals (test statistic p-value)	0.0731 (p>0.1)	0.0989065 (p>0.1)	0.104882 (p>0.1)	0.104339 (p>0.1)

We have received a satisfactory fit level, for Czech Republic, Polish and Slovakia ($0.6<R^2<0.8$) and, additionally, a very good fit for EU countries ($R^2>0.9$). The value of directional coefficients suggests, that CHE/GDP growth is the fastest in Slovakia, but this

country started from the lowest value CHE/GDP (5.19%). The growth rate of CHE/GDP for Czech Republic and Poland have been similar, respectively 0.067 and 0.069, although Poland, in 1995, spend less on health (5.47% comparing to 6.20% for Czech Republic) (Table 4, Figures 2, 3, 4, 5).
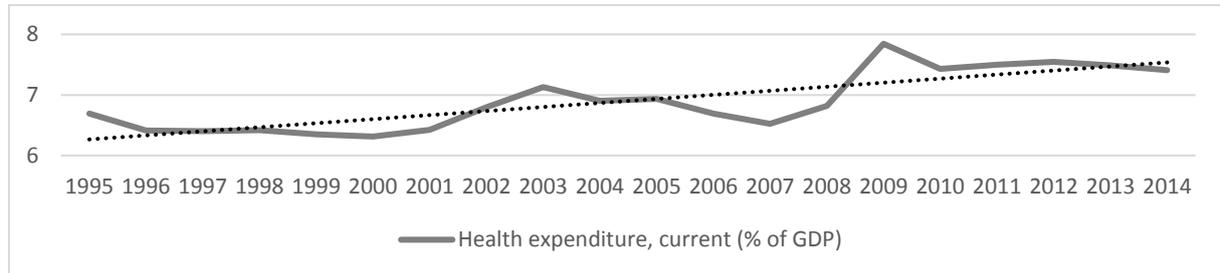

Figure 2: CHCE/GDP and estimated trend line for Czech Republic, years 1995–2014
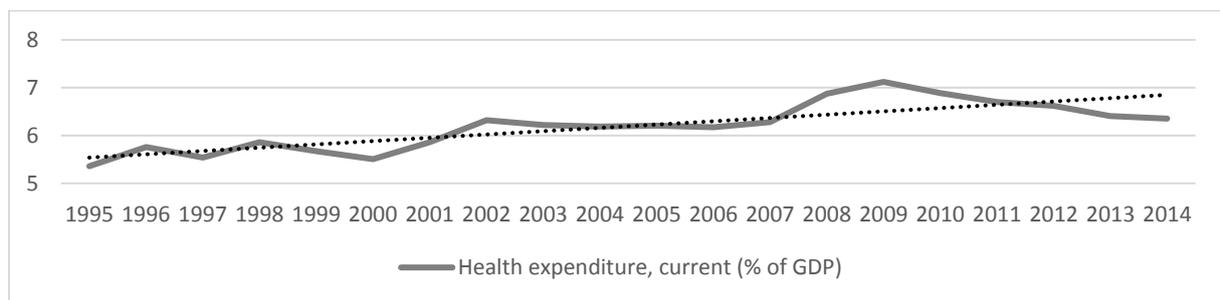
Figure 3: CHCE/GDP and estimated trend line for Poland, years 1995–2014
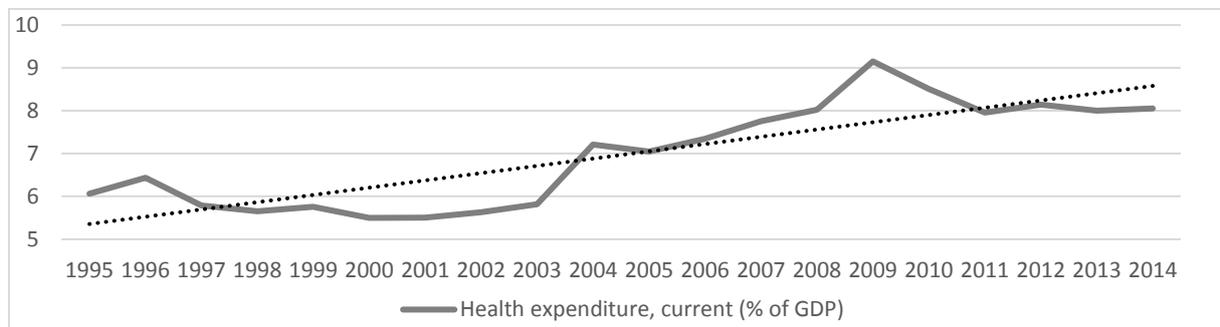
Figure 4: CHCE/GDP and estimated trend line for Slovakia, years 1995–2014
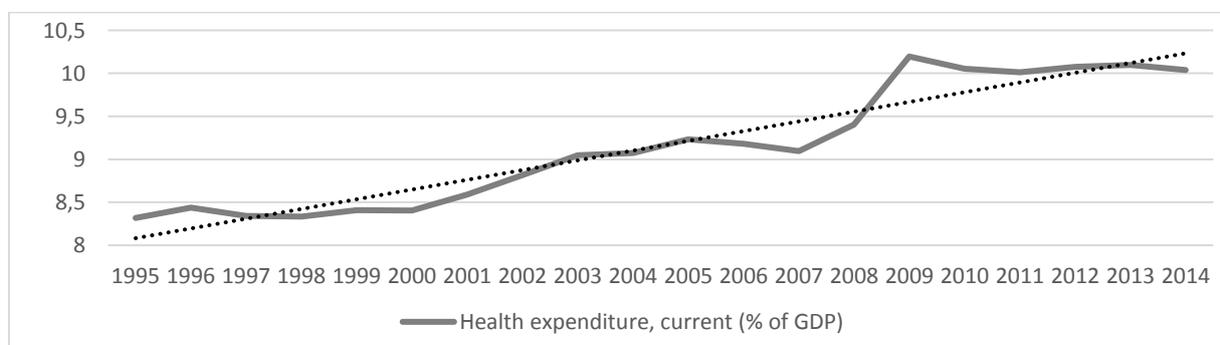
Figure 5: CHCE/GDP and estimated trend line for EU, years 1995–2014

This findings have allowed us to adopt the H2 hypothesis, according to fact, that we have estimated the trendline for CHE/GDP ratio, characterized by the fitting level higher than 0.6.

4. Discussion and Conclusions

Presented research have confirmed, that in 3 analyzed CEE countries, the relationship between CHE and GDP has non-stationary character, as well as, on average, in EU countries. These observations are consistent with some results presented in the literature (Baltagi & Moscone, 2010), (Gerdtham & Löthgren, 2000), (Fedeli, 2015). Presented research do not allow, however, to estimate the direction of this relationship, what should be a subject of future research.

Studies have not only confirmed the existence of CHE/GDP relationship, but have also have shown, that, at least in the analyzed period, it takes a linear form. We can observe, that along with the increase in the economy's income, a share of health care spending increases.

We can also observe, that 2009 year was a moment, which can be perceived as a structural break, in analyzed time-series, in every country. In this year some increase in CHE/GDP ratio was noted, which was mainly caused by lower GDP level – the level of CHE, probably due to a high share of public spending, could not adapt in a short time. However, even more interesting was the situation after 2009 – both in Slovakia and EU expenditure returned to the previous development paths, defined before the financial crisis, while in the Czech Republic, and, especially, in Poland, CHE/GDP growth slowed down, which might suggest that, in the future, the level of expenditure could reach a certain level of saturation and, as a result, would stop to grow, despite the anticipated demographic changes. This may be a result of adopted health care financing system, however, the horizon of the analyses has been too short to confirm this observation.

This study contributes to the science in several ways – of course this a new voice in discussion concerning CHE/GDP relationship, as well as the fact, that even as simple method as forecasting based on linear trendline can be a useful tools. What is more important this is one of relatively few studies based on data from CEE countries.

The primary limitation of this study is relatively short period of analysis, which results from the fact, that there is no reliable data concerning health care spending, from year before 1995.

Acknowledgements

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20th International Scientific Conference
"Enterprise and Competitive Environment", March 9–10, 2017,
Brno, Czech Republic

Effect of multicultural and language barriers on level of competition awareness

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Abstract

The paper reviews and considers the role of multicultural and language barriers effect on handling information in each phase of an information cycle aimed at gathering information about competition. Its aim is to review the level to which multicultural and language barriers influence success of individual phases of handling information in CI cycle. The level to which these barriers effect the processes of resources selection and their availability as well as the effect of these barriers on making analysis will be assessed. To analyse the results of questionnaire research of 105 respondents, methods of regressive and correlation analysis will be used. Based on respondents´ opinions evaluation and our knowledge some recommendation aimed at improvement of the level of awareness concerning competitive environment will be defined. The paper also concentrates on moral and ethical way of getting and utilizing information of competitive intelligence to compare the situation in our country and abroad. By assessment of necessity and importance of education and high quality preparation of managers which helps them to manage different barriers (based on reviewing their opinions and requirements) several recommendations to eliminate these barriers will be determined.

Keywords: information system, competitive intelligence, multicultural and language barriers, competition awareness, SME

JEL Code: M210

1. Introduction

The topic of multiculturalism as well as language readiness of business managers is an actual one. The aim of this paper is show to what level multicultural and language barriers prevent and interfere getting and analysing information about business environment. In general, it concerns information related to competition, business partners,

technologies, innovations, market, customers and foreign markets. But this paper pays special attention to the process of getting and analysing information about competition, which of course should follow ethical and moral principles and rules. Our aim is also to confirm that an opportunity to be educated and to get high quality multicultural and foreign language preparation of managers will definitely improve competition environment knowledge and support sustainability of companies´ competitive advantage.

2. Business and Competitive Intelligence as tools of information gathering

Since the data we use and analyse in an analytical part of this paper resulted from the questionnaire survey aimed at utilization of Competitive Intelligence and Business Intelligence in Slovak companies the paper brings here brief characteristics of both systems.

Business intelligence is defined as a system that collects, transforms, and presents structured data from multiple sources (Negash, 2004, in Pomffyová, Bartková, 2016) reducing needed time to obtain relevant business information and enables their efficient use in management decision-making process (Den Hamer, 2005), allowing enterprise to search, gather, analyse and explain data and to transform it to managerial decisions (Nofal et al., 2013).

Competitive intelligence should be understood as a series of systematic steps or as a cycle (Bartes, 2012, Molnár, Střelka, 2012) and is defined as an ethical and legal process of gathering and analysing information about competitors and the environment in which they operate with the aim to help managers take better decisions and achieve their goals. Other definition of competitive intelligence defines it as the transformation of raw information regarding the competitive external environment into intelligence to support business decisions (Hughes, 2005). Main goal of CI programs is to use different information sources in order to increase the competitiveness of an organization as well to decrease the competitive advantage of rivals (Fitzpatrick, Burke, 2003).

3. Multicultural competitive environment

Although the subject of the paper are multicultural and language barriers in the process of getting and analysing information about competition, we consider it quite relevant to characterize about whom and what type of information companies try to get and analyse. The process concerns information about competition or competitive environment and their consequent analysis helps companies to understand this environment and to find out who and in which ways competes with companies. Competition can be according to a business dictionary characterized as rivalry in which every seller tries to get what other sellers are seeking at the same time: sales, profit, and market share by offering the best practicable combination of price, quality, and service. Where the market information flows freely, competition plays a regulatory function in balancing demand and supply.

According to Porter (2008) the base of competitive analysis is identification and analysis of five competitive forces, i.e. analysis of existing companies, potential competitors, substitute products, clients and suppliers. When analysing competition, the subject

of analysis are competitors´ strengths and weaknesses, the aims they want to achieve, their processes of decision-making and power division.

Since the paper discusses multicultural and language barriers and their effect on getting and analysing information concerning competition we think it is important to characterize competitiveness from an international point of view according to which competitiveness is ability of a company to face the competition on foreign markets (Barney, 2010). It is expressed in the acceptance of products of a given country and increasing its share in export.

What is very important and necessary to point out here is the fact that this approach to the competitiveness of an organization involves its active adaptation to the changes taking place in the environment – in our opinion also multicultural one as well.

4. Ethical aspects of information gathering

One of the critical conditions for businesses to survive and succeed is their ability to cope with strong competitive pressure. To manage it companies must be aware of importance of ethical principles of their activities and decision making. As mentioned above in the process of getting information about competition the basic ethical rules are to be followed.

From the point of view of this paper we emphasize especially international business ethics, which according to Čierna (2001), is one of the most complicated parts of business ethics. The above mentioned author also states that nowadays a lot of companies enter international markets and that their activities become international as well.

In practice development of international business ethics is a slow process. World leaders can partially influence international business ethics by establishing international legal norms, codes and manuals to manage international transactions. International law can be perceived as law located in the central zone between abstract principles like justice and freedom and national laws specification. During trade expansion and growing inter-dependence of states and nations different ethical conflicts are predicted to arise and they will cause changes in systems of values and practises in international business activities.

The pillar of business ethics as well as of multicultural business ethics are the principles and rules requiring to follow basic values without which no business as activity could be done. Such approach to business excludes lie, cheating, thefts, murders, pressure, physical violence and other illegal activities. On the contrary the basic rules of business ethics are honesty, justice, truths, mutual trust, observing obligations and responsibility.

Related to getting information about competition it is also a must to avoid unethical ways of obtaining them and follow ethical principles of confidential information protection. It is also equally important to follow ethical principles and respect the rights of information providers – preserve their anonymity, do not put them under stress, do not use disputable methods and techniques of information gathering, information providers should agree and be aware of the fact they provide information, do not push and do not embarrass them (Hanuláková, 1996).

5. Teaching language or/and multicultural issues

In this part of the paper we try to underline inseparable connection of language and multicultural education of university students aimed at their readiness for a real business life. The opinions which are presented below also confirm critical importance of this requirement. In the process of foreign languages education, the task to strengthen socio-cultural components of other nations becomes a priority, which makes communication abilities more effective. (Rohaľ, 2004).

Close connection between language and social communication of its users make us realize that teaching and learning of foreign languages cannot be separated from learning about culture, i.e. culture learning (Tandlichová, 2004).

In the knowledge based society of the twenty-first century, language competence and multicultural competence are fundamental for businesses to be able to interact and get to know other companies (Némethová, 2005)

As Delgadová (2005) states at universities specialized in non-philological studies, and this is also the case of Matej Bel University, we should not try to teach our students so called a language of "norm" or "standard", i.e. to insist on perfect grammar utilization and excellent pronunciation.

Following the requirements of the era of globalization and multiculturalism teachers are supposed to prepare their students to manage language situations in their home as well as in foreign countries which requires sufficient knowledge of multicultural topics (Jančovičová, 2005).

At the end of this part of the paper two opinions concerning something like a definition of cultural competence and the ways how to achieve it are presented. Culture integrated into foreign languages education may be taught either as a set of facts, and in this case the goal of education will be absorbing information and getting some knowledge about these facts. But on the other hand culture in foreign languages education may be understood as a continuous process of acquiring and expanding cultural awareness and improving cultural competence (Zelenková, 2004).

And finally we think it is important to state that when we deal with cultural and multicultural tasks we can´t avoid the term values, more precisely cultural values as basic phenomenon helping to understand multiculturalism. Krninská and Adamová (2015) state that according to Hofstede and Hofstede (2005) we perceive values as a general trend to differ some facts from other states, and thus it is possible to define the heart of the culture. Values are associated with feelings that have a specific direction, a positive or negative aspect, and indicate what surrounds a human in the categories of "good or bad, true or false, beautiful or ugly, rational or irrational"; they provide the possibility of orientation in the world by the fact that the social reality is structured in terms of importance and corresponding hierarchy. And as the above mentioned authors state "cultural dimensions according to Hofstede (1999), Hofstede and Hofstede (2005), based on similar contradictions and desirable for corporate culture in the knowledge economy are power distance, individualism vs. collectivism, masculinity vs. femininity, uncertainty avoidance and long-term vs. short-term orientation" (Krninská, Adamová, 2015, p. 453).

6. Methodology and Data

The aim of the research was – based on the research respondents´ reactions – to find out the effect of language and multicultural barriers on acquisition and analysis of information about competition, the level of necessity of foreign language and multicultural education as factors aimed at improvement of competitive awareness, what specific foreign language they choose to be educated in and in which countries the respondents are most interested in case of multicultural preparation.

H1 We suppose that in respect to information acquisition majority of respondents consider language barrier to be a bigger barrier than multicultural ones.
H2 We suppose that in respect to information analysis majority of respondents consider multicultural barriers to be bigger barriers than a language one.
H3 We suppose that in case of competitive environment awareness improvement majority of respondents consider the opportunity of foreign language education equal to the opportunity to multicultural education.
H4 We suppose that in case of foreign languages education majority of respondents would choose the opportunity to be educated in English language.

The methods used in an empirical part of the paper resulted from the paper aim and defined hypotheses. At first detailed study of literature was required to get adequate information how to get and process research data. The method to acquire research data was a questionnaire containing factual, opened and closed questions.

In the process of research results evaluation and interpretation the methods assessing quantity and frequency of the phenomena which we found and the methods evaluating their quality – Mann–Whitney U test, Wilcoxon Signed Ranks Test and comparison, summarising methods – synthesis and also train of thoughts – induction and deduction were used. Obtained statistic data are processed in figures.

Research sample in which among others also our topic was searched, includes 189 companies and the research was done from September to December 2016. There were 9 agricultural enterprises, companies, 6 extractive industry companies, 4 chemical industry companies, 22 engineering companies, 25 food industry companies, 16 building enterprises, 84 companies doing business in retail and wholesale business, accommodation and catering services, 5 enterprises from the area of traffic, communications and telecommunications, 9 companies from financial sector and 10 companies from the area of health service, educational system, and state administration. Size of companies was determined by the number of employees – included in the set of respondents. From this point of view our research sample contained 73 micro-companies, 57 small companies, 34 middle sized companies and 25 big ones. The respondents who filled in the questionnaires were usually in a position of company owners or top management members (55%), middle management members of lower management ones (26%), administrative workers (15%), consultant (3%) or worked as marketers and copywriter, commercial premises operator or sales and accounting employee (1%).

7. Results

To evaluate questionnaire survey results based on quantitative methods of respondents´ – managers´ opinions evaluation the SPSS programme environment was used. To prove

up the validity of hypotheses we defined, the method Mann–Whitney U test was applied. This is a nonparametric test of the null hypothesis that it is equally likely that a randomly selected value from one sample will be less than or greater than a randomly selected value from a second sample.

In H1 we suppose that in respect to information acquisition majority of respondents consider language barrier to be a bigger barrier than multicultural ones.

By Mann–Whitney U test and based on respondents´ answers we calculated

$$\alpha = 0.079 > 0.05$$

and we confirm above mentioned H1. The results are processed in Table 1.

Table 1: Language and multicultural barriers – acquisition of information.

Type of enterprise	language barrier is an obstacle	multicultural barriers present an obstacle
micro	10	0
small	6	1
medium	5	1
Total	21	2

In H2 we suppose that in respect to information analysis majority of respondents consider multicultural barriers to be bigger barriers than a language one.
By Mann-Whitney U test we found out that α =0.003<0.05 and the hypothesis we defined is rejected. Significance level of preferences is lower than 0.05 and H2 was not confirmed. To express it quantitatively the number of respondents who consider multicultural barriers to be obstacles in information analysis was only 18.1% from the total number of responses.

In H3 we suppose that in case of competitive environment awareness improvement majority of respondents consider the opportunity of foreign language education equal to the opportunity to multicultural education. To verify H3 Wilcoxon Signed Ranks Test was used and since α =0.000<0.05, our hypothesis is rejected. The results are shown in Table 2.

Table 2: Frequency of preferences of language and multicultural preparation

	foreign languages preparation	multicultural preparation
yes	104	59
no	29	55
I do not know	56	75

Although H3 was not confirmed when interpreting the results, it is necessary to notice the following fact: from the total number of 189 respondents 55% of them clearly supported the importance of language preparation and 31% multicultural preparation. However, when we add quite high number of respondents who do not know if language or multicultural preparation would definitely help them to be better aware of competing environment the result is: 84.6% respondents in favour of language and 70.8% in favour of multicultural preparation. And this is really a challenge for all foreign languages and multicultural educators to prove their importance and legitimacy.

H4 supposed that in case of foreign languages education majority of respondents would choose the opportunity to be educated in English language. Based on respondents´ answers we state that 51% of them chose English language, 26% German, 12% Russian, 7% Polish and 4% other languages (Spanish, Chinese, Italian, French). By

Friedman test we found out sequence of responses according to respondents´ preferences and they are presented in Table3.

Table 3: Sequence of language selection preferences

Language	Mean Rank
English	4.22
German	3.21
Russian	2.69
Polish	2.50
other	2.37

Most frequently repeating response was preference of English, where mean rank is 4.22. Using Kruskall-Wallis test we searched mutual dependencies of preference of respondents who appreciate an opportunity to get new knowledge in English compared with other languages. There are values of coefficients of significance levels and preference of English towards other languages in Table 4.

Table 4: Table of dependencies between English and other languages

Test Statistics[b,c]

	German	Russian	Polish	Other
Chi-Square	.472	.760	.135	17.662
df	1	1	1	1
Asymp. Sig.	**.492**	**.383**	**.713**	**.000**
Monte Carlo Sig. Sig.	.583[a]	.489[a]	.773[a]	.000[a]
99% Confidence Interval Lower Bound	.570	.476	.762	.000
Upper Bound	.596	.502	.783	.001

a. Based on 10000 sampled tables with starting seed 334431365.
b. Kruskal Wallis Test
c. Grouping Variable: English

If we compare partial values of coefficients α towards preference of English language, they are higher than 0.05, and the H0 is accepted. We calculated the average values using coefficients: α =0.397 >0.05 and H_0 is not rejected and our H4 is confirmed. In connection with multicultural preparation the respondents were asked about which country they would need to get most information and knowledge. Sequence of country based on Friedman test and mean rank calculation looks as follows: Germany – 4.21, England – 3.80, Poland – 3.53, Austria – 3.50, Ukraine – 3.04 and Hungary – 2.91.

8. Discussion and Conclusions

Based on the research results which are in details described in the previous part of the paper, with the aim to eliminate effect of language and multicultural barriers which companies have in gathering and analysing information concerning apart from other facts also competitive environment, in our opinion the adequate solution is high quality education of university students and within long life education also education of company managers in the area of language and multicultural preparation.

When preparing seminars or courses several questions are to answered: how to train students of economics or managers so that they are ready to work and live in multicultural environment, what should the multicultural education include in order to educate effective communicators who respect cultural differences, what does the multicul-

tural training in business mean, what are the targets that should be achieved in this re-spect, is there a sufficient supply of teaching materials aimed at developing the skills which enable our graduates to work in multinational environment or what are the pos-sibilities that our students currently have to get some relevant cross-cultural or multi-cultural training (Balážová, 2005).

The other question which is often discussed even now is the position of multicul-tural training. Two alternatives are available – multicultural training established as a separate subject or multicultural training as part of the contents of studied subjects taught at Faculties of Economics, e.g. English, Marketing, Management, etc.

Considering the aim of this paper let us describe the situation which exists at our workplace – the Institute of Managerial Systems, Poprad, Faculty of Economics at UMB and which might present a combination of two above mentioned alternatives.

During their bachelor studies students study foreign languages as compulsory op-tional courses in four semesters and the textbooks which are currently used (MacKen-zie: English for Business Studies, Cotton et all: Market Leaders, Mascull: Business Vocab-ulary in Use) – since their authors are aware of the fact that these books are to be used internationally – contain topics related to multiculturalism. Let us mention some of them – Management and cultural diversity, Market structure and competition, Business ethics, International trade, Competitive strategy, The global economy, Intercultural teams, In-tercultural meetings and Intercultural networking. So it is up to us teachers to use all these materials, combine them with actual authentic materials (periodicals, newspapers, journals, company materials) and information they provide to develop multicultural awareness of students related especially to general multicultural issues, e.g. eating hab-its, national languages, dress codes, gift giving, religion, cultural values, rules at work, ways of remuneration, decision making, etc.)

The best solution how to handle the issues of multiculturalism, however, was and we are sure will be (after master study will be accredited at the Institute) a special sub-ject taught and studied during master studies called Intercultural Relationships and Business Practice. Although it was and we think will be offered as an optional subject in the past almost 100% of students at IMS in Poprad chose it. The textbook used in this course was – Business Across Cultures (English, Lynn, 1995) and the topics studied, dis-cussed, summarised and used to get general multicultural information and compare it to the relevant information about Slovakia concerns countries like United Kingdom, France, Germany, Russia, Japan, the United States, Canada, Australia, New Zealand and the Arab Emirates.

In this course the following business-related multicultural issues are discussed: na-tional stereotypes, initial contacts, hospitality, time management, decision making, nego-tiations, contracts, marketing, management and employees relations and the interna-tional business person across cultures. Each topic starts with Warm-up activities which prompt students to share their knowledge or experience related to the topic. Case stud-ies either authentic or based on extensive cultural research provide students with realis-tic context in which multicultural cross-cultural misunderstandings occur while also presenting useful business concepts. In Problem solving section students read different pieces of information that help them better understand the conflict presented in the case and are asked to develop a concrete plans to help solve it. The part titled Around the world broadens students´ basic business knowledge and draws their attention to their own experiences and cultural perspectives. Last but not least section – Language expan-sion – give the students opportunity to practice vocabulary in the topic area of the unit

and helps students see how cultural and multicultural attitudes are reflected in language usage (English, Lynn, 1995).

Due to the fact that foreign language teachers rarely develop or create plans of studies at our universities our only but on the other hand crucial task is to discuss and persuade those who do that plans of studies should include studies of at least of two foreign languages and the number of lessons should be sufficient, in most cases higher.

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Procedural aspects of the Common Corporate Consolidated Tax Base

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Abstract

In October 2016, the European Commission introduced both a proposal for Council Directive on a Common Consolidated Corporate Tax Base (CCCTB) and a proposal for Council Directive on a Common Corporate Tax Base (CCTB). These proposals deal also with the administration and procedures. Groups of companies should be administered by the principal tax authority. The tax audit of group members should be performed by national authorities, which should be coordinated by the principal tax authority. The CCCTB proposal requires the cooperation between concerned authorities. The leading role of the principal tax authority, different procedural rules in 28 Member States and different interests of the concerned authorities can lead to the unfounded differences in the quality of tax administration and legal protection of taxpayers rights. Taxpayers may tend to "administrative shopping". The aim of this paper is to analyze the administration and procedures mentioned in proposals for Directives on CCTB and CCCTB, to consider pros and cons of these proposals and, eventually suggest another solution. The author concludes that best solution for fair and effective administration is to establish one tax authority on the EU level ("EU Specialized Tax Office") and introduce complex EU procedural rules ("EU Tax Procedure Code"). The paper uses standard methods of scientific work as method of description, comparative analysis, and methods of synthesis, deduction and induction.

Keywords: CCTB, CCCTB, Principal Tax Authority, Competent Authority, Tax Administration, Tax Audit, Taxpayers Rights

JEL Code: K34, K41, H21

1. Introduction

After a years of discussions, the European Commission ("Commission") introduced a proposal for Directive on a Common Consolidated Corporate Tax Base (CCCTB)[1] in 2011.

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[1] Proposal for a Council Directive COM (2011) 121 final/2 of 3. 10. 2011 on a Common Consolidated Corporate Tax Base (CCCTB)

This proposal has not been adopted, so the Commission formally withdrawn it and replaced it by two new proposals in October 2016: (i) proposal for a Directive on a Common Consolidated Corporate Tax Base (CCCTB)[2] ("CCCTB Directive"), and (ii) a proposal for a Directive on a Common Corporate Tax Base[3] ("CCTB Directive"). Commission decided for splitting of the original proposal into two directives, hoping that, contrary to original proposal, this ambitious project would more likely be adopted in this two-step way. First, the EU Member States should agree on rules for the common corporate tax base ("CCTB"), and after that, as a second step, should be solved the consolidation of the corporate tax base, in other words common consolidated corporate tax base ("CCCTB").

Contrary to the CCCTB proposal from 2011, which was based on voluntary basis, current proposal is mandatory for groups of companies with the turnover over EUR 750 million[4]. The smaller companies may opt for the CCTB and groups for the CCCTB. Both the CCTB Directive and CCCTB Directive shall apply to a company that is established under the laws of a Member State, including its permanent establishment in other Member States, where the company meets all of the conditions stipulated in these Directives, i.e.:

- It has a form listed in Annex I to the CCTB or CCCTB Directive,
- It is subject to one of the corporate taxes listed in Annex II to the CCTB or CCCTB Directive or to a similar tax subsequently introduced,
- It belongs to a consolidated group for financial accounting purposes with a total consolidated group revenue that exceeded EUR 750 million during the financial year preceding the relevant financial year. Groups for consolidation are defined in Art. 6 of the CCCTB Directive and, if we simplify the definition, we can say that a group should be formed by a resident taxpayer with all its permanent establishments that are situated in a Member State, and also all permanent establishments that are situated in a Member State and belong to its qualifying subsidiaries that are tax resident in a third country, and all its qualifying subsidiaries.
- the company qualifies as a parent company or qualifying subsidiary[5] and/or has one or more permanent establishments as referred to in Article 5 of the CCTB Directive.

Both proposals contain some administrative provisions. Under the CCTB Directive, companies may continue to apply their national rules for administering tax liability, so administrative provisions in the CCTB Directive are very brief and of a lesser significance than in the case of the CCCTB Directive. In other words, the company will fall under the tax administration of the Member State in which it is tax resident or in which its permanent establishment is situated[6]. Such taxpayer should just announce to the tax authority of the Member State where it is tax resident, that it falls under the scope of the CCTB Directive. If the company will fall under the CCTB Directive, it shall cease to be subject to the national corporate tax law in respect of all matters regulated by the CCTB Directive, but from the procedural point of view, it stays under the power of local tax authorities.[7] It implies that for the taxpayer applying "just" CCTB Directive, procedural

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[2]Proposal for a Council Directive COM (2016) 683 final of 25. 10. 2016 on a Common Consolidated Corporate Tax Base (CCCTB)

[3]Proposal for a Council Directive COM (2016) 685 final of 25. 10. 2016 on a Common Corporate Tax Base

[4]Art. 2 of the CCCTB Directive

[5]Qualifying subsidiary is immediate and lower-tier subsidiary in which the parent company holds the right to exercise more than 50% of the voting rights and has on ownership right amounting to more than 75% or the subsidiary´s capital or it owns more than 75% of the rights giving entitlement to profit.

[6]Art. 64 (1) of the CCTB Directive

[7]Art. 2 (2) of the CCCTB Directive

rules are of lower importance, because he stays under the tax administration of the state of his residency.

However, for companies that are members of the group that is subject to CCCTB Directive (either obligatory, or voluntarily), the procedural provisions are of higher importance, because the CCCTB require administration of groups of companies having members in more EU Member States, or alternatively even with qualifying subsidiaries or resident taxpayers that are qualifying subsidiaries of a non-taxpayer who is resident in a third country.

The leading role in the tax administration under the CCCTB Directive should have the principal tax authority. It should serve as "one stop shop". The group should submit only one corporate tax return in the country of the principal taxpayer. However, the principal tax authority should in some cases cooperate with local authorities, and in the CCCTB Directive are mentioned also situations in which the members of the group should refer to local authorities, not to the principal tax authority. Tax offices have to cooperate together and, of course, there could arise disputes between them.

The aim of this paper is to analyze administration and procedural rules of the CCCTB Directive, to consider pros and cons of them and, eventually suggest another solution for fairer and more effective tax administration of the taxpayers who are subject to the CCCTB Directive.

2. Administration and procedures under the CCCTB Directive

In the CCCTB Directive, the procedural rules are stipulated in the Chapter IX, Administration and Procedures, Art. 46–68. The main features of administration and procedures are described below.

2.1. Tax Authorities

2.1.1. Definition

The CCCTB Directive defines two types of tax authorities: (i) the principal tax authority, and (ii) the competent authority.

Principal tax authority is the competent authority of the Member State in which the principal taxpayer of the group is resident for tax purposes or in which the permanent establishment of non-resident taxpayer is located. Principal taxpayer is defined in Art. 3 (11) of the CCCTB Directive[8]. If we will simplify this definition, the principal taxpayer

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- [8]a resident taxpayer that forms a group with its qualifying subsidiaries or its permanent establishments located in another Member States or qualifying subsidiary that is resident in a third country,
- a resident taxpayer designated by the group that is composed of only two or more resident taxpayers which are immediate qualifying subsidiaries of the same parent company resident in a third country,
- a resident taxpayer that is the qualifying subsidiary of a parent company resident in a third country, where that resident taxpayer forms a group with only one or more permanent establishment of its parent,
- a permanent establishment designated by a non-resident taxpayer that forms a group with only its permanent establishments located in two or more Member States.

usually will be the parent company of the group, or taxpayer chosen by the members of the group in other cases.

Competent authority is the authority designated by each Member State to administer all matters related to the implementation of the CCCTB Directive[9]. Competent authorities should communicate between them by electronic means. Rules stipulated in the Directive 2011/16/EU, on administrative cooperation in the field of taxation, should be used.[10]

All information made known to a Member State pursuant to the rules of this Directive shall be covered by the obligation of official secrecy in that Member State and enjoy the protection extended to similar information under the domestic legislation of that Member State.[11]

2.1.2. Role of the Principal Tax Authority

The principal tax authority has the leading role in the following cases.

Announcement of the principal taxpayer on creation of the group is submitted to the principal tax authority. Principal tax authority should immediately hand over such notice to the competent authorities of all concerned Member States. Competent authorities may submit their views to the principal tax authority within one-month time-limit. The principal tax authority shall examine whether the group fulfils the requirements of the CCCTB Directive. If the taxpayer has not fully disclosed all required information, the principal tax authority in agreement with the other competent authorities concerned, may invalidate the original notice. In the case that the principal taxpayer will not make such announcement, the principal tax authority shall issue assessment within six months of the discovery of the absence of a notice, however no longer than the previous five tax years.

The principal taxpayer shall submit the consolidated tax return of the group with the principal tax authority.

The principal tax authority shall issue a tax assessment based on an estimate and taking into account the available information if the principal taxpayer fails to submit the consolidated tax return.

The principal tax authority shall verify the consolidated tax return and, if required, issues an amended tax assessment. Prior to issuing amended tax assessment, the principal tax authority should consult the competent authorities.

The principal tax authority may initiate and coordinate tax audits of group members. The principal authority should also compile the results of all audits of group members.

During appellate proceeding, the principal tax authority shall act in close consultation with the other competent authorities. The competent authorities should provide all necessary assistance to the principal authority.

2.1.3. Role of the Competent Authorities

The taxpayer may request from the competent authority of the Member State an opinion on the implementation of the rules of the CCCTB Directive on a specific transaction or series of transactions that it plans to carry on. The opinion of the competent authority

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[9]Art. 3 (26) of the CCCTB Directive
[10]Art. 62 of the CCCTB Directive
[11]Art. 63 of the CCCTB Directive

should be binding, unless the courts of the Member States of the principal tax authority subsequently decide otherwise.[12]

A competent authority may request on the principal tax authority initiation of the tax audit.

The competent authorities can express their views on issuing amended assessment by the principal tax office within one month of consultation.

The competent authority may call on the principal tax authority to issue an amended tax assessment.

The competent authorities should provide all necessary assistance to the principal authority during the tax audit and appellate process.

2.1.4. Disagreement between competent authorities and the principal tax authority

When the competent authority disagrees with a decision of the principal tax authority, it may challenge that decision before the courts of the Member State of the principal tax authority within a period of three months.

In such a case, the competent authority should have at least the same procedural rights as those enjoyed by a taxpayer under the law of that Member State in proceedings against a decision of the principal tax authority.[13]

2.2. Tax Return of the Group and Tax Assessment

The principal taxpayer shall submit the consolidated tax return of the group with the principal tax authority. The deadline is the nine months from the end of tax year. Consolidated tax return should be treated as an assessment of the tax liability of each group member. The consolidated tax returns will be stored in a central database to which all the competent authorities shall have access.

In the Members States in which the law provides that a tax return has the legal status of a tax assessment and is to be treated as an instrument permitting the enforcement of tax debts, the consolidated tax return shall have the same effect in relation to a group member liable to tax in that Member State. However, in the Member States in which the tax return does not have this effect, the competent authority may issue an instrument of national law authorizing enforcement in that Member State. Such instrument shall incorporate the data in the consolidated tax return concerning the group member. Appeals against such instrument should be submitted only against national tax assessment of the respective group member, not against the tax assessment of other group members. The procedure should be governed by the national law of the relevant Member State.[14]

The content of the consolidated tax return is stipulated in Art. 52 of the CCCTB Directive and should include, among others, the calculation of the tax base of each group member, the calculation of the consolidated tax base, the calculation of the apportioned share of each group member and the calculation of the tax liability of each group member.

All group members shall have the same tax year.[15]

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[12]Art. 61 of the CCCTB Directive
[13]Art. 65 of the CCCTB Directive
[14]Art. 51 of the CCCTB Directive
[15]Art. 50 of the CCCTB Directive

If the principal taxpayer fails to submit a consolidated tax return, the principal tax authority shall issue a tax assessment based on an estimate and taking into account the available information. The principal taxpayer may appeal against such assessment.

If errors were made in the consolidated tax return, the principal taxpayer shall notify the principal tax authority of them.

The principal tax authority shall verify the consolidated tax return and, if required, amended tax assessment shall be issued in maximum three years from the final date of submission of consolidated tax return or, where no return was submitted, not later than three years following issuance of a tax assessment based on the estimate of the principal tax office and based on available information.[16]

This 3-year time-limit will not apply in the case of deliberate or grossly negligent misstatement of the taxpayer, where the time-limit is 6 years, or in the case when the misstatement is the subject of criminal proceedings. In such a case 12-year time-limit applies.

Prior to issuing amended tax assessment, the principal tax authority should consult the competent authorities. Those authorities may express their views within one month of consultation. The competent authority may call on the principal tax authority to issue an amended tax assessment. Failure of the principal tax authority to notify within three months of that call to the competent authority that it undertakes to issue that amended tax assessment shall be treated as refusal.

2.3. Tax audits

Tax audit of group members may be either initiated by the principal tax authority, or by a request for initiation of the competent authorities. The principal tax authority and the other competent authorities should jointly determine the scope and content of an audit and the group members to be audited. In each case, tax audit of group members should be coordinated by the principal tax authority. The principal authority should also compile the results of all audits.

Tax audit should be conducted in accordance with the national legislation of the Member State in which it is carried out, subject to such adjustments that are necessary to ensure a proper implementation of the rules of the CCCTB Directive.

2.4. Remedies

The CCCTB Directive introduces two types of remedies: administrative appeals and judicial appeals.

Appeal can be submitted by a principal taxpayer, among others, against an amended tax assessment or an assessment of the failure to file a consolidated tax return. The appeal shall be submitted within sixty days of the receipt of the act appealed against. An appeal shall not have any suspensory effect on tax liability of a taxpayer.

2.4.1. Administrative Appeals

Appeals against amended tax assessments or assessment of the failure to file a consolidated tax return shall be heard by an administrative body that according to the law of the Member State of the principal tax authority is competent to hear appeals at first instance. That administrative body shall be independent from the tax authorities in the

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[16]Art. 56 of the CCCTB Directive

Member State of the principal tax authority. If in some country is not such administrative body, the principal taxpayer may file a judicial appeal directly.

The administrative body entitled to decide the appeal can change the decision of the principal tax authority, confirm the decision of the principal tax authority or annul such decision. The appeal shall be decided by administrative body in six months. If no decision is received by the principal taxpayer within that period, the decision of the principal tax authority shall be deemed to have been confirmed. Where the decision is annulled, the administrative body should remit the matter to the principal tax authority. In such a case, the principal tax authority is obliged to issue new decision within sixty days. The principal taxpayer may appeal against it to administrative body again, or directly to the court.

2.4.2. Judicial Appeals

Where the decision of the principal tax authority has been varied or confirmed by the administrative body, the principal taxpayer shall have the right to appeal directly to the courts of the members State of the principal tax authority within sixty days of the receipt of the decision of the administrative appeals body.

A judicial appeal shall be governed by the law of the Member State of the principal tax authority. When making a submission to the court, the principal tax authority should consult it with the other competent authorities. The competent authorities shall provide all necessary assistance to the principal tax authority.

3. Methodology

The paper uses standard methods of scientific work. Firstly, the method of description is used, to describe the administrative and procedural rules in the CCCTB Directive. Then, comparative analysis is used when comparing the proposal for the CCCTB Directive in 2011 with the proposal for the CCCTB and CCTB Directives in 2016. Finally, the method of synthesis, deduction and induction is used, when analysing the procedural rules of both the CCTB Directive and the CCCTB Directive and own conclusions and suggestions are formulated.

4. Results

4.1.   Different level of the law protection and tax administration in various Member States

Tax audit should be conducted in accordance with the national legislation of the Member State in which it is carried out, subject to such adjustments that are necessary to ensure a proper implementation of the rules of the CCCTB Directive. However, it is always coordinated by the principal tax authority and appeals has to be submitted and decided by authorities from the Member State where the principal tax authority is located.

The tax return will be treated as an assessment of the tax liability of each group member. Formalizing the assessment and effecting payment then follow the rules of the national law of each Member State involved. Thus, income allocations to countries with self-assessment procedures lead to a more or less immediate payment obligation, while

those payments to countries with assessment notices would lead to official payment demands (Erasmus-Koen, 2011).

Different procedural rules of Member States and the emphasis of the CCCTB Directive to the country of the principal taxpayer together with the leading role of the principal tax authority (as described in part 2.1.2 of this paper) may lead to the situation that taxpayers will establish parent companies (principal taxpayers) in jurisdictions where tax authorities have friendly behavior than in countries with stricter procedural rules and in which the risk of tax audit is higher than in other Member States.

The same conclusion is valid also for court protection because the authorization to decide judicial disputes have the courts in the country where the principal tax authority is located. The standard of protection of the rights of taxpayers differ in all Member States. It implies that taxpayers would have a tendency for "administrative shopping" choosing the country of principal taxpayer under the level and quality of administrative and judicial bodies.

The CCCTB Directive defines some procedural criteria, but in very brief way. In authors opinion, these rules should be much more harmonized, e.g. by preparation of the law on the EU Tax Procedure (something like: "EU Tax Procedure Code"). The reference to the Directive 2011/16/EU, on administrative cooperation in the field of taxation, makes sense, but is not sufficient for ensuring of unified level of protection of the rights of taxpayers and fair tax administration.

4.2. Conflicts between the competent authorities

As stated in part 2.1.4 and 2.1.5 of this paper, when the competent authority disagrees with a decision of the principal tax authority, it may challenge that decision before the courts of the Member State in proceedings against a decision of the principal authority and the competent authority should have the same procedural rights as the taxpayer.

With regard to the fact that the law of the state of the principal tax authority in such a case should be used, officials from the competent authority from different Member State are in big disadvantage consisting in unknowing of the law of the principal tax authority.

It could help if Member States will train officials to submitted lawsuits before the court in other Member States. However, currently, there is 28 different legal systems, so it is not realistic that each official in each Member State will know procedural court rules in other Member State to protect the interests of the concerned competent office.

Moreover, each competent authority of each state will tend to protect the interests of its own jurisdiction, so very likely the competent authority may disagree with the opinion of the principal tax authority which would result in lower tax collection in its own Member State (Cerioni, 2011).

The competent authority may call on the principal tax authority to issue an amended tax assessment. Failure of the principal tax authority to notify within three months of that call to the competent authority that it undertakes to issue that amended tax assessment shall be treated as refusal. This could lead to the situation that the principal tax office will rather be passive than actively decide the case.

The solution could be to establish one authority in the EU level with authorization to administer CCCTB, something like an EU Specialized Tax Office for groups of companies under the CCCTB Directive. Officials should work for this body on the EU level and not for the tax authorities of their Member States. In such a case the disputes between the officials from different Member States could be minimized. Or, if this solution is not

politically accepted, there should be established e.g. the arbitration committee, which should decide the disputes between the competent authorities rather than the court in the Member State of the principal tax authority. This was contained in the CCCTB Directive proposal from 2011, but it was removed from 2016 proposal.

4.3. Uncertainty of taxpayers

As mentioned in part 2.1.3 of this paper, the taxpayer may request from the competent authority of the Member State a binding opinion on specific transaction or series of transactions that it plans to carry on. However, the opinion will not be binding, if the courts of the Member State of the principal tax authority subsequently decide otherwise.

This rule can lead to the following situation: if under the national law of the tax authority giving the opinion such opinion is unconditionally binding, the advance ruling system provided by the proposal of the CCCTB Directive could fail to provide taxpayers with the same degree of legal certainty offered by the national advance ruling system. With regard to the fact that the final decision should be on the courts of the Member State of the principal tax authority, advance ruling system under the CCCTB Directive could be less attractive for a group member asking the opinion of a tax authority from the point of view of legal certainty than a tax ruling system under a national tax regime (Cerioni, 2011).

The solution to remove this obstacle could be the obligatory cooperation between the competent authority and principal tax authority during issuing the ruling, similarly it is suggested in the case of tax audit of group members. Alternatively, the authorization to issue binding ruling could be given to independent authority on the EU level (e.g. EU Specialized Tax Office).

5. Discussion and Conclusions

In order to benefit from the proposal for CCCTB Directive, companies might choose to establish the principal taxpayer (and, therefore, also have the principal tax authority) in a Member State with the most relaxed tax audit requirements. (Mkrtchyan, 2008). This would be eliminated by the rule that the principal tax office will not be situated in the country of the principal taxpayer, but in the country in which the highest profit in the group is generated.

The author appreciates that the procedural rules in the CCCTB Directive contain mainly clear provisions with exact time-limits for action from the side of both authorities and taxpayers. On the other hand, the leading role of the principal tax authority, the different procedural rules in Member States, the different level of the court protection may lead to tendency for "administrative shopping" from the side of taxpayers. Taxpayers will likely structure their business in the way that the principal taxpayer will be established in the country with the highest standard of the rights of the taxpayers and the risk of tax audit is the lowest.

The Commission presents that "one-stop shop" will reduce costs of the taxpayers[17]. In authors opinion, it is not so clear. It is true that the group submits only one consolidated tax return by the principal taxpayer in the country of the principal taxpayer, so compliance costs will probably be reduced. However, the CCCTB Directive presumes

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[17] Explanatory memorandum to the CCCTB Directive

also situations in which taxpayers should communicate directly with local authorities (e.g. ask them for binding ruling). Binding ruling issued by local authority may be cancelled by the court in the country of the principal tax authority. This brings a lot of uncertainty to the taxpayers and the "one-stop shop" does not have only "one-stop".

On the other hand, the costs of tax administrations will be higher, mainly in countries with the principal tax authority. That authority has the leading role in tax administration and should cooperate with competent authorities in Member States where members of the group are located. Demands on tax officials will be also higher, because they should be trained on the tax procedure systems and court protection in other EU Member Countries.

All of these obstacles can be solved by establishing one EU body with authorization to administer the CCCTB taxpayers, some kind of "the EU Specialized Tax Office". The court disputes can be solved in front of the Court of Justice of the EU.

Harmonization of procedure rules in the CCCTB Directive is not sufficient for ensuring fair and effective tax administration. Therefore, the unified tax procedure code on EU level should be introduced and should be used to administration of all companies that are subject to the CCCTB Directive.

However, with regard to the fact that the proposals on CCTB and CCCTB Directive would diminish the sovereign right of Member States to set and control their own taxes, it is unfortunately not probable that in near future the proposals will be passed. So, the European Commission has the time for improvement of these proposals.

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The relation between the company financial brand value and the company market value

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Abstract

A number of papers dealing with the company brand and its valuation as the company's important intangible asset highlight the growing importance of this asset within the company's exploited set of assets. The focus is particularly on the brand ability to influence the consumer behavior and thereby achieve economic advantages compared to competitors in the form of higher profit margins, a higher market share, stability of cash flow and so on. The aim of this paper is to verify by data on the brand valuations and the company valuations on public markets whether the financial brand valuations contain some information on future company valuations or whether the estimates of the financial brand value are rather a sort of company market value residuum not attributed to another particular company value generator. The result of the selected brand companies sample analysis implies that the latter is probably closer to reality.

Keywords: brand, brand valuation, Granger causality test

JEL Code: M20, M21, G31

1. Introduction

A number of authors (e.g. Aaker, 1996; Keller, 2003) have highlighted the importance of the brand among the company's exploited assets. The main source of its value is seen as the brand awareness, the perceived quality, the image, and the brand loyalty (Aaker, 1996). According to Keller (2003), the brand may be associated with goods, services, people, organizations, geographical locations, ideas and more. Like other intangible assets, the brands are becoming more substantial value generators and are assuming the role that previously belonged to tangible assets (Krabec, 2009). Many methods have been developed to achieve a financial brand valuation (Salinas, 2009). The effort is generally aimed to express the economic benefits of brand marketing characteristics (Smith, Richey, 2013). Ambitions to capture the benefits of a brand for a company go from maximalist to the middle and to the minimalist approach (Jurečka, 2006), like the license

analogy method (Čada, 2007). The more developed methods seek to convert the brand behavioral-quality metrics to their financial statements (e.g. Čižinská, Krabec, 2015).

According to the diverging valuations of (recorded) tangible assets and market capitalizations of publicly traded companies, the unrecorded intangible assets are becoming increasingly important. In 2010, the estimated proportion of company brand values in market capitalization of the S&P 500 Index exceeded 30% (Larkin, 2013). A number of agencies focus on the company brand valuation. Their valuation procedures are generally private. It is therefore not easy to replicate them. However, the results of their valuations for the largest companies are available. It is thus possible to test in what relation the brand agency estimated financial brand value is to the branded company market capitalization. This paper examines whether the separate financial brand valuation helps to estimate the company market value. Only the entire product portfolio brands and the company name related brands were included in examination for symmetry of the comparison. All examined companies were publicly traded companies. The source of brand value estimates were the leading agencies dealing with the financial brand valuation, Interbrand and MillwardBrown.

2. Methodology and Data

The main challenge in the effort to express the financial value of the brand is probably to isolate its influences from the other assets exploited. The correct financial brand valuation should contribute to the whole company valuation, to the explanation of the overall business value. The vagueness and challenging intangible assets manifestation recording may cause their estimated financial value to become a residual category that includes everything that has not been possible to assign unambiguously to the other value generators. The Granger causality test could indicate whether the estimated financial brand values contribute to the explanation of the whole company business value or whether they are just residual values between company market values and values of its identified value generators. The procedure tests whether the delayed value of one variable (e.g. financial brand value) contributes to the explanation of the other variable (e.g. the whole company market value). The current value explanation can be formulated as a linear combination of delayed values of the explained variable and delayed values of the explanatory variable according the following formula (Kirchgässner, Wolters, Hasseler, 2012):

$$y_t = \alpha_0 + \sum_{k=1}^{k1} \alpha_{11}^k y_{t-k} + \sum_{k=1}^{k2} \alpha_{12}^k x_{t-k} + u_t$$

(1)

The null hypothesis for testing is:

$$H_0 : \alpha_{12}^1 = \alpha_{12}^2 = ... = \alpha_{12}^{k2} = 0$$

(2)

The role of the test is to determine whether previous values of (x) contribute to the explanation of the current value of (y). The test is based on David Hume assumption that the cause always precedes the effect.

The Granger causality test is applied to the data on financial brand value estimates collected form brand valuation agencies (Interbrand and MillwardBrown) and the data on company market capitalization (retrieved from Bloomberg). The company market

capitalization is used as a proxy for the company market value. There were several requirements concerning data so that a proper test of the relation was possible:

- the brand is related to the company whole product portfolio or it coincides with its business name;
- the brand financial value is available for the entire analyzed period;
- the company is traded on public markets for the entire analyzed period;
- the financial brand value estimate is available for the entire analyzed period.

In the case of Interbrand, 16 financial brand valuation time series estimates were selected from the issued lists of 100 world most valuable brands published for each year in the period from 2000 to 2014. In the case of MillwardBrown, 10 financial brand valuation time series estimates were selected from the issued lists of 100 world most valuable brands published for each year in the period 2006–2015. The list of the selected brands and their financial value estimates is stated with market capitalizations of their companies in table 1, separately for Interbrand and MillwardBrown.

Table 1: The selected company financial brand value estimates and related company market capitalizations (bl. USD). Source: Interbrand, MillwardBrown, Bloomberg.

Company	Interbrand (2014)	Market Capitalization (2014)
Apple	118.9	567.2
Coca Cola	81.6	181.3
IBM	72.2	158.9
General Electric	45.5	258.7
McDonald	42.3	94.6
Intel	34.2	156.3
Disney	32.2	147.9
Cisco	30.1	121.8
Amazon	29.5	149.6
HP	23.8	62.4
Honda	21.7	60.5
Nike	19.9	72.4
American Express	19.5	95.1
Pepsi	19.1	134.7
SAP	17.3	89.9
Kelloggs	13.4	22.5
Company	**MillwardBrown (2015)**	**Market Capitalization (2015)**
Apple	247.0	668.1
Coca Cola	83.8	178.3
IBM	94.0	132.9
General Electric	59.3	266.3
McDonald	81.2	95.1
Amazon	62.3	233.7
SAP	38.2	86.4
Ebay	14.2	51.3
BMW	26.3	70.3
Toyota	28.9	201.1

The value of the company market capitalization in each year is obtained as the average of the company market capitalization at the calendar quarter end in the selected year.

Model Specification

The Granger causality between the company market capitalization and the financial brand value estimate was tested in the panel with fixed effects (Heiji et al., 2004). The mutual relation between the two variables was tested in absolute terms and in logarithms of those values. Due to the annual interval of the recorded values (it can be considered quite a long interval in financial markets), the models for testing include only one-period or two-period time lags of the explained and the explanatory variables. According to the delay order, the models for testing the causality direction have the following specifications:

$$y_{it} = \alpha_i + \beta_1 x_{it-1} + \beta_2 y_{it-1} \tag{3}$$

for the model with one-period time lag and the following for the two-period time lag model:

$$y_{it} = \alpha_i + \beta_1 x_{it-1} + \beta_2 y_{it-1} + \beta_3 x_{it-2} + \beta_4 y_{it-2} \tag{4}$$

Because of the possibility of a common time trend component representing non-included variables, the models with time component were additionally constructed and tested, with the following specifications:

$$y_{it} = \alpha_i + \beta_0 t + \beta_1 x_{it-1} + \beta_2 y_{it-1} \text{ and} \tag{5}$$

$$y_{it} = \alpha_i + \beta_0 t + \beta_1 x_{it-1} + \beta_2 y_{it-1} + \beta_3 x_{it-2} + \beta_4 y_{it-2} \tag{6}$$

Variables (y) and (x) represent the market capitalization and the brand financial value and conversely, index (i) represents the sectional unit, index (t) represents the different time period, α_i represents the sectional unit specific parameter, and indexes β_0 to β_4 represent common regression coefficients.

The two datasets comprising data on company market capitalizations and financial brand value estimates by Interbrand and MillwardBrown were tested separately.

3. Results and Discussion

The models were originally composed for absolute levels of examined values. But the different levels and the evolving market capitalization and developing brand values lead to data heteroskedasticity. This is mitigated by logarithmic transformation of the input values. The original and the transformed values are captured in Figure 1. Therefore, only the results of logarithmic transformation of the original data are presented in the following text. The model specifications for Granger causality test were enriched by added variants with time component to capture the long-term trend in data (for interception of common non-specified variable influence). The resulting parameter values of assumed model variants and related Granger causality tests (as F-tests) are shown in Table 2 and Table 3.

brand value versus market capitalization

Y = 1,28e+004 + 0,139X – – – –

market capitalization

log of brand value vs log oof market capitalization

Y = 2,86 + 0,634X – – – –

log of market capitalizatoin
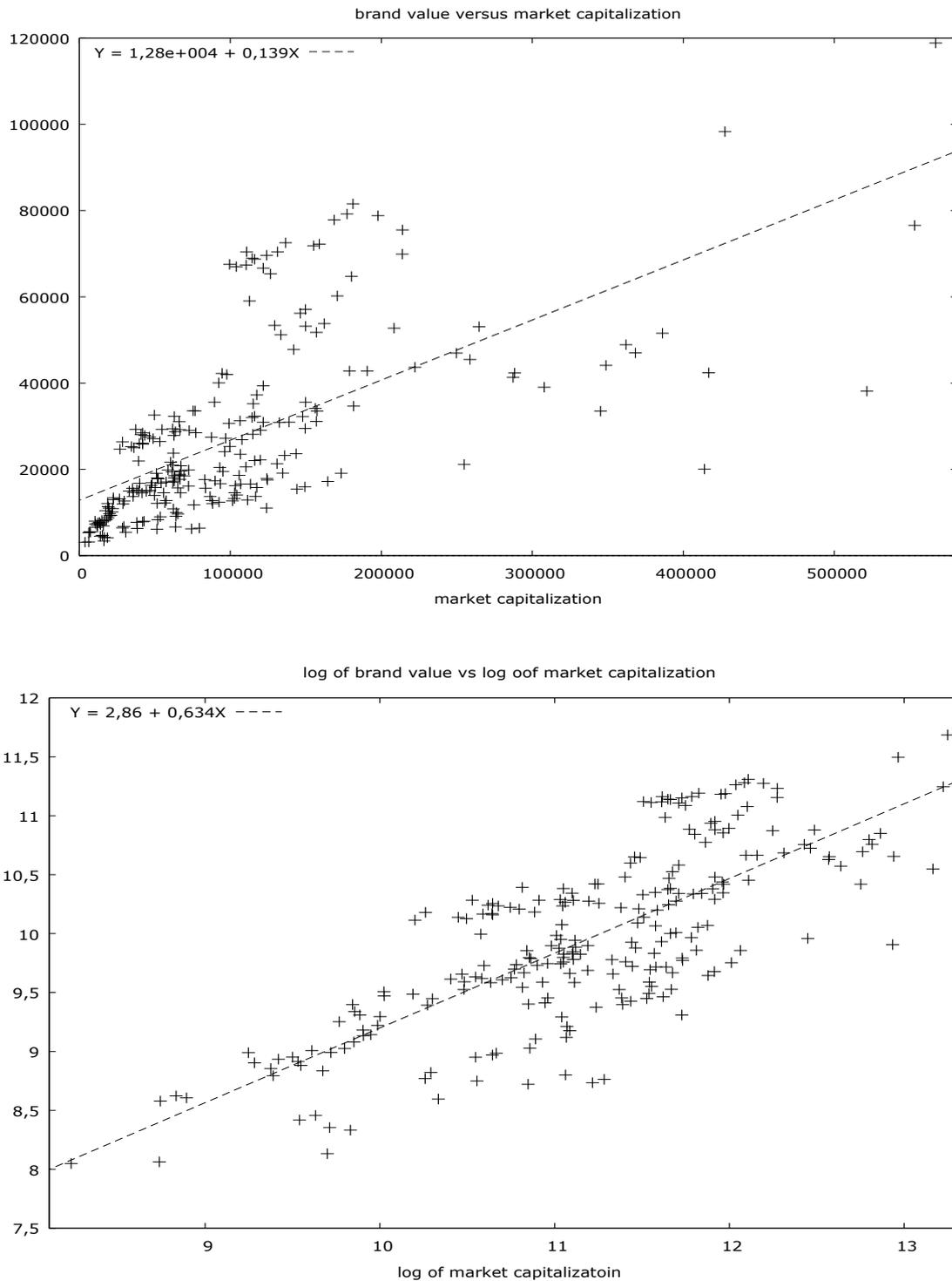
Figure 1: Market capitalization on the horizontal axis and brand value on the vertical axis (left) and their logarithms (right). Source: Bloomberg, Interbrand, author's own calculation.

The tables contain regression coefficient values and their standard deviations and the test results of null hypotheses on the failure of the lagged explanatory variables to contribute to explanation of the current value of the variable explained. The tests examine both the contribution of the previous market capitalizations to the current financial brand value explanation and the contribution of the previous financial brand values to the current market capitalization explanation. Variable (y) represents the logarithm of

the company market capitalization and variable (x) represents the logarithm of the estimated financial brand value in Tables 2 and 3. Table 2 shows the results in the case of financial brand valuation agency Interbrand and Table 3 shows the results in the case of financial brand valuation agency MillwardBrown.

Table 2: The Granger causality test results between the market capitalization and the Intenbrand financial brand valuation estimate in different types of causality models. Source: Bloomberg, Interbrand, author's own calculation.

Model	b0	b1	b2	b3	b4	F-test
			t-ratios			p-value
Logarithms without time trend						
$y_{it} = \alpha_i + \beta_1 x_{it-1} + \beta_2 y_{it-1}$	—	0.15 (1.7)	0.83 (16)	—	—	b1=0 0.086
$x_{it} = \alpha_i + \beta_1 x_{it-1} + \beta_2 y_{it-1}$	—	0.92 (29)	0.11 (5.9)	—	—	b2=0 0.0000
$y_{it} = \alpha_i + \beta_1 x_{it-1} + \beta_2 y_{it-1}$ $+ \beta_3 x_{it-2} + \beta_4 y_{it-2}$	—	−0.07 (0.4)	1.03 (15)	0.24 (1.2)	−0,23 (3,5)	b1=b3=0 0.098
$x_{it} = \alpha_i + \beta_1 x_{it-1} + \beta_2 y_{it-1}$ $+ \beta_3 x_{it-2} + \beta_4 y_{it-2}$	—	0.98 (13)	0.16 (6.1)	−0.08 (1.0)	−0,05 (2,1)	b2=b4=0 0.0000
Logarithms with time trend						
$y_{it} = \alpha_i + \beta_{0t} + \beta_1 x_{it-1} + \beta_2 y_{it-1}$	0.02 (4.7)	−0.06 (0.7)	0.86 (17)	—	—	b1=0 0.497
$x_{it} = \alpha_i + \beta_{0t} + \beta_1 x_{it-1} + \beta_2 y_{it-1}$	0.01 (3.5)	0.86 (25)	0.12 (6.4)	—	—	b2=0 0.0000
$y_{it} = \alpha_i + \beta_{0t} + \beta_1 x_{it-1} + \beta_2 y_{it-1}$ $+ \beta_3 x_{it-2} + \beta_4 y_{it-2}$	0.01 (2.1)	−0.1 (0.6)	1 (14)	0.18 (0.9)	−0,19 (2,7)	b1=b3=0 0.601
$x_{it} = \alpha_i + \beta_{0t} + \beta_1 x_{it-1} + \beta_2 y_{it-1}$ $+ \beta_3 x_{it-2} + \beta_4 y_{it-2}$	0.00 (0.3)	0.98 (13)	0.15 (5.7)	−0.09 (1.2)	−0,04 (1,7)	b2=b4=0 0.0000

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Table 3 The Granger causality test results between the market capitalization and the MillwardBrown financial brand valuation estimate in different types of causality models. Source: Bloomberg, Millwardbrown, author's own calculation.

Model	b0	b1	b2	b3	b4	F-test
			t-ratios			p-value
Logarithm of variables						
$y_{it} = \alpha_i + \beta_1 x_{it-1} + \beta_2 y_{it-1}$	—	0.11 (1.4)	0.72 (8.4)	—	—	b1=0 0.169
$x_{it} = \alpha_i + \beta_1 x_{it-1} + \beta_2 y_{it-1}$	—	0.52 (9.6)	0.36 (5.9)	—	—	b2= 0 0.0000
$y_{it} = \alpha_i + \beta_1 x_{it-1} + \beta_2 y_{it-1}$ $+ \beta_3 x_{it-2} + \beta_4 y_{it-2}$	—	0.36 (2.1)	0.85 (7.2)	−0.02 (0.2)	−0.29 (2.1)	b1=b3=0 0.019

Model	b0	b1	b2	b3	b4	F-test
			t-ratios			p-value
$x_{it} = \alpha_i + \beta_1 x_{it-1} + \beta_2 y_{it-1}$ $+ \beta_3 x_{it-2} + \beta_4 y_{it-2}$	—	0.49 (5.2)	0.42 (6.4)	0.00 (0.1)	−0.15 (1.9)	b2=b4=0 0.0000
Logarithms with time trend						
$y_{it} = \alpha_i + \beta_{0t} + \beta_1 x_{it-1} + \beta_2 y_i$	0.03 (2.7)	0.05 (0.6)	0.66 (7.8)	—	—	b1=0 0.562
$x_{it} = \alpha_i + \beta_{0t} + \beta_1 x_{it-1} + \beta_2 y_i$	−0.00 (0.7)	0.53 (9.3)	0.36 (5.8)	—	—	b2= 0 0.0000
$y_{it} = \alpha_i + \beta_{0t} + \beta_1 x_{it-1} + \beta_2 y_i$ $+ \beta_3 x_{it-2} + \beta_4 y_{it-2}$	0.05 (4.1)	0.34 (2.2)	0.67 (5.8)	−0.1 (0.9)	−0.23 (1.8)	b1=b3=0 0.068
$x_{it} = \alpha_i + \beta_{0t} + \beta_1 x_{it-1} + \beta_2 y_i$ $+ \beta_3 x_{it-2} + \beta_4 y_{it-2}$	−0.01 (0.8)	0.49 (5.2)	0.44 (6.2)	0.01 (0.2)	−0.16 (2)	b2=b4=0 0.0000

Table 2 shows that in the case of Interbrand the estimated financial brand values do not contribute to the explanation of the market capitalization at significance level α=5% even when the two-period time lags are included. When the time component is included in the model, the previous period financial brand value estimates become completely insignificant. When the reverse causality is tested, the previous period values of market capitalization contribute to the explanation of the current financial brand values. The null hypothesis is rejected in the case of both time lag structures even when the time variable is included.

Table 3 shows that in the case of MillwardBrown the estimated financial brand values do not contribute to the explanation of the market capitalization at significance level α=10% in the case of only one-period time lag structure and at significance level α=1% in the case of the two-period time lag. When the time component is included in the model, the previous period financial brand value estimates become completely insignificant in the case of one-period time lag and they do not contribute to the explanation of the market capitalization at significance level α=5% in the case of the two-period time lags. When the reverse causality is tested, the previous period values of market capitalization contribute to the explanation of the current financial brand values. The null hypothesis is rejected in the case of both time lag structures even when the time variable is included.

The results of the conducted Granger causality tests imply that the previous market capitalization values contribute to the current financial brand valuation estimates but the previous financial brand valuations do not contribute significantly to the current market capitalization.

The results could be influenced by the choice of brand valuation agencies. They were selected for their respected position in the brand valuation industry and the availability of their financial brand valuations. The selected company brands were chosen for the availability of the financial brand value estimates for each period. This preselection can have influenced the sample brand value variability. The samples are formed from the world most valuable brands only, so the relations in the other brand segments to the

company market capitalization can be different. The company market capitalization as a value of one share multiplied by the total number of shares might not be the best proxy for the whole company market value. The brands with the same relation to the name of the entrepreneur (and its reputation) were mostly used in the sample. The brands related to one product only or a subgroup of products without relation to the whole product portfolio or the entrepreneur's name were not included. The exact date of the financial brand valuation creation is not available. The supposed time relations (and thus the causality) between the financial brand value estimate and the market capitalization may be then misleading. The market capitalization is the average of market capitalizations at the calendar quarter end in the calendar year. The results can also be the consequence of the specific time period when the financial brand valuations and the related company market capitalizations were available for the analysis. In this respect, the data sets were also restricted only to brands of companies listed on public markets.

4. Conclusions

The results of the conducted Granger causality tests imply that the previous market capitalizations contribute to the current financial brand valuation explanation but the previous financial brand valuations probably do not contribute significantly to the current market capitalization explanation. It could support the idea that the financial brand valuation by the concerned agencies is rather an expression of the not attributable proportion of the whole company value to particular (known) value generators. The reported brand value is rather the residual category for undetected value creation generators than the sole brand value. Further research should focus on other brand valuation agencies to decide whether it is a particular or a common phenomenon. Further studies should also use wider datasets to derive the relation between the financial brand value estimates and the company market capitalization.

Acknowledgements

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Intergenerational Analysis of Preferences of Information Sources in the Banking Market

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Abstract

This paper deals with the analysis of consumer behaviour on the banking market. The main goal is to investigate how preference of information sources differ across distinct age groups (Generation Z and Generation Y) and across two European markets (Czech, British). The study identifies how young bank clients gather information in information search stage and which communication channels they use in post-purchase stage. The study is based on on-line survey conducted in both countries. The findings indicate the impact of segmentation criteria (gender, age generations) on discussed information sources (reference groups, mass media, social media). This article also attempts to find relationship between criteria for bank choice and preferred source of information.

Keywords: Generation Z, generation Y, banking market, consumer behaviour, information sources

JEL Code: C83, G21, M31

1. Introduction

The development of new communication and information technologies, the Internet in particular, is changing the way in which companies and service providers interact with consumers and customers. The banking industry, highly affected by technology evolution, also has transformed the way banks deliver their service using technologies such phone banking, Internet banking, and mobile banking. The aim of this contribution is to specify how different segments of consumers prefer information sources (reference groups, mass media, social media) in pre-purchase search and post-purchase stages.

2. Literature review

Consumer behaviour is is a process when people "select, purchase, use or dispose of a product, services, ideas or experiences to satisfy needs and desires" (Solomon, 2013, p. 31). Blackwell, Miniard & Engel (2001) define the consumer behaviour as a field of study focusing on consumer activities and analysing simply "why people buy".

The traditional model of consumer decision making involves five stages of consumer problem solving: problem recognition, information search, evaluation of alternatives, purchase decision and post-purchase evaluation (Kardes, Cronley, Cline, 2015).

If problem recognition is sufficiently strong the second stage in the consumer decision-making process will begin. Information search involves the identification of alternative ways of problem solution. (Jobber, 2010).

2.1.   Information search

Information search can be explained as following: "the motivated activation of knowledge stored in memory or acquisition of information from the environment, concerning potential need satisfiers" (Blackwell, Miniard & Engel, 2006, p. 107). Indeed, Solomon (2015, p. 70) concurs and expends this statement by pointing out that information search is "the process by which consumers survey the environment for appropriate data to make a reasonable decision."

In general, most of the researchers and writers agree that there are two types information search: internal and external (Clow & Baack, 2007, Ennew & Waite, 2007, Dahlén, Lange & Smith, 2010, Bateson & Hoffman, 2011, Solomon, 2015). To begin with, when consumer is aware of the problem they begin with internal search. In other words, they access their own memory where may be saved information heard in the past or experiences with solving similar problem. For this reason, Bateson and Hoffman (2011) state three different sets appearing during internal search.

When all available information is retrieved from the memory and consumer still need to obtain more, then the internal search is followed by external search. Naturally, external information come from different sources such as friends, relatives, experts, advertisements, or the Internet. As a consequence, crucial role plays here word of mouth (what other people say about product/service) and reference groups (what kind of product/service other people use) (Palmer, 2014).

In addition, Clow and Baack (2007), Dahlén, Lange and Smith (2010), and Solomon (2015) observe that there are several factors that may influence the time and effort consumers spend on the search, for instance it can be involvement, perceived risk, knowledge, ability to search, or motivation. Also, an interesting paradox appears during external search, Bettman and Whan Park (1980), Moore and Lehmann (1980), and Gobb and Hoyer (1985) confirm that the consumers who know almost nothing about product/service and the ones who are "experts in the area" spend the same amount of time and effort on search, whereas, those who have already some knowledge spend more time and effort on the search than the previous two consumers. In conclusion, a report from agency GroupM and comScore found out that "nearly 60 percent of cases that end in a purchase begin with search (of the Internet)" and also that "40 percent of consumers who use search in their path to purchase are motivated to use social media to further their decision making process" (Sterling, 2011). Evidently, social media such as blogs, consumer reviews, YouTube, Twitter and Facebook play important role and their power cannot be ignored.

Besides the two main types of search, Bloch, Sherrel and Ridgway (1986) declared two additional types of search, which are pre-purchase search and ongoing search. Initially, pre-purchase search is the typical search when consumers recognize a particular need they have and throughout the information search they try to solve the problem by satisfying (purchasing) the need (product, service). On the other hand, ongoing search is defined as "search activities that are independent of specific purchase needs or decisions" (Bloch, Sherrel & Ridgway, 1986, p. 120). As an example, some consumers like to be informed about the new trends and technologies in the marketplace and therefore they keep looking for additional information.

2.2. Generations

2.2.1. Generation Y

Generation Y, also known as the Millennials, were born between 1977 and 1995. Gen Y grew up in a small world – thanks to the Internet. Members of Generation Y were influenced by Internet during their adolescence and later, but using these technologies during their childhood was not usual (Pawlasová, Spáčil, Valečková, 2014). As a result, they are tech-savvy, literally redefining how we communicate and share information. They embrace 24/7 connectedness and multi- tasking on computers, smartphones, and MP3 players and iPods. Comfortable with digital technology, gen Y expects personal communication with brands and likes to share its opinions about products and services online. Gen Y is online (95%), and correspondingly large percentage gets their news from the Internet (76%) (Zickuhr, 2010).

One area where Gen Y discriminates in digital media – they rarely listen to podcasts, avoid banner ads, and pay little attention to tweets – 63% do not read them and 72% do not send them. In contrast, 42% visit social media sites multiple times per day (Kardes, Cronley, Cline, 2015). But they get information from each other – not from marketers. Marketers do not successfully sell to generation Y, Generation Y comes to them through recommendations from their friends, colleagues and communities.

2.2.2. Generation Z

Although there is rarely complete agreement about when one generation end and another begins, generation Z is commonly thought to include those boring after 1995 (Kardes, Cronley, Cline, 2015). They are even more tech-savvy than Gen Y, routinely upgrading software and navigating through any new smartphones app without instruction. Although gen Z share similarities with Gen Y, members of gen Z possess the following unique characteristics (Gassaway, 2011)
- perpetual connectedness through smartphones
- a preference for written over verbal communication (e.g. texting)
- having access to media on demand, such as iTunes, videos and movies

Despite this enormous potential, the teenage market continues to frustrate marketers. Today´s teens have access to more information than any other generation, through a plethora of media. This makes them more accessible to marketers, but also more skeptical. Teen skepticism centers primarily on advertising, which implies that teen members of Gen Z recognize that advertisers must be biased and untruthful (Kardes, Cronley, Cline, 2015). Moreover, because Gen Z typically does not respond to lectures from parents, they absorb the views of their peers. It follows that ads targeting teens in Gen Z should use teenage spokespersons (Kardes, Cronley, Cline, 2015).

Study fielded by J.D. Power in early 2015 found that Gen Z customers were utilizing mobile banking at a higher rate (38%) than other generational groups whose collective usage of mobile banking averaged 19%. The study from TD Bank examined the habits and preferences of Gen Z and how they compare to Millennials, which revealed some stark contrasts between the two generational segments. 39% of Gen Z respondents ranked mobile banking as a top day-to-day banking service or feature, compared to only 17% of overall Americans and 32% of Millennials (Pilcher, 2015).

3. Methodology and Data

3.1. Research approach

Maylor & Blackmon (2005) introduce two different research approaches which can be used when conducting a research, i.e. scientific and ethnographic. Scientific approach will be applied as this research requires the exploration of what (preferred source of information or criteria for bank choice) and how much (its level and differences between two compared generations), Deductive logic connected with quantitative research will be utilized (Saunders, Lewis & Thornhill, 2012), on which this research will be based as it is intended to collect as much data as possible and then statistically analyze them.

3.2. Research method

Survey was considered as the best option how to conduct this research. Survey is appropriate when intending to gain facts, opinions, behaviour and attitudes from large amount of respondents. It also corresponds with scientific approach as usually gives answers to concrete questions (Saunders, Lewis & Thornhill, 2012 and Maylor & Blackmon, 2005).

Self-completed questionnaire (web-based) was chosen as a research method because of following characteristics. It enables to collect data from considerable amount of people in economical way and is also convenient for making comparisons. These characteristics contribute to author's selection the questionnaire as research method.

3.3. Questionnaire design

Two versions of questionnaire were formulated, one for the Czech market and the other for the British market. These two markets were chosen to represent different banking market structure. British banking market is strongly conservative with a long tradition. UK respondents searched in that study have mainly opened an account at banks with more than 150 years of history (Lloyds, Barclays, Nationwide, HBSC) while Czech respondents are clients of both traditional banks (Česká spořitelna, Commercial bank) and newcomers (Air bank, Fio bank).

The key questions used for purpose of this study aim at (1) specifying preferred information sources for bank selection, (2) determining the communication channels that respondents use for getting information, (3) identifying criteria for bank selection. All questions are closed ones, three of them are formulated as multiple response set. As a consequence of applying this type of questions all variables have nominal character.

3.4. Sampling design

Non-probability sampling was chosen as sampling approach. Quota sampling was considered as the most appropriate for this paper. This study focuses on Generation X and Generation Z, both determined by the year of birth according to which were divided into two groups. Moreover, each category is required to have sufficient and equal representativeness of both categories (Maylor & Blackmon, 2005). In order to achieve unbiased results, the authors made an effort to have even number of responses from British as well as Czech representatives of both generations.

3.5. Sample size and structure

Sample size was 279 respondents. No matter that on-line survey as data collecting method was applied in that study the sample has been moderately balanced according to the three key segmentation variables (see tables 1 and 2).

Table 1: Sample structure according to the gender, country and generations

	male	female	CZ	UK	Gen Z	Gen Y
absolute frequency	135	144	146	133	136	143
relative frequency	48%	52%	52%	48%	49%	51%

Table 2: Sample structure according to the country and generations

	generation Z	generation Y	total
CZ	68	78	146
UK	68	65	133
total	136	143	279

Generation Z is composed by respondents in age categories of 18–20 years and 21–23 years while generation Y includes respondents from age categories of 24 – 26 years, 27 – 29 years and 30 – 33 years (see table 3).

Table 3: Sample structure according to the age of respondents

	18–20	21–23	24–26	27–29	30–33
absolute frequency	61	75	58	40	45
relative frequency	22%	27%	21%	14%	16%

3.6. Data analysis

Data collected from both countries were firstly edited and coded. Then data were analyzed via statistical package of IBM SPSS Statistics version 24. For all four discussed questions frequency distribution was counted because all questions have been classified as closed ones. All variables obtained from questions were nominal (non-metric) so non-parametric tests were used for testing. Chi square statistic was applied to test statistical significance (see tables 4, 6, 8 and 11) of the observed association in cross tabulations (see tables 3, 5, 7, 9 and 11). It assisted us in determining whether a systematic association exists between two variables. First variable was always gender, followed by country residence and type of generation.

4. Results

Preferred sources of information have been examined from two perspectives. Firstly, as part of an information search when choosing a bank. Secondly, as the preferred method of communication between the client and the bank. It reacts on study of Bloch, Sherrel and Ridgway (1986) who specified two types of search, which are pre-purchase search and ongoing search.

4.1. Information sources for bank selection

Respondents were asked to specify information sources which they have used when making bank selection. They could provide up three information sources. That is a reason why sums in vertical columns for different segmentation variables do not count 100%. The bank clients namely rely on personal sources of information (family recommendations, friends recommendations, personal meeting with bank employee) while impersonal sources with exception of references on the Internet are not substantially applied. Newspapers ads which were also offered as an option have not been mentioned neither one respondent in Czech Republic or United Kingdom. Therefore this alternative is missing in the table.

Table 4: Information sources for bank selection according to segmentation variables

	male	female	CZ	UK	Gen Z	Gen Y
Family recommendations	39%	55%	44%	51%	67%	29%
Friends recommendations	37%	41%	41%	37%	43%	35%
Personal meeting with bank employee	31%	35%	37%	29%	38%	29%
Internet advertisement	13%	7%	10%	9%	8%	11%
TV advertisement	10%	8%	8%	11%	7%	10%
References on the Internet	38%	24%	38%	23%	22%	39%

Table 5 provides statistical confirmation of differences in preference of information sources. Probability values expressed in bold indicate values lower than significance level (0.05) and confirms the impact of segmentation variables on preferred information sources. Namely references on the Internet are sought by men, Czech residents and Gen Y.

Table 5: Probability values of the test statistic (χ^2) for information sources

	gender	country	generations
Family recommendations	**0.009**	0.223	**0.000**
Friend recommendations	0.501	0.467	0.150
Personal meeting with bank employee	0.446	0.175	0.090
Internet advertisement	0.111	0.724	0.381
TV advertisement	0.705	0.382	0.359
References on the Internet	**0.015**	**0.009**	**0.002**

Based on findings from table 4 the typology of clients has been formulated (see table 6). Seekers of family recommendation rely on personal sources including family recommendations. Seekers of personal sources use just friend recommendation or personal

meeting with bank employee. Personal sources are overlooked by seekers of impersonal sources (advertisements, references on Internet). Seekers of mixed sources prefer both types of information sources. There are strong differences concerning namely with seekers of family recommendations and seekers who use impersonal sources. Generally, the role of personal sources when choosing a bank is more stressed.

Table 6: Clusters based on preferred information sources according to the segmentation variables

	male	female	CZ	UK	Gen Z	Gen Y
seekers of family recommendations	31%	41%	36%	37%	49%	24%
seekers of personal sources	21%	24%	18%	26%	17%	27%
seekers of impersonal sources	26%	4%	17%	12%	1%	27%
seekers of mixed sources	22%	31%	29%	25%	32%	22%

Gender, but namely type of generation has substantial effect on typology of clients (see table 7). Gen Z predominantly uses family recommendations and relies on personal sources as whole. This attitude is close to female approach.

Table 7: Probability values of the test statistic (χ^2) for typology of clients

	gender	country	generations
Typology of bank clients	0.000	0.311	0.000

Table 8 describes the relationship between criteria for bank selection and information sources. The aim was to identify whether the preferred criterion in the pre-purchase stage affecting the source of information used by the respondent.

Table 8: Criteria of bank selection vs. Information sources for bank selection

	Family	Friends	Bank	INT ad	TV ad	INT ref	total
Bank (branch) availability	44%	29%	42%	37%	40%	28%	37%
ATMs availability	61%	71%	62%	63%	44%	56%	59%
Low or no fees	83%	91%	78%	85%	84%	92%	83%
Large scale of products	11%	12%	13%	15%	20%	15%	12%
Interest rate of current account	14%	17%	17%	15%	24%	17%	15%
Friendliness of staff	9%	6%	12%	4%	12%	7%	8%
Quality of bank consulting	14%	6%	15%	0%	12%	4%	10%
Possibility of getting other products	17%	11%	15%	7%	8%	15%	14%
Image of the bank	14%	25%	17%	26%	12%	23%	17%

Table 9 displays probability values of test statistic (χ^2). Those values which are expressed in bold indicate values lower than significance level (0.05) and confirm the impact of criteria for bank selection on preferred information sources. The table shows key role of friend recommendations that were used for five criteria while references on the Internet were applied in three cases.

Table 9: Probability values of the test statistic (χ^2) for criteria vs information sources for bank selection

	Family	Friends	Bank	Int ad	TV ad	INT ref
Bank (branch) availability	**0.021**	**0.036**	0.219	0.989	0.738	**0.037**

	Family	Friends	Bank	Int ad	TV ad	INT ref
ATMs availability	0.557	**0.001**	0.390	0.642	0.116	0.501
Low or no fees	0.807	**0.006**	0.141	0.767	0.906	**0.009**
Large scale of products	0.444	0.915	0.796	0.660	0.211	0.318
Interest rate of current account	0.436	0.683	0.558	0.928	0.213	0.531
Friendliness of staff	0.348	0.575	0.054	0.428	0.374	0.816
Quality of bank consulting	**0.022**	**0.044**	**0.049**	0.068	0.732	**0.015**
Possibility of getting other products	0.293	0.204	0.809	0.280	0.343	0.804
Image of the bank	0.135	**0.007**	1.000	0.206	0.470	0.074

4.2. Preferred type of communication

There were two questions that examined preferred type of communication. First question was formulated as multiple response set. The respondents were asked to state all used communication channels (see table 10). There are no substantial differences with exception of branch visiting.

Table 10: Preferred type of communication according to the segmentation variables

	male	female	CZ	UK	Gen Z	Gen Y
Online Banking	93%	88%	90%	90%	90%	90%
Mobile Banking	30%	22%	25%	26%	26%	25%
Telephone banking	5%	1%	5%	2 %	2%	4%
Branch visiting	36%	51%	54%	32%	43%	45%
Personal contact with private banker	13%	9%	11%	11%	7%	14%

Second question was focused on the most often used type of communication. The respondents have chosen just one option. UK residents prefer online banking more than Czech residents while in the case of mobile marketing it is exactly the opposite (see table 11). Women distinctly use branch visiting in comparison with the other segments.

Table 11: The most often used type of communication according to the segmentation variables

	male	female	CZ	UK	Gen Z	Gen Y
Online Banking	79%	74%	71%	82%	74%	78%
Mobile Banking	13%	8%	14%	5%	13%	8%
Telephone banking	2%		2%		1%	1%
Branch visiting	4%	17%	12%	10%	13%	9%
Personal contact with private banker	2%	1%	1%	3%		3%

Findings show statistical significant impact of gender and country residence on the most often used type of communication (see table 12).

Table 12: Probability values of the test statistic (χ^2) for most often used type of communication

	gender	country	generations
The most often used type of communication	0.003	0.016	0.094

5. Discussion and Conclusions

Contribution confirmed the impact all observed segmentation variables on preferred source of information in pre-purchase stage. The remarkable differences were observed in the case of family recommendations. Contrary to opinions Kardes, Cronley, Cline (2015) generation Z is intensively influenced by opinions of parents and family recommendations represent the most preferred information source for that age category. On the other hand, qualitative study from banking industry developed by Fraga (2015) holds that generation Z have lots of respect for — and heed advice from — their parents. For Gen Y references on the Internet are the most important source of information when choosing a bank. Preference of references on the Internet is typical for male respondents and also for Czech residents.

In the case of ongoing search for bank information the differences between generations are not statistically confirmed. In line with the views of Gassaway (2011) and Zickur (2010) both generations prefer written to oral communication. Online banking is the most often used type of communication. Czech residents give a slight higher preference to mobile banking than UK residents. Women prefer a branch visiting to technological solutions (online banking, mobile banking) more than the other segments do. This conclusion is statistically confirmed.

Acknowledgements

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Financial problems of the functioning of local governments units in Poland

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Abstract

Local government units (LGUs) are an important subject of the public finance sector in Poland. The essence of their operations are connected with meeting the needs of the population of municipalities (gminas), districts (poviats) and voivodeships. The basics of financial management are determined by legal regulations which thus define the scope of activities of LGUs and affect the state of financial resources at their disposal. The doctrinal problem and in practice political problem, which needs to be resolved in order to talk about the real financial autonomy of local government is the answer to the question; what should be the proportion of obligatory and optional tasks implemented by the local government? The purpose of the article is to show the financial situation of Polish local government in the years 2010–2016 and an attempt to answer the question what are the prospects of its development. The financial condition of Polish municipalities and districts is significant, because the local government is responsible for funding more than 30% of public tasks in Poland.

Keywords: LGUs, revenues, budget, operating surplus, Poland

JEL Code: H7

1. Introduction

Local government is the public finance sector entity responsible for the realization of a particular part of the public tasks. Therefore, it should have access to financial resources, enabling performing tasks. The scope of the income independence of local government units, however, is diverse, depending on the adopted concept of its functioning. The system of financing local government should be shaped differently if it is to ensure the adequacy of revenues to the range of performed tasks and in a different way, if the local government is responsible for conducting its own development policy. The doctrinal problem and in practice political problem, which needs to be resolved in order to talk about the real financial autonomy of local government is the answer to the question;

what should be the proportion of obligatory and optional tasks implemented by the local government?

The purpose of the article is to show the financial situation of Polish local government in the years 2010–2016 and an attempt to answer the question what are the prospects of its development. The financial condition of Polish municipalities and districts is significant, because the local government is responsible for funding more than 30% of public tasks in Poland.

2. Literature review

2.1. The essence of local government

Local government results from the collapse of the feudal system and the rise of democracy. As a consequence of these systemic changes administration decentralization became possible. Local government is a significant element of decentralized administration (Swianiewicz, 2014).

In the literature since the beginning of the local government study there has been a dispute about its nature, the scope and independence from the state. It comes down, in particular, to answering the fundamental question of whether local government is the fourth power in the state (*pouvoir municipal*) (Panejko, 1934, p. 77) with its own constituting and executive bodies, or whether it is just a form of devolution of tasks and public funds to lower levels of government. The dispute originated from the history of the basic units of local government, i.e. municipalities. The formation of the municipalities did not arise from legal provisions, but it was due to the cooperation of people in a given area in order to defend their issues and fulfil the specific social and administrative needs. Exactly this natural formation of the basic units of local government was the cause of expression that municipalities have the inherent right to exist, without interfering of the state in their sphere of action (Kroński, 1932, pp. 6 and next). Some proponents of the naturalistic theories went even further, claiming that the municipality is older than the state, and therefore the state should derive their rights from municipalities. These claims were justified by the autonomy of medieval towns that ruled themselves, and in relation to the king they only recognized obligations (paying tributes) and the judiciary (Panejko, 1934, p. 80).

Naturalistic theory of local government, completely freeing the municipalities from the state, in contemporary science about local government is however not developed. Taking into account the natural right of local residents to their own organization and implementation of the tasks it stands in contradiction to the sovereignty of the state (*empire*), which is the basis of all laws in force in the country.

Among others that is the reason why the state theory of local government, which assumes that this institution can exist only by the will of the state to fulfil its tasks assigned by the state, began to dominate the world in the thirties of the twentieth century (Wollmann, 2016). The views of proponents of this theory, however, are diverse.

According to some the state in order to fulfil statutory tasks may appoint (in addition to the government administrative body) their local authorities operating on principles of certain independence (Vanags and Vilka, 2006). And this independence, not the internal organization of local government is to constitute the essence of self-government.

According to other views within the frame of the state theory self-government means resignation of the state from a certain range of its powers in the field of administration in favour of local governments as different from the state public-law entities, with their own, chosen in secret and democratic elections administrative authorities (Fuks, 1981, p. 11). These views are the closest to the contemporary concept of local government.

2.2. Local government in the view of the public sector in Poland

Public finance sector functioning in Poland may be divided into three sub-sectors, as shown in Table 1.

Table 1: Public finance sector in Poland

Name of the sub-sector	Revenues (in %)	Expenditures (in %)
Government	57	36
Local government	15	31
Social security	28	33

Source: own elaboration based on the data from the Ministry of Finance.

Government sub-sector collects about 57% of all public sector revenues and it finances 36% of all public services. Despite this it closes with a deficit each year. In turn, the sub-sectors of social insurance (financing pensions for all social groups) and local government fulfil much more tasks than have their own income. For example, the local government in Poland participates in 15% of the public sector income and provides 31% of all public services in the country. This is possible because the state budget funds and subsidizes local government as well as funds the social security sub-sector.

Local government in Poland has existed for 27 years. It was reactivated in 1990 at the local (municipal) level and since 1999 also at the district and regional level.

The basic organizational level of local government is presented by **municipalities**, the number of which in Poland is 2478. They are rural municipalities, urban municipalities, cities and municipalities and cities with district status. Municipalities finance **78%** of all tasks performed by the local government. Among the municipalities, cities with the district status form specific group. Although there are 66, nearly 33% of the Polish population lives there. They constitute a separate category of municipalities with their own problems that are fundamentally different than problems in other municipalities. Therefore in the performed analysis their financial situation will be presented separately from other municipalities.

The districts in Poland finance **13%** of all tasks of local government in Poland and the regions (local districts) **9%**[1].

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[1]Basically different role of the regions (self-government provinces) in financing public tasks means that they will not be considered in this study.

3. Methodology and Data

3.1. The revenues of local government in Poland

Financial management of local government units is based on four sources of financial contribution. These are:
- own revenues,
- percentage shares in income taxes from individuals and legal persons,
- subvention,
- targeted subsidies,

An important source of local government revenues are from local taxes and fees (Wollmann, 2012). Due to the fact that they have been given entirely, as a source of income, to the local government, local authorities received from the legislature specified power of taxation. It is connected with the fact that these authorities determine the level of tax rates, the size of the fees, they may apply reductions and exemptions, and may also cancel debts; divide the payment into instalments, etc. In addition to the fiscal functions they are in many cases an efficient tool for influencing local authorities on the behaviour of the private entities operating in the area.

Poor performance of local taxes, as well as the lack of revenues from these taxes in the budgets of the intermediate levels of local government units makes local government also has access to the central taxes, coming from the given sector (Gould and Zarkesh, 1986). It should be emphasized that the revenues from these taxes are a significant source of financial contribution, enabling local government to implement the basic tasks. In many cases, state tax revenues exceed the revenues from local taxes.

Local government is involved in the central taxes division, either through the establishment of local additions to income taxes, or by percentage shares in income taxes. The importance of both forms is varied.

The main difference between the share of the tax and the addition to the tax is connected with the fact that in the case of the share the local authorities do not have a major impact on the size of budget revenues. The funds due to local authorities are calculated almost automatically. The size of the share is determined by the legislature. Depending on the size of tax revenue obtained in a given area, local authorities receive a percentage of the revenue from these taxes. These revenues do not, however, perform the motivation function as:
- they do not require greater efforts from local authorities to obtain them,
- local authorities can not by means of them actively interact with entities located in their area,
- they do not have a significant ability to influence their growth.

It all makes the shares in taxes are treated as complementary, rather than their own sources of financial contribution to local governments (Denek, 2011). Their character is similar however to general subsidies (Surówka, 2013, p. 65). The differences between general subsidies and shares in central taxes depend essentially on the fact that the general subsidies are used to balance the budgets of financially weaker local communities, while the shares in central taxes dominate as a source of local government budget revenues with significant economic potential. In Poland, the local government has percentage shares in central taxes.

Tax benefits essentially are different in economic nature from the shares in taxes. Introduction of local benefit to the state tax means that local government authorities

have the statutory right to impose a fiscal burden. The benefit flows into the budget of local government and functions alongside tax rates determining the level of central budget revenues. The maximum amount of the benefit may be determined by the central authorities. Whereas, the local authorities determine the amount of benefit of less than the maximum, differentiating it in each period, rarely in relation to specific subjects, but within their taxation powers. The right to determine the benefits to the state taxes makes that local authorities have the tools through which they can (as in the case of local taxes) actively interact with the entities forming the economic base of the area.

Local government owns a majority of public property in its area. These are primarily buildings, land, and economic entities, of which the founding body is, or in which the shares are held by local government units. The property brings various revenues to the local government units in the form of the rent of lease, dividends, surplus payments of local government budget divisions, revenues for services provided, fees for the use of municipal infrastructure, revenues from the sale of assets, etc. (Patrzałek, 2010, p. 190).

Income from assets form heterogeneous source of local budgets revenues. The principal role in the group is assigned to the charges for services provided by local government units. These are the charges for services such as garbage collection, sewage, street cleaning, road maintenance, residents supply with water, heat and electricity, fees for kindergartens, for the use of the pools, admission to museums, etc. Most frequently the proceeds derived from the provided services do not cover the incurred expenses for this purpose. It should be noted, however, that the main objective of the local government is to meet the needs of residents. For that reason, the local government should be intended to provide assets to the local community not in order to be rich (generate profits), but in order to provide residents with sufficient living conditions.

The main source of budget revenues for the most part of local government units, both in Poland and other countries remain subsidies and compensatory subventions, meaning the transfers of state budget. The necessity of external contribution is essential, because the revenues from taxes and the assets of local communities are not enough in any country to finance budget expenditures. You also can not ignore the fact that there are rich regions and municipalities, which create a considerable portion of the national income of the country, but there are also regions and municipalities which could not develop with the income generated in a given area without the help of the central government. Therefore, leaving all the funds in those regions where they arise would lead to substantial disproportions in economic, social and cultural life of the country. Subsidies and subventions are to prevent these disproportions and properly designed mechanism of their calculation does not have to limit the principles of local government. But to do this, two fundamental conditions should be fulfilled:

- firstly, the compensatory measures should be determined on the basis of objectified criteria and the local government should know what proceeds are to achieve,
- secondly, the local government has to decide individually on the allocation of funds received.

The above mentioned conditions are fulfilled by general subsidies (subventions). The long history of local government in the West illustrates that the criteria based on which the general subsidies are transferred to the local government are sometimes greatly enhanced. The size of allocations can be dependent on many factors. Most often it is the number of residents, age structure of the population, the value of municipal infrastructure facilities located in the municipality, the district and the region, the taxation potential etc.

Apart from the general subsidies the second form of external financial contribution to local government units are targeted subsidies. The measures from this account are provided to local governments to finance specific projects, mostly on the implementation of the tasks assigned, as well as to finance investment. Targeted subsidies as a source of revenues, however, are generally criticized. For they cause dependence of receiving subsidies local government on the government administration and other local government units. They are transferred to the particular purpose, they need to be settled, and the unused parts should be returned to the subsidizing entity. Another disadvantage is the fact that the amount of the granted funds is decided always by the providers, guided by their own calculations, which may not always be beneficial to the recipient.

The structure of revenues sources of the different levels of local government in Poland is diversified. Tables 2–4 show the structure of revenues of Polish local government in the years 2010–2016.

The figures contained in Tables 2–4 show that the financial independence of the different levels of local government in Poland is diversified. In the case of municipalities own revenues (calculated including the shares of income tax from individuals and legal persons) account for 45% of their total revenues and in case of the districts for about 30%. Only in the big cities this share exceeds 60%.

Table 2: Structure of municipalities revenues in the years 2010–2016 (in %)

	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016***
Total revenues	100	100	100	100	100	100	100
Own revenues	30	29	30	31	32	31	28
Shares in PIT and CIT	15	16	16	17	17	18	17
Subvention	31	31	31	31	29	29	26
Subsidies	24	24	23	21	22	22	29

Source: Own calculations based on the study titled Financial economy of local government units 2015, Central Statistical Office (GUS), Studies and statistical analyzes, Warsaw 2016 and on the basis of reports from the Ministry of Finance.

*Plan for 2016, after the changes at the end of September.

Table 3: Revenues structure of cities with district status in the years 2010–2016 (in %)

	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016***
Total revenues	100	100	100	100	100	100	100
Own revenues	37	36	35	37	37	36	35
Shares in PIT and CIT	27	27	26	26	26	27	27
Subvention	22	22	22	21	20	20	20
Subsidies	14	15	17	16	17	17	18

Source: As in table 2.

Table 4: Revenues structure of districts in the years 1999–2010 (in %)

	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016***
Total revenues	100	100	100	100	100	100	100
Own revenues	15	14	14	13	14	15	15
Shares in PIT and CIT	13	14	15	17	17	18	19
Subvention	43	43	45	45	43	42	42
Subsidies	29	29	26	25	26	25	24

Source: As in table 2.

The prevalence of transfers from the state budget over the own revenues in the budgets of local governments notably limits their opportunities for development. Transfers are in fact so calculated to secure financing current expenses (tasks). Meanwhile, the level of services provided in modern countries depends on the quality of the existing social and communal infrastructure. Its maintenance requires ongoing tax expenses. Reducing investment activities leads to degradation of the assets and deterioration of services provided.

4. Results

4.1. Operating surplus as a measure of Polish local government financial condition

A detailed presentation of changes in the tasks performed by the local government in recent years would obscure its activities. Therefore, in the further considerations the simplification was adopted that these changes will be reflected by the presentation of expenditures and revenues in constant prices of 1999.

Table 5 shows the operating surplus of municipalities in Poland in the years 2010–2016, in constant prices (1999).

Table 5: Current revenues and current expenditures of municipalities in Poland in 2010–2016 (in billion zl)

	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016***
Current revenues	47.2	47.1	45.2	48.6	51.2	53.9	60.9
Current expenditures	41.3	40.7	41.2	42.1	44.2	45.8	57.3
Surplus	5.9	6.4	4.0	6.5	7.0	8.1	3.6

Source: Own elaboration, the values in constant prices of 1999.

*Plan for 2016, after the changes at the end of September.

Table 5 shows that in the years 2010-2016 current expenditures of municipalities increased by **39%**. The increase in expenditures in constant prices (1999) reflects the fact that municipalities received new tasks to realize, that required additional property expenses and employment growth. The increase in expenditures was not accompanied, however, by a proportional increase in current revenues. These revenues increased by only **29%** in the analyzed period. Therefore, the operating surplus at the end of 2016

accounted for only 6% of current expenditures, while in 2010 it was 14%. The decrease in operating surplus, expressed in constant prices means that in municipalities there was a continuous reduction of the possibilities to generate revenues for servicing (payment of instalments and interest) from incurred obligations.

Table 6 shows the operating surplus of cities with district status in Poland in the years 2010–2016, in constant prices (1999).

Table 6: Current revenues and current expenditures of the cities with district status in 2010–2016 (in billion zl)

	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016***
Current revenues	35.8	35.6	34.3	37.8	40.0	42.0	43.7
Current expenditures	31.7	32.1	32.7	33.3	35.0	36.5	41.5
Surplus	4.1	3.5	1.6	4.5	5.0	5.5	2.2

Source: As in table 5.

Table 6 illustrates that in the years 2010–2016 in the cities with district status current expenditures at constant prices increased by **30%** and the current revenues by **22%.** Also in this group of local government units, increasing current expenditures were not accompanied by a proportional increase in current revenues. Operating surplus ranged from 2.2–5.5 billion zl (at 1999 prices), whereby at the end of 2016 it accounted only for 5% of current expenditures, while in 2015 it was 14%. This reduces significantly the possibility of large cities development, despite the fact that they have to maintain a very large public property.

Table 7 illustrates the operating surplus of districts in Poland in the years 2010–2016, in constant prices (1999 year).

Table 7: Current revenues and current expenditures of districts in Poland in 2010–2016 (in billion zl)

	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016***
Current revenues	14.4	14.7	13.3	14.0	14.4	14.7	14.2
Current expenditures	12.9	13.0	12.6	12.8	12.9	12.8	13.6
Surplus	1.5	1.7	0.7	1.2	1.5	1.9	0.6

Source: As in table 5.

The data contained in Table 7 illustrates that the districts have a small surplus of current revenues over current expenditures. They accounted for 15% of current expenditures of districts in 2015 to less than 5% at the end of 2016. This makes it virtually impossible to incur liabilities by districts, due to insufficient own contribution. In the last five years district expenditures **increased** by more than 5% (at 1999 constant prices) and the current revenues **fell** by 2%. This resulted in a decline in operating surplus from 13% in 2015 to 5% in the following year.

4.2. The level of liabilities as an indicator of the financial situation of local government in Poland

Revenues from taxes, public property as well as general and targeted subsidies (except for revenues from the sale of assets and investment subsidies) are intended to finance the current tasks of local government. Meanwhile, local authorities take on their area

various development decisions. Then, they must use special sources of financial contribution, which are loans, credits or issued bonds.

Loans and credits, however, differ from the budget revenues with the fact that they are returnable, and besides, they should be operated on a current basis. As a result, it can lead local government units to excessive debt. Subsequently financing current needs of residents becomes endangered. To counteract this local government has the statutory limitations on the use of the returnable system of financial contribution.

In Poland till the end of 2013 two measures defining the upper limits of the debt of local government were applicable. They were referred to in Article 169 and 170 of the Public Finance Act of 30.06.2005[2].

The Public Finance Act, which came into force on 1.01.2010, maintained the principle of regulating the level of debt of local government in Poland. However, it introduced a new so-called individual indicator for each local government unit.

The Act defined the principle[3] that the body of local government unit may not establish the budget, the implementation of which will cause that in a budgetary year and in any other year following the budgetary year the ratio of the total amount of credits and loans repayments per a given budgetary year as well as and redemption of securities with accrued interest, and also the potential repayments of the amounts resulting from sureties and guarantees, to the planned total budget revenues will exceed the arithmetic average of calculated for the last 3 years relation of its current revenues, increased by revenues from the sale of assets and decreased by current expenditures, to the total budget revenues.

The new design of the indicator on the one hand removes restrictions binding till the end of 2013 local government units with great development potential, for which incurring even a fairly substantial financial liabilities can be an instrument of safe development policy, on the other hand, however, it disciplines those individuals whose high burden on revenues with liabilities repayments requires great caution when taking out new credits and loans. This formula strictly makes the size of the burden of local government units due to incurred liabilities dependent on operating surplus corrected by revenues from the sale of assets.

Table 8 shows the amount of liabilities of particular groups of local government units in Poland in 2010–2016.

Table 8: The size of the liabilities of local government units in 2010–2016 (in billion zl)

	2010	2011	2012	2013	2014	2015	2016*
LGUs	58.0	65.8	67.8	69.1	72.1	71.6	69.0
Municipalities	21.9	26.0	26.2	25.7	26.4	25.4	23.4
Urban districts	23.4	28.1	29.8	30.9	32.4	33.2	32.7
Districts	5.4	6.1	6.0	5.9	5.9	5.8	5.7
Voivodeships	4.3	5.6	5.8	6.6	7.3	7.1	7.2

Source: As in table 5, current prices.

The figures in Table 8 prove the increase of liabilities in local government units in the years 2010–2014 by 44%, and in the years 2015–2016 there is stabilization or the debt reduction in each group of local government units. The debt of municipalities decreased in two years about 3 billion zl and of districts about 0.2 billion zl. Only in the case of cities with district status the amount of liabilities has not changed, stabilizing at

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[2]Article 85 point 3 of the Act of 27.08.2009. – Regulations implementing the Act on Public Finances (OJ No 157, item 1241 as amended).

[3]Article 243 of the Act of 27.08.2009 on Public Finances (consolidated text: OJ of 2013 item 885 as amended).

around 33 billion zl. The decrease in debt can be assessed positively, if not for the fact that in the years 2015–2016 there was a significant reduction in investment and the level of utilization of EU funds allocated to Poland as part of the financial prospects for the years 2014–2020.

The stabilization of the debt does not result from the lack of investment needs of Polish local government, but from the appearance of political and legal barriers that do not allow local government to reach for the returnable sources of financing. The demand for money in the local government sector is large, but legal and political restrictions prevent reaching for financial resources. Meanwhile, the non-utilization of these measures may reduce the quality of services in the coming years.

5. Discussion and Conclusions

Local government in Poland, as well as the entire system of public finance is in financial crisis in recent years (Bolívar, Galera, Muñoz and Subirés, 2016). A sign of financial difficulties of local government units is declining operating surplus and the high level of debt. While the cause of this crisis is primarily decreasing own revenues with increasing tasks of Polish local government. Consequently, this forces the local government units to take refundable proceeds. The legal limits of Polish local government indebtedness are to prevent it. This phenomenon has become particularly evident in the second decade of the twenty-first century, when the municipalities, districts and provinces take saving measures to reduce their debt. Maintaining a longer period of such a trend will however lower the quality of services.

The correction of the financing system of local government units in Poland is therefore necessary. It should consist of:
- the search for additional sources of own revenues for local government units, through the introduction of a tax on the value of a property (cadastral tax);
- the conversion of percentage shares of local government units in income taxes, to the local government additions to these taxes;
- the dependence of the subvention amount on the increasing state budget revenues (as it was before 2004);
- the change of the indebtedness limits of local government units.

Acknowledgements

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Fiscal R&D incentives and tax subsidy in selected EU countries

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Abstract

This article focuses on the fiscal incentives for research and development (R&D) in 20 selected EU countries. The article's aim is to compare fiscal incentives and the generosity of tax incentives using the method of B-index (Warda, 2001) and tax subsidy rates in year 2015. The empirical evidence is based on data from Eurostat and the OECD tax database. Within the EU, only Germany, Finland and Estonia do not currently have a tax policy aimed directly at stimulating innovation. The results indicate the existence of substantial differences in provided incentives – from negative support or tax burden (in Germany, Denmark and Finland) to 43% tax subsidy (for SMEs in France). The most generous R&D tax incentives are in Portugal, France and Spain. Some countries differentiate the level of support across firm types and offer more generous subsidy for SMEs than for large firms. e.g. subsidy tax rate are 29% vs. 10% in the UK and 26% vs. 43% in France. Moreover, differences are reported in the largesse of tax subsidy by profit scenario – the highest support is reported in a loss-making scenario in France for SMEs.

Keywords: research and development, fiscal incentives, tax subsidy, B-index

JEL Code: H25, O38, O30

1. Introduction

Research and development (R&D) play a key role in a creation of knowledge, products and technologies. As Neubig et al. (2016) write, fiscal incentives, including tax policies, should be directed at specific barriers, impediments or synergies to facilitate the desired level of investment in R&D and innovations. R&D tax policy needs to be considered in the context of the country's general tax policies, its broader innovation policy mix and its other R&D support policies. Generally, governments have three main instruments for financing R&D(own R&D, direct and indirect funding), each of which has advantages and disadvantages from the perspective of economic theory (David et al., 2000 or Guellec and van Pottelsberghe, 2003). Direct support is more focused on long-term research, while

indirect instruments primarily support short-term applied research and increase incremental innovations (Westmore, 2013).

The financial crisis obliged many governments to introduce tough fiscal consolidation measures, prioritizing other issues over R&D. The limited financial resources and urgency to balance expenditure on innovation against expenditure on other policies, force the governments to look for a different innovation policy with new instruments.

The paper focuses on direct and indirect public support for R&D and the aim is to compare the generosity of tax incentives using the method of B-index (Warda, 2001) and tax subsidy rates in 2015. It is organized as follows. Next chapter introduces theoretical background and a short literature review. Chapter 3 provides a description of methodology and data. Empirical part focuses on used direct and indirect instruments for funding R&D and presents generosity of tax subsidy for R&D expenditures by profit scenario and firm size in analyzed countries.

2. Theoretical backgrounds

The neoclassical growth model known as Solow-Swan model considers the long-run economic growth (Solow, 1956). This model explains the economic growth with the capital accumulation, productivity, population growth and technological progress as the dominant drivers of economic growth and competitiveness. Svensson (2008) presents an overview of the economic literature focused on R&D and discusses the advantages and disadvantages of different types of public funding of R&D and analyses what differentiates R&D from other forms of input and why spillover effects occur. The empirical literature is often focused on studies that econometrically analyses impact of R&D tax incentives on key policy goals of the instrument. Since a primary goal of R&D tax incentives is to raise R&D expenditure by enterprises, most studies look at input additionality, i.e. the change in private R&D expenditure that can be attributed to the tax incentive (Castellacci and Lie, 2015; Hud and Hussinger, 2015). The studies are typically based on firm-level panel data and either cover periods before and after the introduction of a tax incentive, or they analyse the effects of changes in the generosity of R&D tax incentives (Becker, 2015).

Köhler et al. (2012) discuss results of 18 published papers and note that despite a growing number of studies on the impacts of R&D expenditure and tax incentives, our knowledge about the effectiveness of R&D expenditure and how a scheme should be designed to maximise its impacts remains limited. They note that little is known about the effects of recently introduced or redesigned fiscal schemes, which often show different design features compared to older programmes.

Although the single market is one of the attributes of the EU functioning, the market for innovation and R&D within which fiscal incentives operate is very heterogeneous. It is possible to find next sources of heterogeneity in the market, which may be a prerequisite for potential incentives: types of innovation, types of R&D expenses, types of R&D business models, types of firms, types of financing and other economic and policy conditions in a country as bankruptcy laws or patent protection.

There is also considerable heterogeneity within types of fiscal incentives. Governments offer direct support through public procurement for R&D and a variety of grants, subsidies, loans or equity funding. Indirect public funding is mostly realized as tax incentives and it is usually more neutral than direct support in terms of industry, region and firm characteristics, although this does not exclude some differentiation, most often by firm size (OECD, 2010). Tax incentives reduce the marginal cost of R&D and innovation

spending. Tax incentives applicable to different tax arrangements, including corporate and personal income taxes, are also widely used to encourage private investments in R&D and the exploitation of IP assets, to attract business angels and leverage early-stage finance, and to attract foreign talent or foreign multinationals.

Moreover, a country's general tax rules can be an important attraction or deterrent to risk-taking innovators. Huňady et al. (2014) and Akcigit et al. (2015) claim that tax rates matter to the location of inventors and their patent registrations. The tax rates that mattered were personal income tax rates of the inventors, and those who were employed likely to take advantage of personal income tax differentials. Favourable tax treatment of employee stock options can make them more attractive to employers than paying cash salaries, as they help to reduce cash out-flows (Edgerton, 2010). Labour taxes, particularly employer payroll taxes, can significantly increase the cost of doing business in a particular country. Tax loss limitation rules and choice of business entity can affect the general business tax climate as well as the value of particular targeted R&D tax incentives.

3. Methodology and Data

The country sample is limited to the availability of data, so the paper examines 20 European countries, namely Austria (AT), Belgium (BE), Czech Republic (CZ), Denmark (DK), Estonia (ES), Finland (FI), France (FR), Germany (DE), Greece (GR), Hungary (HU), Ireland (IR), Italy (IT), Netherlands (NL), Poland (PL), Portugal (PT), Slovakia (SK), Slovenia (SI), Spain (SP), Sweden (SW) and United Kingdom (UK). This empirical evidence is based on data collected from the Eurostat and OECD database, benchmark tax data information, including statutory corporate income tax rates, is obtained from the OECD Tax Database.

As already noted, the aim of the article is to compare the generosity of tax incentives using the method of B-index (Warda, 2001 and 2005) and tax subsidy rates in 2015, all variables are detail described in Thomson (2012). Tax subsidy is an experimental indicator based on quantitative and qualitative information representing a national level of tax subsidy rate under different scenarios. The tax subsidy rate is calculated as 1 minus the B-index (Warda, 2005). The B-index (B) is defined as a minimum present value of before-tax income necessary to pay the cost of R&D and to pay the corporate income taxes, so that it becomes profitable for the firm to conduct R&D:

$$1\text{-}B = tax\ subsidy\ (if\ positive)\ or\ tax\ burden\ (if\ negative) \tag{1}$$

The B-index measures the relative attractiveness of R&D tax treatment in the country or region. It is based on well-founded economic theory and designed so that it is easy to apply and capable of including all tax parameters, and can be used as a policy analysis tool (Šeligová, 2016). The model is based on the marginal effective tax rate and contains an overall measure of the corporate tax burden on marginal R&D investments in different countries, therefore it allows international benchmarking of the attractiveness of R&D tax systems. The model includes the following components of R&D cost structure and applicable tax provisions:

- Current expenditures: wages and salaries of R&D personnel and the cost of materials used in the R&D process.
- Capital expenditures incurred in R&D: the cost of machinery and equipment (ME) and facilities/buildings.

- Depreciation of capital assets used in R&D: these assets are typically depreciated over the useful life according to two methods.
- Additional allowances on R&D expenditures: these provisions allow firms conducting R&D to deduct more from their taxable income than they actually spend on R&D.
- Tax credits: credits are applied against income tax payable. The benefit of the credit can be non-taxable or taxable.
- Statutory corporate income tax rates.

For consistent comparisons, the model measures country B-indexes under constant and uniform technical assumptions. In accordance with Warda (2005) and OECD (2016) the assumptions include:

- R&D expenditures are split into current expenses and capital expenses, using an average proportion of 90% and 10%, respectively.
- Wages and salaries represent 60% per cent of total R&D expenditures.
- Capital expenses are divided equally between machinery and equipment (5%), and buildings (5%.
- Time factor: the B-index model is expressed in present value terms. It is assumed that for all the countries compared, the discount rate is constant and holds at 10%.

The basic formula for B-index is defined in equation (2).

$$B = \frac{1 - A}{1 - t} \tag{2}$$

where B is B-index, A is the net present discounted value of depreciation allowances, tax credits and other R&D tax incentives available (i.e. after-tax cost), t is corporate income tax rate. For example, in the case of a θ allowance rate on R&D (deduction from taxable profits) $A = t\,\theta$. When $\theta = 1$, current expenditures are fully (100%) deductible, the benchmark scenario in most countries, $B = 1$ and the subsidy rate is zero.

In recent years, the adverse economic climate has dented the profitability of many companies. In recognition of the fact that there are significant differences in the provisions made by countries for scenarios in which companies cannot immediately realise the entire value of tax incentives on R&D, OECD (2013) amends and generalised the B-index formula as follows:

$$B = \frac{1 - t(x + (1 - x)\psi)\theta}{1 - t(x + (1 - x)\psi)} \tag{3}$$

In this formula, if the firm has a sufficiently large profit to claim the incentives, then *x = 1* and *x = 0* otherwise. ψ is the net present value adjustment factor for the allowance (or equivalent incentive) in the scenario with an insufficiently large profit base ("loss making" for brevity). $\psi = 1$ if the incentive is fully and immediately refundable in the "loss" case and $0 < \psi < 1$ if the incentive can be carried forward (for more details look at OECD, 2013).

The model does not include taxes and related incentives that do not pertain to corporate income taxation. As such personal income taxes, value added taxes, commodity taxes, property taxes, payroll taxes, taxes on wealth and capital, and grants and subsidies.

4. Results and discussion

4.1   Financial support for R&D and fiscal incentives

Expenditure on R&D are regularly monitored by national statistical offices and periodically reported by Eurostat and OECD. The system of R&D indicators is accurately defined and used for international comparisons. It is possible to find basic definitions needed for this examination in Frascati Manual (OECD, 2015a). Gross domestic expenditure on R&D (GERD) is usually reported for sectors of performance: business enterprise, higher education, government and private not for profit institutions serving households. Business enterprise expenditure on R&D (BERD) records gross expenditures on R&D performed by all firms, organisations and institutions whose primary activity is the production of goods and services (other than higher education) for sale to the general public at an economically significant price, and the private non profit institutions mainly serving them.
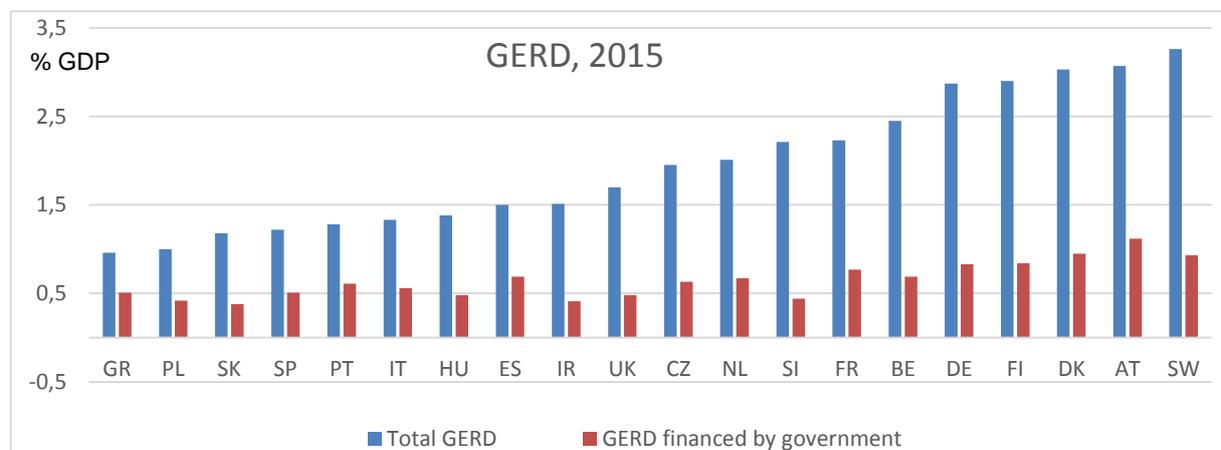
Figure 1: Gross domestic expenditure on R&D in percentage GDP (2015)

It is known that R&D is vital for the knowledge-based economies' competitiveness in a globalized world and support of R&D and innovation is also a political measure. Both the Europe 2020 strategy and its predecessor the Lisbon agenda (launched in 2000) set similar targets in relation to R&D expenditure, namely that expenditure on R&D should be equivalent to at least 3.00% of the EU's GDP and the appropriate split for R&D is 1/3 financed by public funds and 2/3 by private. Fig. 1 shows total R&D expenditure (GERD) and R&D financed by government in the European Union in 2015. Average EU-28's GERD was 2.04% GDP, a share financed by government was 0.66% GDP (Eurostat database).

Government-funded business R&D is the component of R&D performed by business enterprises attributed to direct government funding. It includes grants and payments for R&D contracts for procurement, but not R&D tax incentives, repayable loans or equity investments. Fig. 2 reports total government support of business R&D in 2015 divided into direct government funding of BERD and indirect government through R&D tax incentives based on data from OECD (2015b).
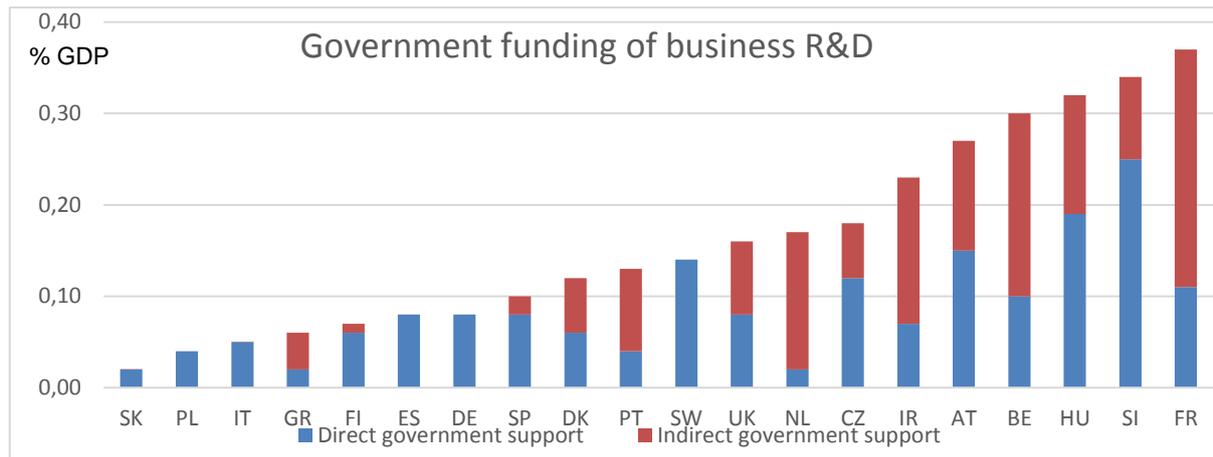
Figure 2: Total government funding of business R&D in 2014 (% GDP)

Current governments often combine direct public funding from both national and EU sources and indirect public funding with the aim to stimulate private R&D activity in order to enhance job creation and economic growth. Direct support can be implemented through public procurement in R&D, by providing grants, subsidies, loans and corporate financing (OECD, 2014) as it is shown in Fig.3. Grants and subsidies are the most common funding instruments. Individual tools are described in Szarowská, 2015).
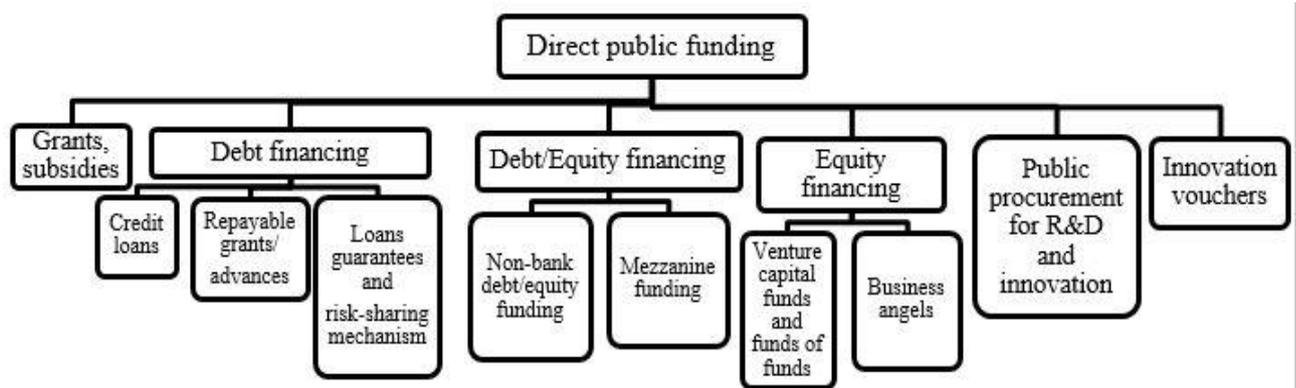
Figure 3: Direct finding instrument for R&D

Indirect support in recent years become more important to encourage investment in R&D and at least one form of stimulus R&D currently exists in 25 EU countries (OECD, 2015c). Within the EU, only Germany, Finland and Estonia currently do not have a tax policy aimed directly at stimulating innovation (year 2015). Although tax incentives are common, they are far from homogeneous and differ substantially across countries, with most countries offering more than one type of instrument. R&D tax credits are the most popular type of incentive, followed by enhanced allowances and accelerated depreciation. Tools also include reduction of social security contributions, exemption from customs duties, preferential loans, venture capital support, advantageous lease of regional and central infrastructure (OECD, 2015c and Deloitte, 2015).

Table 1: Tax incentives for R&D and innovation

Tax arrangements	Expenditure-based	Income-based
Corporate income tax	AT, BE, CZ, DK, FR, GR, HU, IT, PO, PT, SK, SI, SP, UK	BE, GR, HU, IT, NL, PO, SP, UK
Payroll withholding and social security taxes	BE, FR, HU, NL, SP, SW	
Personal income tax	DK, HU	DK
Value-added tax	PO	
Other taxes	FR, IT, PT	
No tax arrangements	ES, FI, DE	

Tab. 1 summarises expenditure-based and income-based tax arragements applied in the selected EU countries in 2015. R&D tax incentives aim to encourage firms to perform R&D by reducing its costs. Compared with direct subsidies, R&D tax incentives allow firms to decide the nature and orientation of their R&D activities, on the assumption that the business sector is best placed to identify research areas that lead to business outcomes. R&D tax incentives are market-friendly instruments that are by nature more neutral than direct support instruments. A variety of tax incentives for R&D and innovation apply to corporate income tax, payroll withholding taxes and social security contributions, personal income tax, value-added tax or other consumption, land and property taxes, etc. Tax breaks are granted on the basis of expenditures incurred for R&D activities (expenditure-based) or gains from innovative activities (income-based).

4.2   Generosity of tax subsidy in selected EU countries

As OECD (2014) highlights, the diversity of national R&D tax arrangements makes cross-country comparisons difficult. In addition, the relative generosity and attractiveness of national R&D tax incentives depends not only on eligibility rules and design features, but also on the taxation system of a country, e.g. the level of corporate taxation, or on firms' ability to claim and use incentives, such as their capacity to make a profit against which potential tax relief on taxes can be applied or their human and financial capacity to administer claims for R&D tax incentives and incur the related costs.

One way to compare the generosity of tax incentives between countries, while taking differences in corporate tax rates into account, is to calculate tax subsidy rates.

The following variables were used for the calculation: corporate income rate, tax price of labour related R&D expenses, tax price of machinery and equipment used for the purposes of R&D, tax price of buildings and structures, tax price of other current (non-labour) expenses, tax price for R&D expenditure that applicable to cross border R&D, that is, where the firm undertaking the R&D is domiciled in a different country to the firm which will own the resultant intellectual property.

Fig. 4 shows tax subsidy rates across EU countries, calculated in line with (4) as one minus the B-index defined in eqution (3).

$$1 - B = 1 - \frac{1 - t(x + (1 - x)\psi)\theta}{1 - t(x + (1 - x)\psi)} \tag{4}$$

The tax subsidy rates are distinguished by firm size and profitability status. A decline in the B-index reflects an increase in R&D tax generosity. The B-index for the profit scenario assumes that the "representative firm" generates a sufficiently large profit to achieve the incentive's full potential benefit. An adjusted B-index is reported for a loss-

making firm that is unable to claim tax benefits in the reporting period. Using an adjusted effective tax rate that takes into account refundability and carry-forward provisions.
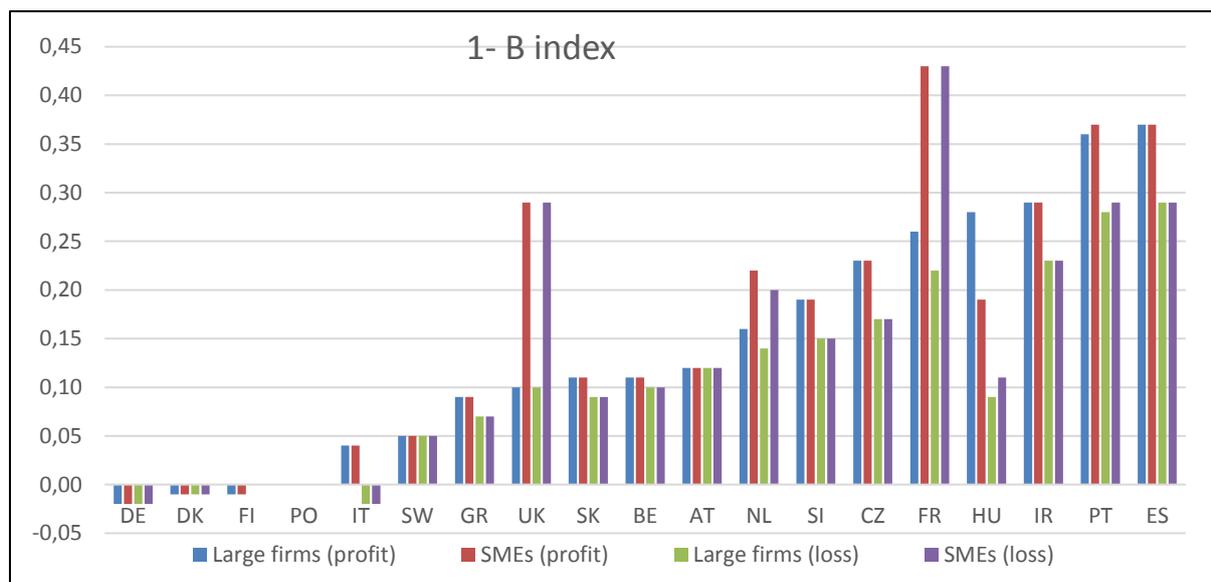

Figure 4: Tax subsidy rates for R&D expenditures by profit scenario and firm size (2015)

The Fig. 4 displays tax subsidy rates for large firms and SMEs. The definitions of SMEs and large firms vary across countries and may also vary over time. In France, Italy, the Netherlands, Portugal and Spain, special tax incentive provisions are available for young innovative firms, start-ups and innovative SMEs, as a subgroup of the SME population. Definition of SME subgroup-specific can be found in the country-specific notes of OECD (2015b). The biggest generosity of R&D tax incentives is found in Portugal, France and Spain. Countries differentiate the level of generosity across firm types. This is reflected in the Fig. 4, where Portugal, the Netherlands and especially France and the United Kingdom offer a more generous treatment for SMEs than for large enterprises (subsidy tax rate are 0.29 vs. 0.10 in UK and 0.26 vs. 0.43 in France). Moreover, SMEs that do not have profits enjoy the same level of tax generosity as profitable SMEs in France and the United Kingdom

Results in Fig. 4 also presents a largesse of tax subsidy by profit scenario. In a profit-making scenario, Portugal and Spain provide the most generous tax mix for R&D. However, tax arrangements are more favourable for SMEs and young innovative firms in France, the Netherlands, Portugal and the United Kingdom where start-ups and small firms benefit from higher deduction rates. In France since 2004, new firms classified as young innovative firms get large exemptions on corporate income tax and social security contributions. In a loss-making scenario, the tax subsidy rate on R&D expenditure is markedly lower for both large and small firms. On the other hand, the gap is particularly significant in Hungary, where R&D tax allowances do not include any carry-forward or refundable options. Therefore, subsidy tax rates for large firms and SMEs are 0.28 and 0.19 by profit scenario vs. 0.09 and 0.11 for loss-making scenario.

Negative value of this indicator means negative tax subsidy rates or tax burden. This is reported for all firm size and profitability status in Germany, Denmark and Finland, as well as in loss-making scenario in Italy.

5. Conclusion

The aim of the article was to compare the fiscal incentives and the generosity of tax incentives using the method of B-index (Warda, 2001) and tax subsidy rates. The empirical evidence done for 20 EU countries is based on data from Eurostat and OECD database. It's found that governments finance R&D and innovation through a mix of direct and indirect instruments. Due to limited financial resources, indirect support has become more important in recent years. Within the EU, only Germany, Finland and Estonia currently do not have a tax policy aimed directly at stimulating innovation. Although tax incentives are common, they are heterogeneous and differ substantially across countries; most countries offer more than one type of instrument. R&D tax credits are the most popular type of incentive, followed by enhanced allowances and accelerated depreciation.

A way to compare the largesse of tax incentives between countries, while taking differences in corporate tax rates into account, is to estimate tax subsidy rates calculated as one minus the B-index (Warda, 2001). The B-index demonstrates the potential of the national tax and innovation system to attract investment in R&D. It is important to note that although the single market is one of the attributes of the EU functioning, generosity if fiscal incentives vary significantly across the EU countries. The results indicate the existence of substantial differences in provided incentives – from negative support or tax burden (in Germany, Denmark and Finland) to 43% tax subsidy (for SMEs in France) . In 2015, the most generous R&D tax incentives are in Portugal, France and Spain. Countries differentiate the level of generosity across firm types and offer more generous treatment for SMEs than for large firms. e.g. France and the United Kingdom offer a distinctly broad-minded support for SMEs than for large firms (subsidy tax rates are 0.29 vs. 0.10 in the UK and 0.26 vs. 0.43 in France). Differences are found in the largesse of tax subsidy by profit scenario. Portugal and Spain provide the most generous subsidy for all firms in loss-making scenario (0.29), but the highest support is reported in a loss-making scenario in France for SMEs (0.43).

Acknowledgements

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Economic aspects of safety and quality food production: The case of small and medium sized businesses settled in the Czech Republic

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Abstract

The basic characteristic of food industry in the Czech Republic is its lagging behind economic performance in comparison with the EU average. It means, measured by the Gross Value Added indicator, more than a 50% lower labor productivity of food producers settled in the Czech Republic. The biggest share of sales within the food industry is gained by economically larger businesses, i. e. businesses with the head count of employees higher than 100. Technological and market economy consequences of safety and quality foods, together with the fact of lower performance of domestic food- processors in comparison to those settled mainly in EU 10 countries, can be discussed as the problem area within sustainable development of small and medium sized enterprises in the Czech Republic. These facts can be mentioned together with the information potential of EU Rapid Alert System for Food Safety (RASFF), which warns against current threats within identified breaking of EU food safety law and order. This article provides partial results of explorative study within cases of breaking the food safety requirements in the Czech Republic, based on data of the Czech Agriculture Food Inspection Authority and State Veterinary Administration, respectively. The sample of foodstuff producers settled in the Czech Republic, which broke the food safety legislation in the time period November 2015–June 2016 was analyzed to identify common factors as possible predictors for intended quality of food and beverages production.

Keywords: food industry, food safety and quality, economic performance

JEL Code: Q13

1. Introduction

The basic characteristic of the food processing industry in the Czech Republic is its lagging behind economic performance in comparison with the EU average. Namely the indicator Gross Added Value per employee was identified at value under 19 th. EUR/employee, so it means about 50% productivity of EU average. Consequently it was declared the Gross Added Value creation per employee at value 40 th EUR/employee. In general comparison with food producers in traditional EU countries, food processing companies settled in the Czech Republic produce a common consumption purpose production with lower involvement of a unique production that is regarded as a potential for creating a competitive advantage (Ministry of Agriculture, 2014). The period of the EU accession can be in the Czech Republic characterized by an increasing trend regarding to business activity, measured by absolute number of involved business entities. Namely, it was gained the absolute number of 18.5 th. active businesses in the food and beverages processing industry in the Czech Republic at the end of year 2012. This amount of businesses was measured within industries classification groups CZ NACE 10 and 11. An insight into a financial valuation of aforementioned industries is provided via indicator Sales for Own Production and Services that is revealing the prevailing gains of economically larger entities, i. e. those with headcount over 100 employees. These size categories are than gaining more than 60% of overall sales within food processing industry (Ministry of Agriculture, 2012).

The food production's quality in the EU member states is the part of complex "communitaure" programs of its management and it is narrowly interconnected with the area of food safety. The food quality area can be mentioned via the business planning, especially in the area of planning the financial and non-financial indicators (e. g. Michalski, 2016). The aforementioned financial indicators and financial goals of business entities can negatively influence the area of food safety and quality. Subsequently, the accessibility of consumer's information concerning food safety and quality can help consumers to change their behavior that is forming in fact the supply side at foodstuff market. These statements are respecting the presence of consumers' price sensitivity at this market (e. g. Syrovátka, 2011). The agri-food industry is regarded to be the second biggest industry in the EU that is employing more than 48 mil. of employees. The overall production of this industry is estimated to be at value about 750 bill. EUR per year. European policy of food safety and quality are mainly focused on securing safe and quality food for consumers, taking into account needs for ensuring best achievable conditions for business activities of food producers settled in EU member countries (European Commission, 2014). There are provided complementarily to the EU food safety and quality policy respective marketing support activities via food quality awards by government authorities, other public bodies or professional chambers. The "Klasa" award can be mentioned as an example of quality marks, which are awarded in the Czech Republic by Ministry of Agriculture, award "Český výrobek – Garantováno Potravinářskou komorou ČR" then as an example of quality mark awarded by a professional chamber.

The food and beverages processing industry itself and in sense of needs for food safety and quality requirements, has to be overviewed in broader consequences as mutually interconnected subsystems with many interrelations. Every part of this system, not excluding farmers, distributors, food producers or retailers, is responsible for quality creation (e. g. Lee, Van Hout, 2009; Matošková, Gálik, 2009). Agri-food chains cope with many requirements for production quality. The core business point of view, however, considers the consumer as the most important assessor of food products, which

are put on market (Hron, Macák, 2010). Accoding to Aramyan et al. (2009) securing the food safety and quality system influence all involved entities of supply chains despite the fact that members of food chains do not have both perfect information on other involved subjects and do not have any information influence on the food chains' members. It was reported in EU member countries over 3000 notifications in Rapid Alert System for Food and Feed (RASFF) in 2015, of which was nearly 800 alerts (European Commission, 2016).

Aim of the article is to identify common both quantitative and qualitative factors, which may influence foodstuff quality and safety requirements via employing secondary corporate data according to the findings reported at RASFF in the Czech Republic.

2. Methodology and Data

The sample of food and beverages producers was constituted according to the information of EU Rapid Alert System for Food Safety (RASFF) on breaking the safety and quality requirements at the market of foodstuff in the Czech Republic. RASFF does not provide for all reported alerts detailed information on businesses entities involved in the cases of breaking the foodstuff safety and quality, so it was employed an equivalent national data of the Czech Agriculture and Food Inspection Authority (CAFIA), State Veterinary Administration for foodstuff alerts at the Czech market. Namely via the internet portal "Potraviny na pranýři" (CAFIA, ©2016). The sample involves businesses settled in the Czech Republic, which were reported at the portal in the time period November 2015 – June 2016. Totally, it was identified 21 legal bodies of food and beverages producers in this period, which were affected by not meeting the quality and safety requirements of their production. The structure of observed businesses is as follows:

- 11 very large and large businesses, out of which 9 businesses were active at production of food, the rest then at production of beverages,
- 5 medium-sized businesses, out of which 3 businesses were active at production of food, the rest then at production of beverages,
- 5 small businesses, out of which 4 businesses were active at production of food.

Business entities from the sample were described with its major characteristics involving quantitative and qualitative indicators, using publicly accessible data (Public registers of Ministry of Justice Czech Republic) and corporate key financial and ownership data from database Amadeus of Bureau van Dijk in order to be explored by employing the cluster analysis at the first step as follows:

- level of interconnection with other business entities as categorical variable (levels: independent entity, interconnection with entity up to 25% of direct ownership, interconnection with entity up to 50% of direct ownership, interconnection with entity via more than 50% of direct ownership, ultimate ownership),
- time duration of business activities from the incorporation of business entity as intervals set-up according to the Sturges rule that was applied on the sample data (intervals: 0–4 years, up to 8 years, up to 16 years, more than 16 years),
- time duration of business activities from the incorporation of business entities' branches, which were affected by breaking safety and quality requirements as intervals set-up according to the Sturges' rule applied on the sample data (intervals: 0–3 years, up to 6 years, up to 9 years, more than 9 years),

- economic size of business entity as categorical variable (small, medium-sized, large and very large),
- prevailing positive influence of respective analytical indicators on the aggregated indicator *Return on Assets* in the observed period of years 2007–2014, covering in the form of categorical variables' proxies the analytical ratio indicators and its multiplicative relation as follows:

Return on Assets = Net Income/Earnings Before Interest and taxation (EBIT) · · EBIT/Total Assets · Total Assets/Equity (1)

- prevailing negative influence of respective analytical indicators on the aggregated indicator Return on Assets in the observed period of years 2007–2014, covering similarly categorical variables' proxies as noted in the previous point,
- development of business activities in the observed period of years 2007–2014, measured via ratio indicator *Sales/Total assets (2)* and respective geometrical mean of year-on-year indexes, coded for purposes of cluster analysis as dichotomous variable,
- level of RASFF alert as the categorical variable, namely, non-compliance with the quality requirements, falsified foodstuff, danger foodstuff.

Year-on-year influence of respective aforementioned analytical indicators on the aggregated indicator Return on Equity was conducted by the index approach as follows:

$\Delta ROE\ (\%) = ROE_{Y1} - ROE_{Y0} =$
$= A_{Y1}B_{Y0}C_{Y0} - A_{Y0}B_{Y0}C_{Y0} + A_{Y1}B_{Y1}C_{Y0} - A_{Y1}B_{Y0}C_{Y0} + A_{Y1}B_{Y1}C_{Y1} - A_{Y1}B_{Y1}C_{Y0}$,

,where:
A = Net Income / EBIT; B = EBIT / Total Assets; C = Total Assets/Equity (3)

Similarities of observed sample cases within breaking the foodstuff quality and safety requirements were analyzed by hierarchical tree clustering approach. Raw input data of previously defined variables were case-wisely standardized according to its mean and standard deviation. It was applied the complete linkage rule and Euclidean measurement of case-wise distances via employing the Ward's approach.

Additionally to the previous approaches it was conducted also a comparison of observed ordinal variables among sample of businesses and industry averages, based on data of Ministry of Industry and Trade Czech Republic to reveal respective differences. More precisely, it was tested median differences between observed values and industry averages in time period of years 2007–2014. The involved variables were ratio indicators *Return on Equity, EBIT/Total Assets, Net Income/EBIT* and *Sales/Total Assets*. For purposes of median difference testing it was employed the non-parametric Wilcoxon matched pairs test.

Software Statistica 12 was employed for procedure of cluster analysis and testing the significance of differences among observed samples' indicators and industry averages.

3. Results

Economic aspects of food safety and quality can be overviewed on one hand via interconnections among respective legislation rules and requirements, demand side of quality foodstuff and on the other hand then via economic performance development of producers in this framework. Consequently, the economic performance of food and beverages producers can be as the starting point analyzed via effective and efficient utilization of factors of production to supply foodstuff at expected quantitative and qualitative parameters.

Managerial tools in the field of productivity represent a specific area of interest within the aforementioned consequences. Such a productivity management has got an expected focus on utilization of respective factors of production. Consequently, the need for increasing productivity of factors of production within the EU Food safety and quality policy and consumer demand can be considered as an ultimate one to encourage and sustain competitiveness of foodstuff processors (Motlíček, Vavřina, 2016).

Gross Added Value per employee indicator that was observed in the Czech Republic within years 2008–2014, can be described as lagging behind the largest food and beverages producing EU countries (see Fig. 1).
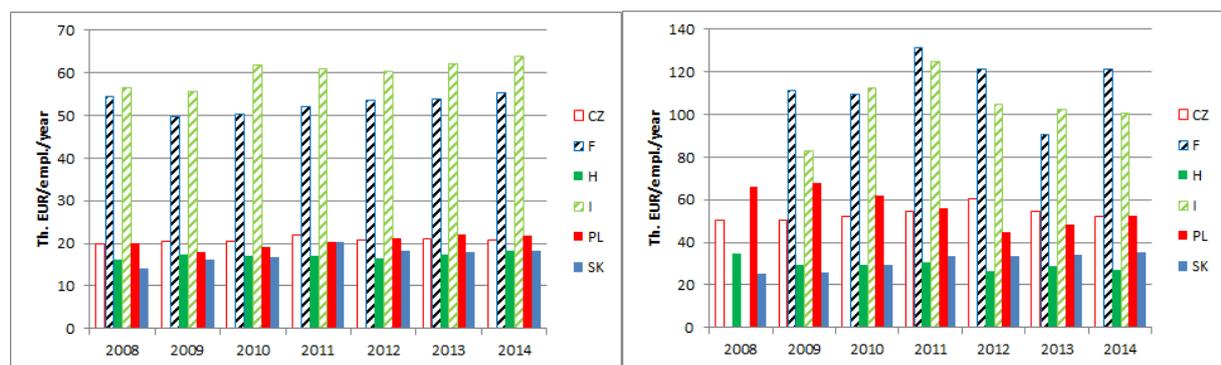
Figure 1: Development of annual Gross Added Value per Employee indicator in selected countries within Manufacture of Food (left graph) and Manufacture of Beverages (right graph) industries
Source: own work using data of EC, Eurostat (©2017)
Note: Missing data for Manufacture of Beverages industry for France and Italy in year 2008

A comparison of Gross Added Value per Employee gained in Czech Republic and other Visegrad4 member countries is as follows. The highest level of variability within Gross Added Value per Employee indicator was identified among Slovak producers in both industries. On contrary, food and beverages industry in Slovakia is identified to be at the highest average growth level from all observed countries in the given time period of years, namely an average growth at 4% in the case of food and nearly 6% in the case of beverages. The situation among food and beverages manufacture industry measured by Gross Added Value per Employee was identified rather as stagnation in both industries, but the absolute values of Gross Added Value per Employee belong to the highest among Visegrad4 member countries together with Poland. The highest average growth of Gross Added Value indicators among observed largest EU food producing countries was identified in Italy, namely an average growth of 2% in the case of food and nearly 4% in the case of beverage manufacture industry in the given time period.

It was observed additionally to the efficiency indicator Gross Added Value per Employee also other indicators regarding profitability of food and beverages producers settled in the Czech Republic. Namely, it was measured by *Return on Assets (ROA)*, *Return*

on Equity (ROE) indicators and its analytical indicators of activity using *Sales on Assets (S/A)* and tax burden equivalent employing *Net Income to EBIT ratio (NI/EBIT)* (see Fig. 2).
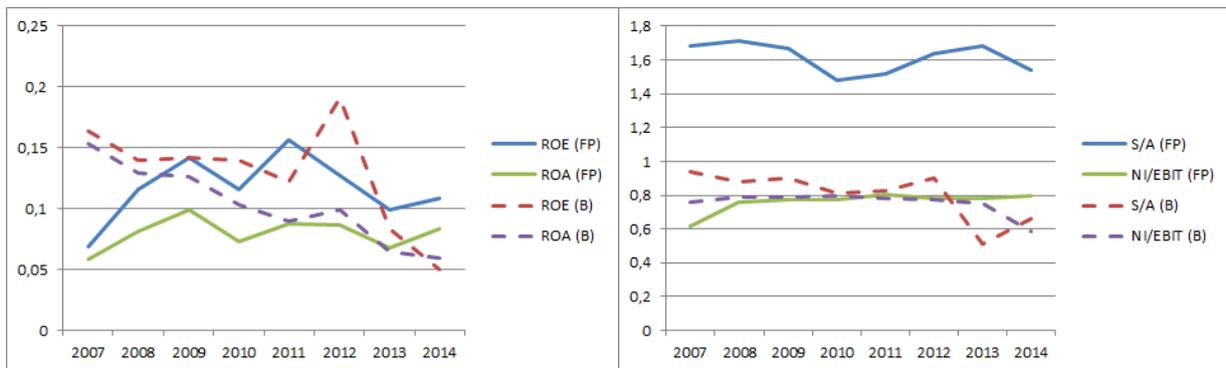

Figure 2: Industry averages within profitability development and other selected indicators of food and beverages manufacturers settled in the Czech Republic (in graph indicators for food producers marked as "FP", indicators for beverages producers marked as "B")
Source: own work using data of the Ministry of Industry and Trade (©2017)

Similarly in both industries it could be deduced a positive profit influence of financial leverage on ROE indicator. On contrary, a difference in development was identified in comparison of both employed profitability indicators between food and beverage manufacturers in the Czech Republic. The latter ones, i. e. beverages manufactures, are witnessing an average decrease of profitability excessing 12% that was influenced mainly by a continuous decrease of their production power and also by a decreasing trend of *Net Income* indicator development. The most significant difference among observed industry averages was identified within the activity indicator *Sales on Assets*, where the level for food producers is twice as much in comparison with producers of beverages. Partial outcomes from the industry averages' analysis are employed for cluster analysis of cases within breaking the quality and safety requirements at the Czech market.

Respective clusters constituted according to the Euclidean distances can be described from the bottom-up point of view as follows (see Fig. 3). The first cluster is including cases 16, 18 and 19. This cluster covers large and very large food producers, which has been founded before 16 and more years. All the observed cases are connected with danger food findings with a negative influence on health of consumers. These danger food findings were identified in between 6–9 years after setting up the affected business units of maternal companies. Profitability of these businesses that was measured by *ROE* and *ROA* indicators was identified as lower than industry average despite the fact of increasing activity of affected businesses, measured by *Sales on Assets* indicator. Profitability of observed businesses was negatively influenced by development of the financial leverage, on contrary a positive influence of profitability was identified due to the growth of their production power.
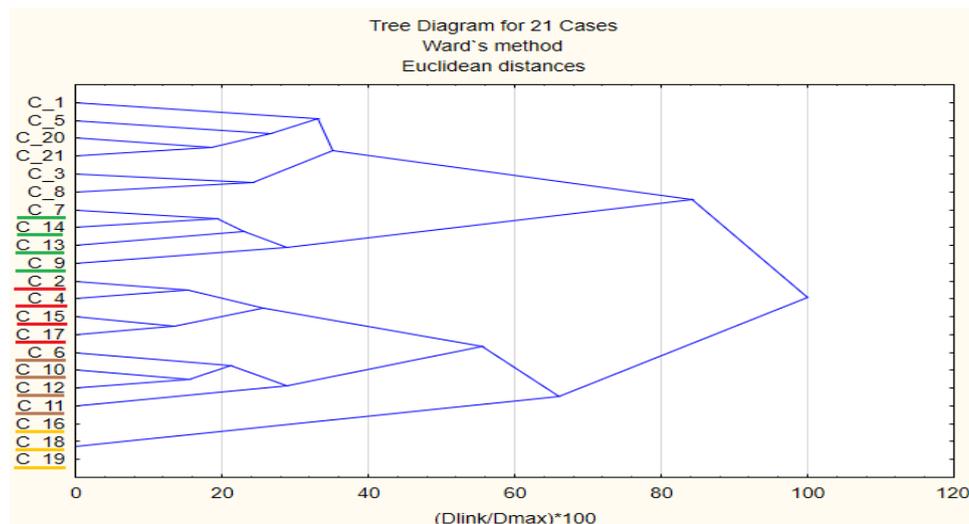
Figure 3: Results of cluster analysis involving 21 legal body businesses regarding the cases of breaking the food quality and safety requirements at the Czech Market in the time period November 2015 – June 2016
Source: own work using data of the Czech Agriculture and Food Inspection Authority, State Veterinary Administration (©2016) and corporate database Amadeus of Bureau van Dijk (©2016)

The second cluster is including cases 6, 10, 11, 12 and it covers medium-sized and large food producers, which have been founded before more than 8 years. All the cases were findings of danger food. These businesses prevailingly do not differ to industry average or are below the industry average according to their profitability. Their profitability development is prevailingly positively influenced by growth of the production power indicator; on the other hand the prevailing negative influence on *ROE* was identified due to the decrease of the *Net Income to EBIT ratio*.

The third cluster covers cases 2, 4, 15 and 17. The prevailing amount of cases is findings of danger food, the rest findings are falsified food. Affected large and very large producers were founded prevailingly before more than 8 years, their branches then before more than 6 years. These businesses prevailingly do not differ to industry average values or are below the industry average according to their profitability. *ROE* indicator in the observed period is negatively influenced mainly by the financial leverage development. On contrary, the positive influence on profitability was identified due to the increase of *Net Income over EBIT ratio*.

The fourth cluster covers cases 9, 7, 13, 14 and consists of prevailingly small and medium sized food producers, which were founded including their business units up to 3 years after breaking the food quality and safety requirements. These cases of breaking the food quality and safety requirements are mainly connected with falsified food without direct negative influence on health of consumers. Profitability of the affected businesses was not differing to the industry average and the same finding was made according to their development of activity indicator *Sales on Assets*. The production power was identified as both positive and negative effect on equity capital's profitability of businesses in this cluster.

The last cluster is constituted from cases 1, 3, 8, 5, 20 and 21. It covers mainly producers of alcoholic drinks and these businesses are prevailingly medium-sized and large businesses, which were founded before more than 8 years and their branches before more than 6 years. All cases of breaking the quality and safety requirements are representing failure of food and beverages quality parameters without direct negative influence on health of consumers. The observed profitability of affected businesses was iden-

tified as prevailingly under the industry average with main positive effect of production power. On contrary, the prevailing negative effect on profitability was identified due to the decrease of *Net Income over EBIT ratio* in the observed time period.

4. Discussion and Conclusions

The economic performance of food and beverages producers settled in the Czech Republic is lagging behind the performance of manufacturers from traditional countries in this branch of production. Namely, it was identified by the outcomes of labor productivities' analysis that food producers settled in the Czech Republic within the observed time period of years 2008–2014 have got a stagnating economic performance at the level below 40% in comparison with businesses settled in France and Italy. The need for competitiveness of food and beverages producers is enhanced by requirements of food safety and quality that is harmonized in respective national legislation according to the EU law and order principles. A sustainable business in the area of food and beverages production then has to follow in the economic sense above all the goals of efficiency and effectiveness of their business processes, when Mezera and Špička (2013) point at the need of investment development of food producers in order to increase labor productivity as one of the critical factor of their competitiveness.

Findings of breaking the food law and order requirements of businesses settled in the Czech Republic within the time period November 2015 – June 2016 are discussed in the aforementioned areas of economic efficiency. The sample of small and medium-sized businesses, which broke the food safety and quality requirements are prevailingly cases of either falsified food and beverages or its non-compliant quality parameters without a direct effect on health of consumers. The cases of falsified food among small and medium-sized enterprises are prevailingly businesses that do not differ from the industry average in their profitability and activity measures. On the other hand the observed cases of non-compliant quality requirements for food and beverages caused by medium sized businesses are connected with lower economic performance of affected businesses. Namely, both profitability of equity capital and business activity measured by *Sales on Assets* indicator is lagging behind the industry averages. The most frequent observed cases of danger food were identified among the economically largest entities from the businesses' sample. Specifically, there were identified no cases of danger beverages in the observed period that could be stressed as a successful settlement of responsible public bodies after the "methanol affair" in the Czech Republic in years 2012 and 2013.

Economically larger businesses, which are connected with the cases of danger food findings, were identified as those with the profitability both below and not differing to the industry average. On contrary, all the cases of danger food findings were identified as statistically significantly differing, higher respectively, from the industry average regarding to the activity indicator *Sales on Assets*. Such a finding is coherent with the development on the food market in the Czech Republic, when the price sensitive demand together with negotiation power of retailers forms the competitive environment. Such a consequence then may affect quality and safety requirements via cost savings not only at the level of business processes, but also cost savings on foodstuffs raw materials, which is consistent with findings of e. g. Latruffe (2010), Putičová and Mezera (2011).

Sustainable development in the area of food quality and safety can be seen as the complex interconnection between producers, retailers, consumers and public bodies. So, the information flow can be regarded as an ultimate element in order to be able effi-

ciently influence the foodstuff demand and supply side on the competitive EU common market.

This article presents above all the partial outcomes of continuous research in the area of food and beverages producers' economic performance in accordance with safety and quality requirements. It is intended to broader the research via employing data of foreign food processing businesses, especially regarding to the findings of RASFF on breaking the EU foodstuff law and order in the Czech Republic.

Acknowledgements

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Modeling the Reality of Decision Making with the Doctus Knowledge-based System

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Abstract

Today we still grapple with the classification of reality, for we can only think about what we have a concept of. All observers are the slaves of their disciplines, which force them to see through the lens of their concepts and methods. The big question is, whether it is necessary for us to stay within the cage of our existing disciplines. Transdisciplinarity examines territories beyond different disciplines. In this study, decisions and their ontology have been observed through the lens of transdisciplinarity. Depending on this approach, a Knowledge-based System, namely the Doctus KBS can be seen as a Decision Support System tool and as Knowledge Representation. During the development of Doctus KBS, used a symbolic logic to visualize knowledge, the process of thinking together was examined to define ontology of the concepts. This study examines how ontology can be applied to inter-agent (human or machine) communication and the reusing of concepts. The goal of this study is the presentation of a different approach.

Keywords: Decision Making, Knowledge Representation, Ontology Development, Transdisciplinarity

JEL Code: D830, M150, O300

1. Against Disciplines: Break Free of your Cage

Everyone has seen someone standing in front of a shop window, looking at a pair of shoes. Everyone has also seen someone walk in after having stared, and either buying or not buying aforementioned shoes. Everyone may well have seen someone staring and then leaving, not entering the store. In other words, everyone has seen decision-makers and decisions, even experienced them, but very few have seen into the thinking process of a decision-maker. This has, however, not stopped a lot of people from attempting to write about that very thinking process, thus describing what they themselves have not seen. Many have tried to find the location of decisions, their time as well as their makers, but so far have had nothing usable to show for it. When we say nothing usable, we mean that it is impossible to use the results of their research to typify places, times and makers of decisions. If we know so little about decisions, then we cannot know what kind of tool could

be developed to help decision makers then and there. A few decades ago, a few tools were developed based on the linear algorithms of programming, and have so far been applied to reality in an experimental fashion, looking for their domain of validity (Brans, Vincke, 1985). At this point, the problem can be described as an inability to make viable tools to support decision-making.

Let us try to grasp the implications of the following ancient passage: "The man gave names to all the cattle, and to the birds of the sky, and to every beast of the field..." Today we still grapple with the classification of reality, for we can only think about what we have a concept of. A simple example is enough to demonstrate. It would be foolish to say that there was no gravity in reality before the 17th century. Newton was merely an observer who understood and named it. Ever since that moment, however, we can think, debate and teach about gravity. If an observer realizes something new, then it is dangerous to give it an old, taken name; it has to be given a new one so that we may think about it.

All observers are the slaves of their disciplines, which force them to see through the lens of their concepts and methods. The big question is, whether it is necessary for us to stay within the cage of our existing disciplines. If we want to name reality, then we should escape our cage, but must avoid slipping into the glorified mainstream cage, or any other. It is logical for the majority to recommend everyone being in the same cage, and then there will be no arguments. In the past, philosophy was the "king" of disciplines. Today, the world glorifies that cage of physics, as positivist thinkers try to herd everyone into it. In the cage of physics, it is recommended to describe reality through causal relations. Fig. 1 depicts the four main disciplines which with their powerful concepts.
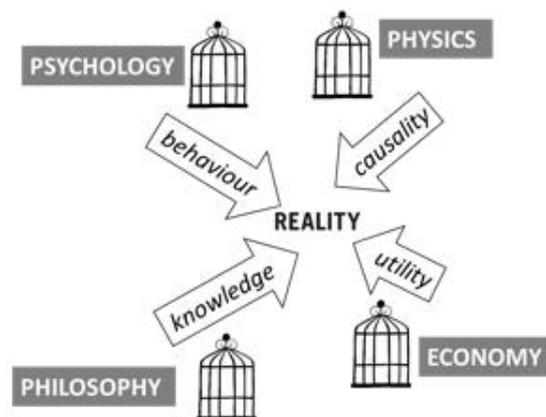

Figure 1: Once free of cages, reality is seen differently

As Nassim Nicholas Taleb said, the mandarins of science are now those with highly systematic, mathematical and logical minds (Taleb, 2007). They protect their privileges by fortifying themselves with a great wall of complex mathematics. This makes it easy for them to fool everyday people who cannot double-check the truth of their declarations. These mandarins exclude economists, psychologists and philosophers, who look at the world differently from mainstream physicists and mathematicians. If we wish to move beyond disciplines, then we must accept that new phenomena are best looked at, and are most exciting without any disciplines. It is useless to look longingly to-wards the cages. Here and now, the way out is most likely transdisciplinary. The Latin "trans" prefix is used in the sense of "beyond", not of "between".

Transdisciplinarity examines territories beyond different disciplines. Totality, a whole picture and its understanding is its goal. Of course, this shift in approach will not

happen one moment to the next, and will have to face a lot of criticism, especially from positivists. Following the works of Barabas Nicolescu (Niculescu, 2001), proponents of radical relativism state that a piecing together of a whole picture is no longer possible. For transdisciplinarity, this whole picture is not only possible, but vitally important, even if it never becomes an enclosed theoretical system. In this study, we looked at decisions and their ontology through the lens of transdisciplinarity.

2. The Reality of Decision Making

We have been teaching decision-making at different levels of university, including MBAs in Hungary, Croatia and Bosnia-Herzegovina for nearly thirty years. After a few years, our students became decision makers, and often invited us to help them and give advice during the preparation of decisions. It was based on these coaching experiences that we started developing the Doctus Knowledge-based System (Doctus KBS). The continuous development of the framework was influenced by our advisory experience and our faith in the reasoning of the decision maker. This development process was not planned. Today, we would know to call it agile development. We went forward step by step, as we understood decision makers' reasoning then and there. During its application, we received feedback that a developer would never have thought of. During our coaching work, we observed the decision makers, looking to see how they would explain their own decisions, and whether we could make the preparation of decisions transparent.

During the history of decision support, the reasoning of participants during the preparation of decisions was somehow always neglected, just as any attempts to make it transparent. The results of operational research were of great significance to the shaping of decision support tools. The realization of the models of multi-faceted decisions helped the comparison of different alternatives, and these realizations were consequently put to use from the 1970s on. Ever newer and more complex decision support tools were born. The main point, however, is that the process of human reasoning was completely neglected by developers. They assumed as self-evident, that all things should be quantifiable, and so great efforts were made to quantify important but immeasurable concepts, and search for points of application for ready-made algorithms as possible. We took decision analysis as our basis, not operational research, and the reasoning of the person preparing the decision was in focus. It is realized that the forced quantification of otherwise non-measurable aspects of decision preparation does not make the comparison of alternatives easier. On the contrary, it often makes it harder, making it more difficult to accept the recommended decision. It is well-established that part of the knowledge of practicing decision-makers can only be described using concepts.

Using the shell, we receive a decision recommendation based upon the expressed knowledge of those taking part in the decision preparation. This recommendation can be explained, the path leading to it is visible, and this reassures the decision maker. It is easier to get the decision accepted as the thinker can understand and see their own reasoning. When using the Doctus KBS, those taking part in the decision preparation can almost experience a conversation with the computer, as it uses the concepts defined by them. This process can reveal concepts that have not previously been explicitly expressed, but have had a strong influence on decisions. The conversation with the computer forces those taking part in the decision presentation process to clearly define the different meanings of their concepts. The tensions arising out of unquantifiable expectations and their interpretations can also be assuaged.

Doctus KBS uses a symbolic logic to visualize knowledge. This means a formalism whereby knowledge is expressed through logical expressions, composed of symbols connected through "if... then..." rules. The symbols in this case are concepts, more precisely the words of the domain experts. Doctus KBS is an empty piece of software that has designed to create knowledge bases based on the knowledge of experts. During the building of this knowledge bases, we organize the expert's knowledge, which often leads to the discovery of new knowledge. The building of the knowledge bases encompasses three processes. These are knowledge acquisition and knowledge engineering, whereby concepts are organized and fine-tuned, and application. These processes are supported by the Knowledge engineer.

There are two known approaches to the nature of reality. Positivists maintain that the observer is an outsider, and therefore passively and objectively observes reality. Anti-positivists would argue that the observer enters the reality she observes, becoming part of it. We prefer the second approach. Reality as object can be interpreted by the observer as subject in many ways. It would be safely declared that there is no decision that two observers would see and interpret in the same way. This leads to the fact that our models of reality must also be different. Depending on our approach, the Doctus KBS can be seen as a Decision Support System (DSS) tool and as Knowledge representation as Fig. 2 depicts.
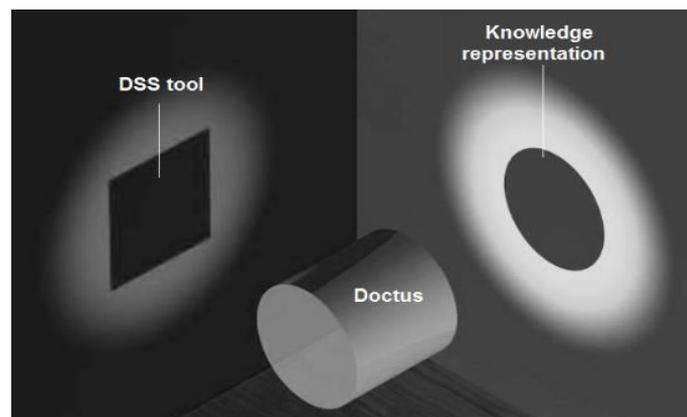
Figure 2: Different views of Doctus KBS

During the development of Doctus KBS, representation of knowledge was the defining characteristic, as we were examining the process of thinking together, and one phase of the research was the modeling of the extraction, organization and sharing of knowledge. "Will Artificial Intelligence Replace Human Intuition?" asks Knowledge@Warton from Daniel Kahneman (Kahneman, 2016). Kahneman's concern is that "as AI becomes more sophisticated, it is moving beyond simply helping humans achieve disciplined thinking to actually being able to execute professional judgment on its own. This will be very threatening to the leaders of organizations." When anybody can have access to decision analysis, anybody can become the leader.

Over the course of nearly 50 years of experience, we have realized that decisions happen, and what we imagined as the preparation of decisions actually happens after those decisions have been made. The decision maker wishes to explain and justify the decision to themselves and to others. We accept the idea of intuitive decisions (Simon, 1982), (Kahneman, 2011), but we have experienced that expectations can never be fully expressed. Even after the decision is made, it is an intellectual challenge to define the expectations to which the decision con-forms.

The filtering of the concepts used by decision maker is helped by different knowledge organization systems, ontologies, taxonomies and folksonomies. Ontology in its original sense is the science of existence, and so is a part of metaphysics. The use of ontologies in the world of Knowledge Management and IT has become more and more popular in the past few decades (Fensel, 2004). In the beginning, researchers of Artificial Intelligence borrowed ontology as an expression from philosophy, but its definition has since long wandered from any philosophical definitions. This study examines how ontology can be applied to inter-agent (human or machine) communication and the reusing of concepts.

The necessary knowledge for a decision rarely resides in the head of a single human. Experts from several fields work together to prepare a decision, making the definition and ontological discernment of the different concepts introduced from different fields a priority and a challenge. This is not merely knowledge sharing, it is thinking together as well as the defining of the necessary knowledge through concepts. The first step is the gathering of concepts used by the different experts. These concepts will form the framework of the expectations of the decision maker. These concepts will be used to describe the possible paths that can be chosen from.

2.1. Decision Makers' viewpoint

We like to say that decision support is not designed to replace but to assist the decision maker. A competent, decisive decision maker will not want to make themselves superfluous, but an indecisive one had better do so. A decisive decision maker will only accept tools that will augment any shortcomings. It would serve a decision maker well to organize the concepts used in making their decisions. A decision is much more than a reason for an action. It gives the possibility to define ethics and truth and to discover and understand what actually hap-pens, what decision makers are doing and what explains their actions. It gives the opportunity to share both the glory and responsibility of the decision and thus the chance to exercise, question and strengthen friendships, oppositions, power or status. That many who take part in decision making spend more time on symbols, myths and rituals is due to the fact that they know those better that the likely outcome (March, 1994).

When decision makers understood and accepted that the Doctus KBS is a helpful tool to collect and represent their concepts, we were successful. When the decision makers became scared that a tool would make decisions instead of them, banishing them to infancy, the coaching process ended in failure. If it is possible to convince the decision maker at the beginning of the coaching process that neither they, nor we, can discern the ontology of the concepts in their mind without a tool, they will become relaxed.

2.2. Knowledges Engineers' viewpoint

Our experience gathered during the building of the knowledge representations of a few hundred decision makers is not enough to write a textbook on the acquisition and representation of decision maker knowledge, but also too much to not give us at least a hint of the process. An experienced decision maker is capable of organizing their knowledge into knowledge bases with the help of a Knowledge Engineer. This process is impossible without conversion that is knowledge sharing. "Shared reflects the notion that an ontology captures consensual knowledge, that is, it is not restricted to some individual, but accepted by a group. Basically, the role of ontologies in the knowledge engineering process is to facilitate the construction of a domain model. An ontology provides a vocabulary of

terms and relations with which to model the domain. Because ontologies aim at consensual domain knowledge their development is often a cooperative process involving different people, possibly at different locations. People who agree to accept an ontology are said to commit themselves to that ontology" (Fensel, 2004:4).

During the use of the Doctus KBS, we have made several attempts to define the necessary competences of the Knowledge Engineer (Baracskai, Velencei, 2002). The role of a Knowledge Engineer is to work together with the decision maker in defining ontology of the concepts that were used during the decision maker's reasoning. How can Knowledge Engineer support knowledge representation? First and foremost, the disorder must be recognized. Knowledge Engineer could see the decision maker preparing to make a decision with a lot of expectations, which are very rarely well-defined, unambiguous concepts. On first glance it may seem irrelevant, but it is very important to note that we worked as Knowledge Engineers with decision makers who spoke three languages as mother tongues. When we translated a concept from one language to another for a publication, we realized that a concept can have a range of very different meanings in a language different to the original concept of the decision maker. Perhaps this also underpins the fervent belief in quantification, as data is interpreted in the same way in all languages.

We have come across decision makers where 27 rules were all we were able to discern, but also ones whom did not stop until 2700. Knowledge engineers gets to know the decision maker. They see whether the decision-maker knows a little, a lot or irrelevant things. They see whether the decision maker follows formal logic in connecting their expectations or not. The most exciting moment is when the Knowledge Engineer shows the decision maker the meta-knowledge that is the complex rules.

3. Discussion

The closer we are to the demarcation, the farther we are from the mainstream. "Gentlemen, tell you what, don't just tear out that page, and tear out the entire introduction. I want it gone, history. Leave nothing of it." This quote from the movie Dead Poets Society is perhaps a little harsh in this case, or perhaps not. The mentioned scene could be the perfect illustration of the demarcation between philosophy and physics. This study aims to fuel the same debate. The problem of demarcation was not to draw a line between science and metaphysics, but rather to separate science from pseudoscience (Popper, 1976).

Based on the ideas of Thomas Kuhn (Kuhn, 1996), normal periods, when a prevailing paradigm is fully stable, have throngs of textbook-type, well-structured process descriptions. These descriptions strengthen the accepted theory and its applications, and, in the case of a newly completed paradigm shift, create the basis for the new normal; usually excluding or taking as axiomatic and natural the processes and thinking that led to its candidacy.

Decision-making can have no textbooks. The observation of the reality of decisions and the classification of new concepts most likely can only be assisted through the refinement of knowledge representation. If we break free of our cage, and do not immediately become enslaved to another one, we will have a better chance of painting a picture of the knowledge of the decision maker, akin to the one we are able to create today with the Doctus KBS.

Acknowledgements

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The performance of groundnut products in the world: a case of peanut pyramid in Nigeria

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Abstract

This study is an attempt to assess the constraints, prospects and market competitiveness of groundnut products in Nigeria. Groundnut (or peanut) is an essential oilseed in the world. The crop as an industrial product, widely cultivated not only by smallholder farmers within the tropical and warm temperate areas in Africa but also large-scale farmers in America and Asia. Peanut farmers in Nigeria faced with limited farm inputs, finance, solely rely on natural rainfall with either recurrent drought or excess rains. In the era of groundnut pyramid (in the 1940s and 60s), the crop was the leading export product in Nigeria, and the country was the leading exporter of the product in the world. However, Nigeria moved from being the largest to the third largest producer in the world. The nation also lost its glory as it is no longer among the major global exporters. Using the OLS approach, the results show that area cultivated, yields, fertiliser, producer and world prices, exports, domestic consumption, and openness have effects on groundnut production in Nigeria. The findings reveal that Nigeria export is highly volatile, as it is mainly concentrated in few countries. There is a need for export promotion and market diversification for competitiveness and earnings to be accelerated and sustained in the country.

Keywords: competitiveness, diversification, farm inputs, export, price, yield

JEL Code: Q10, Q11, Q17

1. Introduction

Groundnut (Arachis hypogea L) also known as peanut is an essential oilseed crop in the world. The crop as an industrial product is widely cultivated not only by smallholder farmers within the tropical and warm temperate areas in Africa but also by large-scale farmers in America and Asia. Studies by Atasie, Akinhanmi and Ojiodu (2009) show that groundnut oil contained 47% fat, 38.6% protein, 1.8% carbohydrate, 3.7% crude fibre, 5.8% moisture and 3.1% ash. They concluded that the oil seed is an excellent source of

protein with high nutritional value. Groundnut is the third most cultivated oilseed in the world. The product has played a significant role in the economy of some African producing countries, such a Sudan, Nigeria, Tanzania, Cameroon, Gambia, Chad and Senegal, and as food in other main cultivating economies (Nautiyal, 2002), such as China, India and the USA.

Prior to crude oil exploration in Nigeria, oilseed commodities, such as groundnut, palm oil and soybeans were among the leading agrarian produce and export products in the country. Surprisingly, these products have taken a back seat in the global export competitiveness. Groundnut used to be the major agricultural export commodity in the northern Nigeria during the colonial era and the post-independence in the 1960s and early 70s. During this period also known as the era of groundnut pyramids, the product was solely exported to the colonial master, the United Kingdom (UK) through Royal Niger Company. However, presently, the UK is no longer the main importing partner as its place has been taken by the Netherlands, Turkey and Niger.

Groundnut production has not increased as expected in Nigeria and the era of peanut pyramids has disappeared or remain redundancy. It might be partly because peanut farmers in Nigeria faced with limited farm inputs, finance, solely rely on natural rainfall with either recurrent drought or excess rains. For instance, studies by Awoke (2003); Ani, Umeh and Weye (2013); Alabi et al. (2013) indicate that yield per hectare and farm inputs have positive effects on groundnut production in Nigeria. On the other hand, lack of improved capital inputs, access to finance due to lack of collaterals, pests and diseases, roads, marketing, non-availability of fertiliser and high-interest rate are the major problems hindering peanut production in the region. Consequently, most farmers engaged communal labour, employed traditional farm inputs and their little personal savings for production in the area.

To ensure that global competitiveness is maintained, the Nigerian government established Commodity Marketing Boards in 1977 with the sole aim of increasing production of exportable agricultural commodities, such as cocoa, cotton, rubber and groundnut. During this period, food imports were discouraged, whereas maximum domestic production for consumption and exports was encouraged (UNEP, 2002; Mou, 2014; Verter, 2016). Nigeria lost its glory in the groundnut production and exportation in the world as the days of groundnut pyramids disappeared. Nigeria was the largest exporter of shelled groundnut and accounted for over 42% share of global exports in quantity for the between 1961 and 1970. Sadly, by 2008, the country took a back seat and lost completely out of the global peanut market and presently exports less than 1% of the product to the world market. Against this backdrop, this study is an attempt to assess the constraints, prospects and market competitiveness of groundnut products in Nigeria.

2. Methodology and Data

The statistical data for the study are obtained from the Food and Agriculture Organization; and International Trade Centre (ITC). The study is substantially descriptive in nature. Data for the analysis are presented in tables, graphs, percentage and raw data. To verify some determinants of groundnut production in Nigeria for the period between 1980 and 2014, one of the formerly leading agricultural export products in Nigeria, a multiple regression model is specified as follows:

$$QGP = \beta_0 + \beta_1 AH + \beta_2 YIELD + \beta_3 PESTI + \beta_4 FER +$$
$$\beta_5 DCG + \beta_6 PP + \beta_7 GEX + \beta_8 GWP + \beta_9 MOPEN + \varepsilon \qquad (1)$$

where QGP is the annual quantity of groundnut (in shell) production (tonnes). AH stands for the area of groundnut harvested, measured in hectares (ha). The variable is captured for the farm size of the crop. YIELD represents the of groundnut yield per acre, measured as kilogrammes per hectare (hg/ha) of harvested land in the country; PESTI is the pesticides (US$) applied in the farms. FER represents fertiliser consumption in farms in the country, measured in tonnes. DCG is the growth rate of domestic groundnut consumption (%); PP is the producer or farm gate prices of groundnut product (US$). Farm gate price is the amount received by smallholder groundnut farmers at the point of initial sales. GEX is the raw quantity of groundnut export (tonnes); GWP is the world price of peanut oil (US$). MOPEN is the merchandise trade openness index, is an indicator of free trade; and ε denotes the error term.

These variables are chosen because they are either direct or indirect factors of production. The prior expectation is for all the variables have positive relationships with peanut production in the country. It is important to reiterate that, the words groundnut and peanut are used interchangeably in this article. Given that I also cultivate groundnut in Nigeria, I have had experience in the sector. Therefore, some views expressed in this article reflect the author's personal experience.

3. Results and discussions

Area land of groundnut planted (or harvested) worldwide, substantially increased to 26.5 million hectares in 2014 from 16.6 million acres in 1961 (FAO, 2017). As shown in Figure 1, India is the largest cultivator of peanut in the world regarding area harvested, but the second largest producer of the product in raw quantity produced and values. It implies that China, India, Nigeria and Sudan are the largest producers of groundnut partly because of their farm sizes relative to other producing countries.
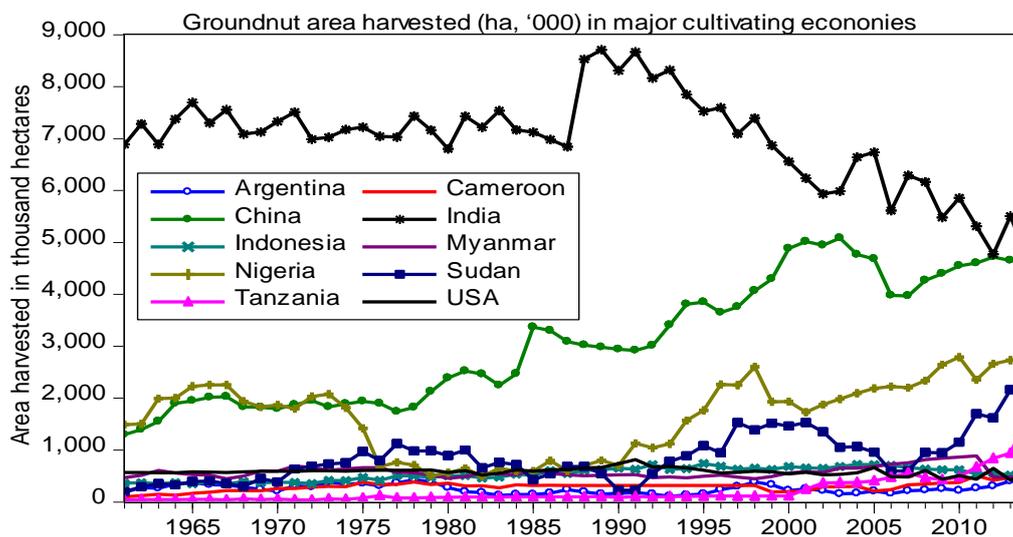

Figure 1: peanut area harvested (ha, '000) in the leading producing countries, 1961–2014
Source: Compiled from FAOSTAT

The USA recorded highest in peanut yield per hectare, followed by China and Argentina. It implies that the USA and Argentina are among the leading producers of peanut mainly due to their high yields per acre. Generally, in advanced economies, groundnut

yield per acre has increased as a result of efficient use of modern technologies coupled with improved seed. However, the reverse has been the case in Africa as yield per hectare is still low in countries, such as Nigeria, Sudan and Tanzania (Figure 2). Also, peanut farmers in Nigeria rely on natural rainfall with either recurrent drought or excess rains. To some extent, it explains why the annual quantity of groundnut output in Nigeria has not risen as expected relatively to the other main producing countries (Table 1). Notwithstanding, looking at area harvested, Nigeria still have a great prospect to increase annual production if the country adopts modern methods of cultivation and improves its seedling as being practised in advanced economies. Also, the global production of groundnut rose from 14.3 million tonnes in 1961 to about 45 million tonnes in 2014. This performance is achieved largely because of the high demand for the product in both producing and importing economies (Verter, 2016).
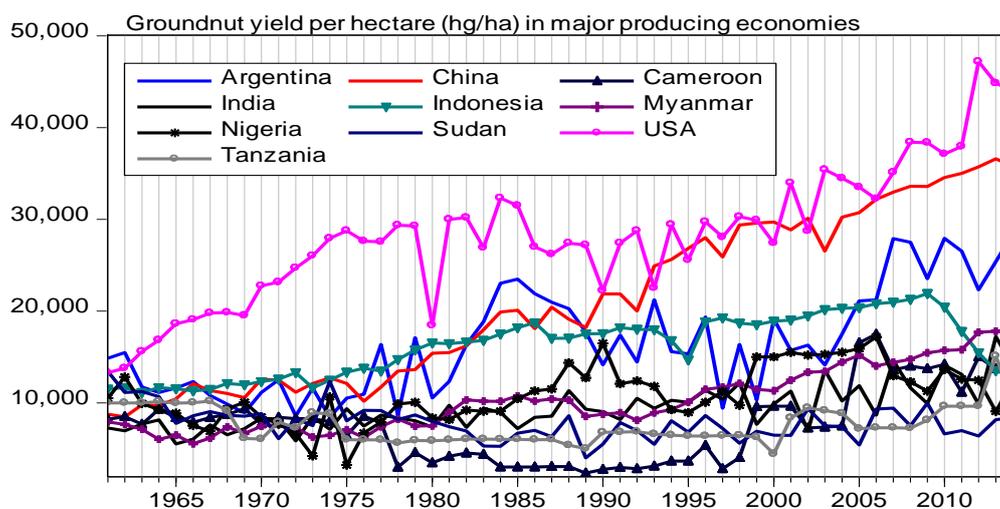
Figure 2: Groundnut yield per hectare (hg/ha) in the leading producing countries, 1961–2014
Source: *Compiled from FAOSTAT*

Despite the numerous challenges that peanut farmers have faced from production to post-harvest, the crop is still among the major oilseed cash crops in some African producing economies, such as Nigeria, Sudan, Tanzania and Cameroon. Similarly, in 2014, Nigeria and Sudan were ranked as the third and fifth largest producers of groundnut in quantity. In the same period, China, India (Asia) and the USA (North America) ranked as the first, second and fourth largest producers of the product respectively in the world (Table 1). The statistical evidence also indicates China and India jointly accounted for about 52% of global groundnut output in-shell from 43% in 1961. Also, net production (constant 2004–2006, US$) share of these countries (China and India) in the world also increased to 58% in 2014 from 44.6% in 1961 (Table 1). China performed tremendously, overtook India to become the largest producer in the world.

The volume of peanut output in two African countries also steadily rose from 1.8 million tonnes or accounting for 13% (Nigeria 11% and Sudan 2%) of global output in 1961 to 5.2 million tonnes or accounting for 11.8% (Nigeria 7.8, and Sudan 4%) of global quantity production in 2014. This shows that peanut production and the positions of these countries have changed significantly during the period under study. For instance, Sudan's share sharply increased from about 2% in 1961 to 4% of global production in 2014, overtook some countries from the tenth position in 1961 to the fifth position in 2014 in the world, while Nigeria's share in the world declined (Table 1). Also, the value

of net production (constant 2004–2006, US$) proportion of Nigeria dropped to 6.5% in 2014 from 11.3% in 1961 (Table 1). It implies even though the production has risen in quantity and value, Nigeria's competitiveness has decreased as other countries have performed better than the country.

Similarly, global peanut quantity export by product category show that Peanuts shelled increased from 1.2 million tonnes in 1961 to 1.7 million tonnes in 2013. On the contrary, peanut oil export decreased to 186 thousand tonnes in 2013 from 290 thousand tonnes in 1961 (Table 1). The peanut exports in countries have also sluggishly fluctuated in the same period under study.

Table 1: major global producers of groundnut (tonnes, '000), net production value (constant 2004–2006, US$ millions), share (%) and global ranking, 1961–2014

Economy	1961			1980			2000			2014		
Qty value	Qty	Rank	Share	Qty	Rank	Share	Qty	Rank	Share	Qty	Rank	Share
China	1,154	3	8.2	3,686	2	21.8	14,516	1	41.8	16,550	1	37.7
India	4,994	1	35.3	5,005	1	29.6	6,480	2	18.7	6,557	2	14.9
Nigeria	1,565	2	11.1	471	7	2.8	2,901	3	8.4	3,413	3	7.8
USA	752	4	5.3	1,045	3	6.2	1,481	4	4.3	2,354	4	5.4
Sudan	266	10	1.9	712	5	4.2	947	7	2.7	1,767	5	4.0
World	14,134	—	100	16,891	—	100	34,741	—	100	43,915	—	100
Value	**US$**	**Rank**	**Share**	**US$**	**Rank**	**Share**	**US$**	**Rank**	**Share**	**US$**	**Rank**	**Share**
China	465	3	8.0	1,560	2	22.5	6,344	1	42.6	7,488	1	37.9
India	2,023	1	34.8	2,023	1	29.2	2,727	2	18.3	4,109	2	20.8
Nigeria	659	2	11.3	192	7	2.8	1,254	3	8.4	1,279	3	6.5
USA	316	5	5.4	432	3	6.2	629	4	4.2	809	4	4.1
Sudan	119	9	2.0	317	5	4.6	421	7	2.8	787	5	4.0
World	5,807	—	100	6,936	—	100	14,887	—	100	19,757	—	100

Source: *Compiled from FAOSTAT*. Notes: Rank and share denote global ranking and country proportion

In the 1960s, agriculture accounted for over 50% of total merchandise exports in Nigeria. During this period, the nation was the major exporter of some tropical agricultural products, such as cocoa, palm oil, cotton, palm kernel and groundnuts in the world. Sadly, agricultural commodities such as groundnut, palm oil and soybeans, which were among the leading agrarian exports, have taken a back seat. Nigeria lost its glory in the peanut export competitiveness in the world as the days of groundnut pyramids substantially disappeared. Nigeria was the largest exporter of shelled groundnut and accounted for over 42% share of global exports in quantity for the between 1961 and 1970. Sadly, by 2008, the country took a back seat and lost completely out of global competition as countries, such as India (1), USA (2), Argentina (3), Netherlands (4) China (5) have taken over as the largest exporters of the crop in the world in 2013.

Nigeria's global export share (shelled) in 2013 was less than 1% and recorded as the twenty-ninth largest exporter of peanut in 2013 from being the biggest exporter with over 42% of the global share in 1961 (Table 1). Similarly, the country's share in Africa and West African groundnut export also shrank from 44% and 51% in 1961 to merely 0.8% and 3.3% respectively in 2013. The underperformance of peanut export in Nigeria is also shown in processed forms, oil and cake. For instance, Nigeria was the second largest exporter of groundnut oil, with 46 thousand tonnes in 1961, but became the ninth largest exporter, with only about 4 thousand tonnes in 2013. Similarly, the country's peanut export share in Africa and West Africa also shrank from 22% and 25% in 1961 to merely 13% and 16% respectively in 2013 (Table 1). It implies that export has been neglected as compared with production.

Even though there is a market access in peanut products (Table 3), albeit only in its primary form, export has drastically decreased over the years. Average growth rate be-

tween 2014 and 2015 was –86%. The Netherlands, Niger, UK and Benin are the leading peanut (1202 Groundnuts, whether or not shelled or broken) importing countries from Nigeria. A critical look at the export destination shows that Nigeria's peanut export is highly volatile as it has been mainly concentrated in only two countries, the Netherlands (accounted for about 63%) and Niger (accounted for about 21%). Arguably, the vulnerability of Nigeria to shocks within destination partners has been intensified. There is a need for export market diversification for more earnings to be ensured. Also, peanut export has not been in proportion to production.

Table 2: Leading peanut exporters (qty thousands, rank and share), 1961–2013

	1961			1970			1998			2013		
	Qty	Rank	Share	Qty	Rank	Share	Qty	Rank	Share	Qty	Rank	Share
Peanuts, shelled												
India	10.3	11	0.9	25.8	8	2.8	51.9	6	5.1	541.3	1	32.4
USA	19.2	9	1.6	50.4	7	5.4	155.5	2	15.3	318.0	2	19.0
Argentina	0	0	0	0	0	0	300.1	1	29.6	189.0	3	11.3
Netherlands	2.0	19	0.2	6.9	13	0.7	70.8	5	7.0	137.5	4	8.2
China	1.8	20	0.1	12.6	11	1.4	153.3	3	15.1	99.4	5	5.9
Nigeria	502.0	1	41.6	291.2	1	31.4	5.1	15	0.5	1.2	29	0.1
USA	19.2	9	1.6	50.4	7	5.4	155.5	2	15.3	318.0	2	19.0
World	1,206	—	100	927	—	100	1,014	—	100	1,671	—	100
Africa	1,152	—	95.5	733.9	—	79.2	132.7	—	13.1	142.7	—	8.5
Western Africa	981	—	81.3	562.2	—	61	47	—	4.6	36.4	—	2.2
Peanuts, oil												
Brazil	0	0	0.0	31.9	4	7	6.3	11	2.2	63.3	1	33.9
Argentina	30.8	3	10.6	42.6	3	10	79.5	1	27.1	40.8	2	21.9
Nicaragua	0	—	0.0	0.0	0	0	2.5	—	0.9	16.4	3	8.8
Senegal	125.8	1	43.4	146.1	1	34	49.9	2	17.0	16.4	4	8.8
Belgium	—	—	0.0	0.0	0	0	—	—	0.0	12.0	5	6.4
Nigeria	46.0	2	15.8	90.3	2	21	8.0	9	2.7	3.7	10	2.0
Western Africa	183.2	—	63.2	265.1	—	62	68.0	—	23.2	20.4	—	11.0
Africa	207.8	—	71.6	287.3	—	67	114.3	—	39.0	23.4	—	12.6
World	**290.1**	**—**	**100**	**429.8**	**—**	**100**	**292.9**	**—**	**100**	**186.3**	**—**	**100**
Peanuts, cake												
Nigeria	75.9	6	6	162.1	4	10	1.6	13	0.3	0.004	—	—

Source: Compiled from FAOSTAT

Table 3: Nigeria: Top importers of groundnuts (1202), whether or not shelled or broken in 2015

	Exports 2015 ($ '000)	Trade bal. 2015 ($ '000)	Share in exports (%)	Qty export 2015	Unit value (USD/unit)	Growth in exports 2014–2015 (%)	Average tariff (%)
Total	48	21	100	109	440	–86	
Netherlands	30	30	62.5	17	1,765	–72	0
Niger	10	10	20.8	81	123	–38	0
UK	3	3	6.3	4	750	—	0
Benin	2	2	4.2	5	400	—	0
Austria	1	1	2.1	0	—	—	0
Belgium	1	1	2.1	1	1,000	—	0
Sweden	1	1	2.1	0	—	—	0

Source: Compiled from ITC

Price volatility characterises most agricultural commodity markets. As shown Figure 3, the consistent price fluctuations of ground oil in the global market might have had adverse effects on export and earnings in Nigeria. Nigeria as among the countries with the lowest groundnut farm-gate prices in the world. Arguably, farm gate prices are often observed to decrease quickly when the world prices drop but rise sluggishly when world prices increase. It implies that smallholder peanut farmers may have not corresponding-

ly benefited from the world prices rise, and in turn, a disincentive to farm expansion in Nigeria.
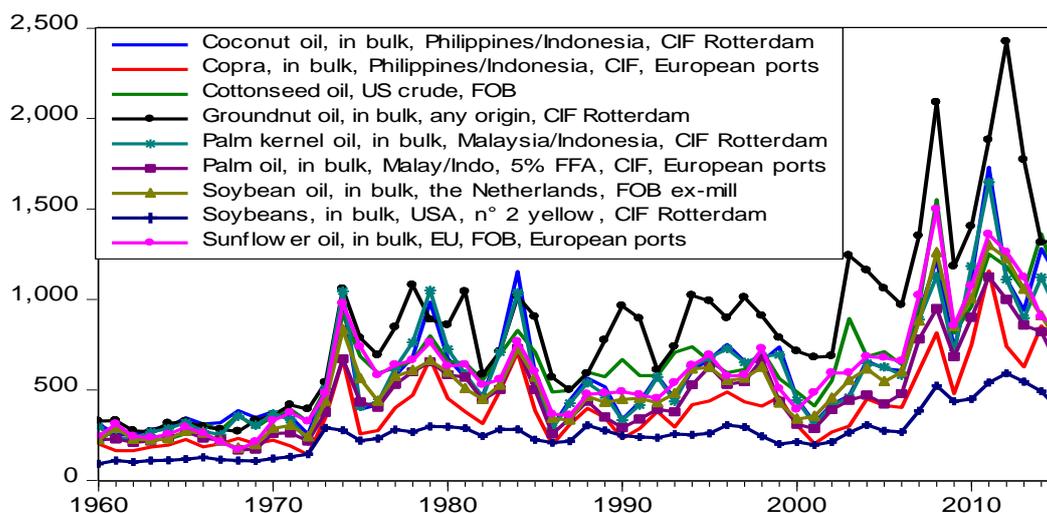

Figure 3: Tropical agricultural prices in the global markets, 1960–2015
Source: Compiled from FAOSTAT

Given that time series data is subject to spurious regression outcomes, the paper carried out Augmented Dickey-Fuller (ADF) unit root tests to address the issue. Table 4 presents ADF test statistics. Apart from export and fertiliser which are stationary at levels, all the variables have become stationary after first difference. As stated above, both Ordinary Least Squares (OLS) regression is run after unit root tests. Similarly, diagnostic checklist tests for the OLS regression was performed, and all the traditional assumptions were satisfied (Table 5).

Table 4: ADF unit root test for stationarity

Variable	Levels	t. statistics	Variable	Levels	t. statistics
QGP	Level	−1.169	DCG	Level	−0.525
	First difference	−8.640***		First difference	−6.436***
AH	Level	−0.788	PP	Level	−1.200
	First difference	−7.131***		First difference	−7.509***
YIELD	Level	−2.726*	GEX	Level	−5.073***
	First difference	−8.138***		First difference	−8.639***
PESTI	Level	−1.717	GWP	Level	−0.748
	First difference	−4.002***		First difference	−6.301***
FER	Level	−2.969**	MOPEN	Level	−2.050
	First difference	−8.505***		First difference	−6.782***

Note: The asterisks (*, **, ***) denote stationarity at 10%, 5%, and 1% respectively

The OLS regression result is presented in Table 6. The results indicate that all the explanatory variables in the model jointly influence groundnut production in Nigeria. The results also show a positive connection between area groundnut harvested (AH) and annual production in Nigeria. This signifies that all things being equal, an increase in the area peanut harvested will bring a corresponding increase in total output in the country. The result is in line with the works by Alabi et al. (2013); Ani, Umeh and Weye (2013) who also find an ample positive relationship between farm size and peanut production in Nigeria. In Nigeria, just as in Sudan, Tanzania and Cameroon, peanut farming is predominantly done by smallholder farmers. Arguably, most of these farmers do not

have the means (i.e. finance and technology) to expand their farms to enjoy economies of scale as have been witnessed in industrialised economies, such as the USA, China and India.

The OLS results further suggest that yield per hectare (YIELD) can increase the overall annual groundnut production in Nigeria (Table 6). The result is in line with the works by Awoke (2003); Verter and Bečvářová (2015) who also find a positive relationship between yield per hectare and crop output in Nigeria. The findings also show that lagged fertiliser application (FER) may well contribute to the overall increase in the total groundnut output in Nigeria (Table 6). Given that soil fertility has been declining in recent decades, the application of fertiliser in the farms may improve yield and the overall annual quantity peanut production in the country. The result is in line with the works by Awoke (2003); Ammani, Alamu and Kudi (2010); Ani, Umeh and Weye (2013); Verter and Bečvářová (2015) who also find a positive connection between fertiliser consumption and crop production in Nigeria.

Table 5: Diagnostic test for OLS regression

Test	P. value
Ramsey's RESET (squares and cubes)	0.672
Heteroskedasticity Test: White	0.094
Heteroskedasticity Test: Breusch-Pagan Godfrey	0.500
Heteroskedasticity Test: ARCH	0.237
LM test for autocorrelation up to order 1	0.967
Autocorrelation up to order 1– Ljung-Box Q'	0.964
Test for normality of residual	0.093
Non-linearity test (squares)	0.188

The OLS results further show that domestic groundnut consumption (DCG) has a positive impact on production in Nigeria (Table 6). Arguably, domestic consumption is an indicator of demand for the product in the country. This to some extent would stimulate farmers to increase the plantation to supply the product in the market for additional earnings. It is also of great importance to emphasise that, peanut output is substantially consumed at home either in raw form or after processed as oil, cake or in any form.

The OLS results also show a positive connection between the farm gate price (PP) and the volume of peanut production in Nigeria. This implies that an increase in the producer price may well stimulate farmers to increase productivity in the country. Figure 5 shows Nigeria as among the least countries with farm gate prices. There is a need for an increase in producer price since the government has hardly given groundnut farmers support or subsidies. In Nigeria, where farmers hardly have access to finance, and rarely get support from the government, producer price is critical to farmers as they plough back a substantial part of the earnings into their farms annually.

Table 6: Determinants of groundnut production in Nigeria, 1981–2014

Variables	Coefficient	t. statistics	VIF
Constant	−89.40 (19.70)	−4.694***	—
AH	1.397 (0.863)	16.180***	1.537
YIELD	170.635 (16.83)	10.140***	1.561
PESTI	0.425 (0.260)	1.637	1.157
FER_1	0.557 (0.161)	3.461***	1.301
DCG	1401 (165.512)	8.467***	1.050
PP	10.924 (1.880)	5.812***	1.472
GEX_1	56.889 (25.823)	2.183**	1.255
GWP	−307.706 (94.089)	−3.270***	1.393

Variables	Coefficient	t. statistics	VIF
MOPEN	3669.74 (1746.64)	2.101**	1.297
R-squared	0.91	Adjusted R²	0.89
F(9, 24)	81.09***	Durbin-Watson	1.96

Note: ** and *** denote statistical significance at 5% and 1% levels respectively. Figures in Parentheses are the standard errors

The results further suggest that the lagged quantity of groundnut export (GEX) has a positive influence on peanut production in Nigeria (Table 6). This implies that the more peanut exported, the more farmers will be encouraged to produce the product. Surprisingly, even though there is zero tariff in peanut importing countries (Table 3), annual export has drastically declined. The underperformance of Nigeria in the global market is partly attributed to the neglect of the country's government in agriculture since the discovery of crude oil in the 1960s. Thus the country has lost its global competitiveness in peanut products, just as in many agrarian commodities. Partly due to the neglect of the product in the world market, the only minimal proportion of the product has been exported in recent years. As a consequence, Nigeria has lost its export competitiveness in all categories of peanut products. Also, Nigerian exporters hardly get export support in the form of product marketing in the global markets or export credits.

On the contrary, the result shows an inverse relationship between the world price of ground oil (GWP) and production in the country. Even though peanut is an important cash crop for producers and foreign earnings for exporters in Nigeria, the fluctuation of peanut oil in the world market could discourage farmers and exporters from more production and export. As shown Figure 3, the consistent price volatility of ground oil in the global market might have had adverse effects on export and earnings in Nigeria. Because world price is notoriously volatile, its create bottlenecks for producers and exporters needing to take proactive investment decisions. Arguably, the extreme world price volatility leads to insecurity for all the exporters involved, and thus the reduction of farm gate prices.

Finally, the results in Table 6 further show that merchandise trade openness (MOPEN) has a positive relationship with peanut production in Nigeria. Holding other factors constant, an increase in merchandise trade openness proxied for trade liberalisation; it may spur groundnut farmers to increase production of the crop. Trade openness partly shows the size of the Nigerian economy in the integration of the country into the global economy. The result agrees with the work by Akanni, Adeokun and Akintola (2004) examine the impact of free trade on the key agrarian products: cocoa, palm kernel and groundnut oil in Nigeria. They confirm that free trade has a positive influence on these export products. Although agricultural commodities from developing countries, such as Nigeria face trade restrictions, such as tariff escalation and quotas in the importing advanced economies, they have been experiencing zero or lower tax regimes in some tropical agricultural products, albeit only in unprocessed forms. For instance, in 2016, there was zero tax on raw peanut product (shell), crude ground oil attracts 6.4% and 10% tariffs in the EU and Chinese markets (ITC, 2017a).

By and large, given that Nigeria is still the third largest producer of groundnut regarding output and area harvested, and has a massive workforce, the country's prospects to increase the peanut production and export is glaring despite the daunting challenges farmers and traders have been facing in the country.

4. Conclusions

This study is an attempt to assess the constraints, prospects and market competitiveness of groundnut products in Nigeria. The crop as an industrial product, widely cultivated not only by smallholder farmers within the tropical and warm temperate areas in Africa but also large-scale farmers in America and Asia. Peanut farmers in Nigeria faced with limited farm inputs, rely on natural rainfall with either recurrent drought or excess rains. In the era of groundnut pyramid (in the 1940s and 60s), peanut was the leading export product in Nigeria. During that period, the product was primarily exported to the colonial master, the UK. Also, the country was the leading exporter of product in the world in the 1960s (accounted for over 30% share of global exports). However, Nigeria moved from being the largest to the third largest producer in the world. The nation also lost her glory as it is no longer among the major global exporters.

Using the OLS approach, the results show that farm size, yields, producer price, exports, fertiliser, consumption and openness have positive effects on peanut production in Nigeria. On the contrary, the result shows an inverse relationship between world price of peanut oil and production in the country. Also, Nigeria's peanut export is highly volatile, as it has been mainly concentrated in few countries. There is a need for export promotion and market diversification for competitiveness and earnings to be accelerated and sustained in the country.

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Determinants of electronic data interchange adoption

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Abstract

One of the objectives of the European Commission is to introduce mandatory electronic invoicing in the case of all public procurement by 2020. Implementation of electronic data interchange (EDI) is thus more desirable and will be one of the major determinants of business success of a company. Despite the current pressure of the public sphere and all the benefits that the adoption of EDI provides, the expansion of this technology is still a minority in the Czech Republic. The aim of this paper is to identify the specifics of EDI adoption, quantify their significance, mutual conditionality and propose a new general model of EDI adoption in businesses. The conclusions of this document are based on the primary data collected through a questionnaire survey in 2015. There were the key factors influencing the likelihood of EDI adoption and their interconnectedness identified. This model reflects the main determinants of the adoption of exchange structured messages for businesses as perceived benefits, external pressure, readiness, attitude of CEO, type of product, participation of trading partners, character of company etc. This study provides a comprehensive survey of motives and barriers of EDI adoption for enterprises, which are aware of the necessary interoperability within the single European market and its highly competitive environment.

Keywords: EDI, electronic data interchange, EDI adoption, model, transmission

JEL Code: M10

1. Introduction

The importance of interoperability (the ability of different systems to work together) for the enterprise is a given, as is the need for standardization and transparency of the flow of information. Accordingly, one of the aims of the European Commission is to reach the objectives of its Europe 2020 strategy in the digital agenda, to introduce mandatory electronic invoicing to public authorities for all public procurement (Edizone, 2014).

Implementing the electronic exchange of data is thus more and more desirable, and destined to be an essential determinant of business success, even for medium-sized and small businesses. The adoption of electronic data interchange (EDI) is now an option

even without any need of high initial investment, since EDI can be provided as a flat-rate fee service. This overcomes one of the main obstacles to the massive expansion of the technology, which used to be its high and unavoidable cost of initial technical investment. Despite this, and the many benefits that companies have experienced using the technology, EDI in the Czech Republic is not yet part of the mainstream.

Electronic Data Interchange enables swifter and better communication between trading partners, reducing staff costs and errors in the exchange of business documents, forging stronger links between business partners, making the company more flexible and bringing many other benefits. Once the EDI system is adopted and implemented it is very easy to use. Goksoy et al. note that after they brought in EDI, business recorded a rise in customer satisfaction, while the performance of the entire supply chain went up significantly (Goksoy, Ozalp and Gulnur, 2012). A growing number of small businesses are becoming aware of the transparency, speed and strategic advantages that EDI brings for their future (Reeves and Deimler, 2011). It could however be surmised that there is still an overall lack of awareness among businesses about the wider-used EDI systems, which leads to the following shortcomings: (1) the unavailability of information about real-world business process management, (2) redundancy in the business documents transferred, and (3) a lack of support for the systematic analysis of company performance and decision making. (Engel et al., 2011).

What then are the determining factors for EDI adoption itself? From studies to date, these seem to be primarily the cost of introduction, competitive advantage, EDI compatibility with the existing system (O'Callagan et at., 1992), business partner influence (Neo et al., 1994), competitive pressure (Premkumar and Ramamurthy, 1995), EDI know-how, the company's IT savviness, market standing (Iancovou, 1995), perceived benefits (Chwelos et al., 2001), etc.

Barriers to the adoption of EDI can be, e.g.: resistance to change among financial management, obsolete software that requires modification, as well as the presumption that Electronic Data Interchange is not simple and cost effective, and low inducement pressure by public administration (Salmony and Harald, 2010).

There are a number of international studies focused on the adoption of EDI, yet very few of them reflect on the prevailing conditions for the adoption of Electronic Data Interchange. Thanks to the burgeoning developments in digital technologies these have changed rapidly over the last decade, and EDI is now accessible to a wide range of companies. Furthermore, each of the studies looks at the subject matter from a certain perspective, which does not help one gather a comprehensive set of conclusions as to the factors determining the adoption of EDI. We must also take into account, when creating an adoption model, the specifics of the individual implementation venues, since most of the existing studies were carried out on other continents (the USA, Japan, Nigeria, etc.), where a different business mind-set may well play its part, as well as the overall conditions for communications implementation. In the Czech Republic, this issue is still not sufficiently researched, academically. Most Czech authors tend to cover the topic in technological terms and the specifics that affect the relevant bodies' decisions on EDI adoption have not yet been the focus of study. This paper is therefore primarily aimed toward identifying the main factors that affect the decision to adopt exchanging business documents using structured messages per the EDI standard and to create an adoption process model. It would be the first stage of mapping the current situation as regards Electronic Data Interchange among Czech businesses.

2. Literature review

For mapping the EDI adoption status and comprehensively surveying to form a unifying overview of the EDI adoption influencing aspects, there is a foundation of several international studies; while each of them focuses only on some particular theoretical perspective as to defining the determinant factors that increase or reduce the likelihood of EDI adoption, these form the theoretical and empirical basis for investigating the circumstances of Czech companies.

The approaches thus far to the issue of EDI adoption can be divided up into several main currents. One of the basic approaches toward the adoption of new technology is founded on the theory of diffusion of innovation (DOI) (Tornatzky and Klein, 1982; Rogers, 1995), this study stream focuses mainly on the characteristics of specific technologies and their readiness for innovation (O'Callaghan et al., 1992; Premkumar, 1994; Teo et al., 1995; Kaefer and Bendoly, 2000; Shahwan, 2013), so this can be called a 'technological' approach. However, the adoption of EDI is almost without exception a decision made in the particular circumstances of the organization, and one cannot take into account only the technological perspective issues. This is one of the reasons why this aspect has turned into a directional stream for further studies, with an 'organizational' approach. These studies focus specifically on the organization profile (Thong, 1995; Gopalakrishnan and Damanpour, 1997). Another major stream of theory re the adoption of Electronic Data Interchange is the viewpoint taken by some authors (Saunders and Clark, 1992; Bouchard, 1993; Ramamurthy, 1995) which takes into account the fact that very often the adoption is affected by pressure from a business partner, which we can call the 'reactive' direction, or approach. The first study (Iacovou et al., 1995) to have attempted to introduce a generic adoption framework (Figure 1) notes that EDI adoption is dependent on three main determinants, namely the expected benefit (technical), organizational readiness (organizational) and contextual pressure (reactive).
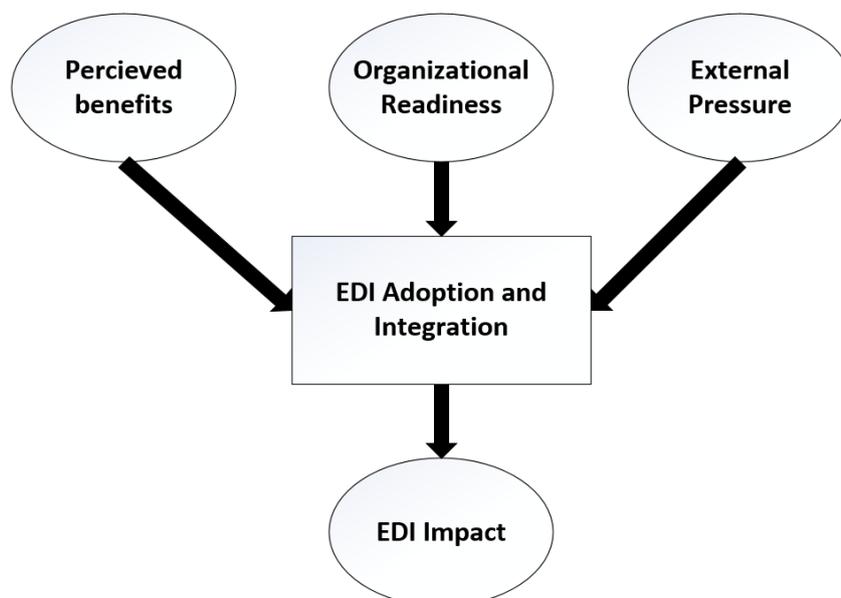
Figure 1: Model of EDI Adoption (Source: Iacovou et al., 1995)

This model was followed up with further studies that expanded on it over time (Kuan and Chau, 2001; Chwelos et al., 2001), going deeper into the detailed structure of the individual aggregate factors, quantifying the impact of the respective variables and empirically testing the applicability of the model under different starting conditions (Musawa and Wahab, 2012). Furthermore, a significant source of information was the meta-analysis comprehensively devoted to the topic of Electronic Data Interchange. The author of the analysis covered the greater part of the factors examined in this study and also their impact on EDI adoption (Figure 2). Also mentioned is the need to extend the knowledge about the introduction of EDI among future managers; the author considers that due to the small body of reference literature in this field there is a lack of knowledge of the benefits of introducing EDI (Narayanan, Marucheck and Handfield, 2009).
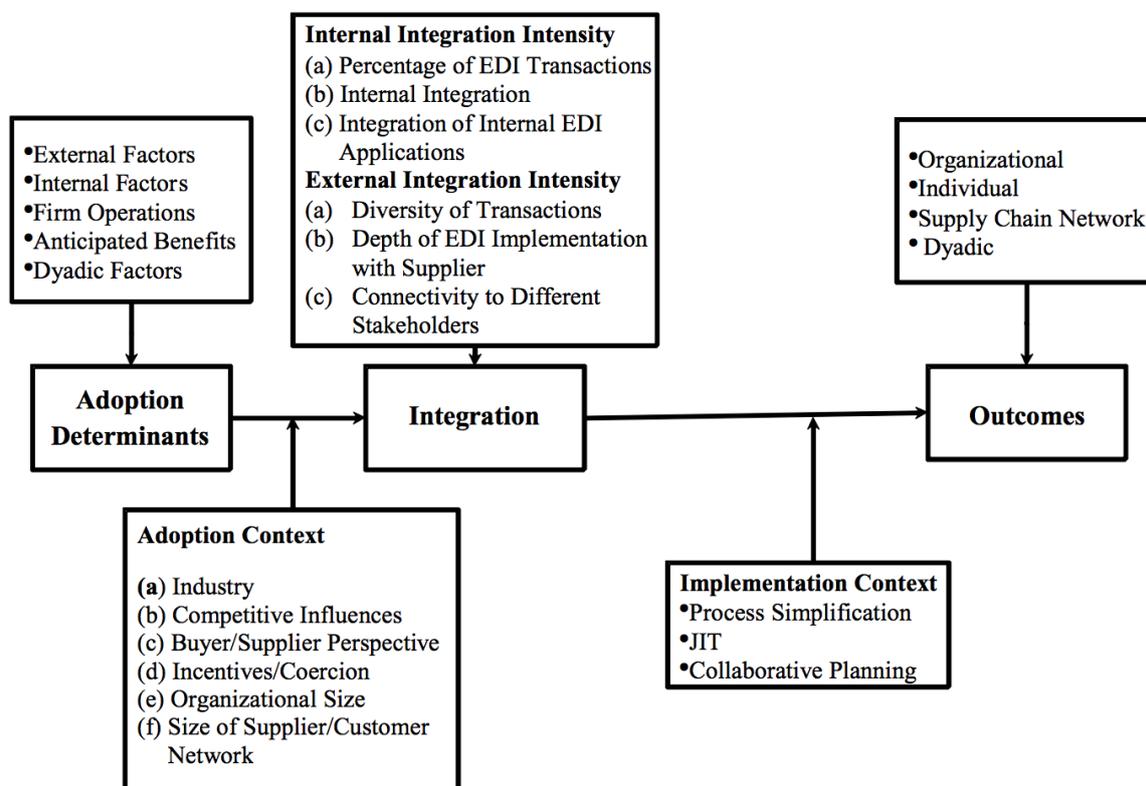
Figure 2: Expanded conceptual model (Source: Narayanan, Marucheck and Handfield, 2009)

3. Methodology and Data

The primary research was focused on the identification of internal and external factors that influence EDI implementation, with reference to the likelihood of different needs in the different sectors. Based on a study of the literature and scientific studies, appropriate questions were prepared to determine the main components entering into the adoption process that we need to include in a generic model of EDI adoption, whereby respondents rated their significance (perceived importance) on a scale (1-10). The chosen format for this survey was that of an electronic questionnaire, created using the "Umbrela" system (software developed at the Mendel University in Brno) and a link to it was subsequently circulated to businesses via email. Before the questionnaire was sent out, it was pre-tested by way of personal polling in order to finalize it. Data collection then

took place from June to September 2015. The respondents were selected on the basis of quota selection per the business entity classification scheme within the classification of economic activities (CZ-NACE) and the investigation unit was a business, responding via the person responsible for document exchange with trading partners. In all some 6230 business entities were approached, and 290 valid questionnaires collected, being a questionnaire yield rate of 4.7%.

The processing of the acquired data was done using descriptive statistical methods, to determine the absolute and relative frequency of each characteristic feature examined. Being examined were dependencies between qualitative characteristics where independence hypothesis-testing was done using the Chi-square test and, where appropriate, its extent was measured with Cramer's contingency coefficient.

Also used was a multivariate statistical method, specifically factor analysis, which was undertaken as the analysis of the main components and Varimax orthogonal rotation of factors, the appropriateness of which to the acquired data was verified using the Kaiser-Mayer-Olkin (KMO) and the Bartlett tests (Hendl, 2012). Here the KMO coefficient can reach values of 0–1 and can be expressed as the ratio of the sum of the squared correlation coefficients to the sum of the squares of the correlation and partial coefficients. If the KMO comes out at 0.5, it is not appropriate to apply factor analysis to the data, on the other hand, the higher the value, the better the explanatory power. Bartlett's sphericity test is based on testing the null hypothesis that the correlation matrix of the observed variables is of unit size. This means the correlation coefficients between the variables are zero and thus not even the basic prerequisite for the use of factor analysis applies. If this null hypothesis is rejected, we can apply factor analysis (Škaloudová, 2010). The extracted factors also had their values calculated (for each statistical unit) for use in further statistical processing. The value of these new composite indicators was determined using the weighted average, where the chosen weighting of each sub variable was its factor loading.

The study also applied the non-parametric testing of independent variables using the Kruskal-Wallis test for the detection of respondent preference differences, which is a generalization of the Mann-Whitney test for cases where it is necessary to compare the distribution of three and more independent samples (Howell, 2010).

The primary data gleaned were processed in Excel, Statistica12 and IBM SPSS Statistics.

4. Results

The study included all the foregoing EDI adoption perspectives, including additional factors. The survey thus aims to bring a comprehensive view to the subject-matter of study and provide a foundation for creating a unified generic model of EDI adoption in the Czech business context.

To handle the perceived importance of adoption factors rated by the users in the second survey on a scale from 1 to 10, these 44 variables were treated with factor analysis. The applicability of this method was shown by calculating the KMO coefficient and the Bartlett sphericity test (see Table 1). The KMO value is high, approaching 0.9, whilst also the outcome of the Bartlett sphericity test, which is statistically significant at the 1% level, means we can reject the null hypothesis of an absence of correlation between the input variables, indicating that the criteria have been met, and confirming that factor analysis can rightly be applied.

Table 1: Criteria for assessing the suitability of factor analysis

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.859
Bartlett's Test of Sphericity	Approx. Chi-Square	10839.328
	df	946
	Sig.	0.000

Table 2:Factor analysis and variance explained (Extraction Method: Principal Component Analysis)

Factors		Components	Factor loadings	Eigen values	Percent of
Management knowledge of IT	1	Has good IT skills	0.805	3.201	7.3
	2	Is technical innovation-friendly	0.861		
	3	Feels that computers improve employee productivity	0.754		
	4	Has good references about EDI from business partners	0.487		
	5	Is aware of the benefits of new technologies	0.839		
	6	Expects to gain competitive advantage with new technology	0.626		
Industry pressure	7	EDI is required for communication with major trading partners	0.946	6.405	14.6
	8	EDI is required for communication with most business partners	0.931		
	9	EDI is required by the public administration	0.861		
	10	EDI is recommended by major trading partners	0.944		
	11	EDI is recommended by most business partners	0.952		
	12	Important competitors are using or will soon be using EDI	0.951		
	13	Most of the competitors are using or will soon be using EDI	0.938		
Operating benefits	14	Less paperwork	0.744	1.486	3.4
	15	Lower error rates	0.661		
	16	Reduced overhead costs	0.718		
	17	Greater productivity	0.657		
Indirect benefits	18	Increased data security	0.525	10.502	23.9
	19	Inventory reduction	0.583		
	20	Faster ordering process	0.659		
	21	Faster communication with business partners	0.637		
	22	Improved company image	0.856		
	23	New competitive advantage	0.896		
	24	Improved customer service	0.848		
	25	Improved business partner relationships	0.889		
	26	Better workflow	0.700		
	27	EDI as an eco-friendly technology	0.469		
Competitive environment	28	Easy to switch to competitors with similar products	0.842	1.977	4.5
	29	Intense rivalry between competitors in the field	0.793		
	30	Many products on the market that perform the same function	0.696		
Company awareness	31	The company needs access to reliable, relevant information	0.746	1.111	2.5
	32	It is crucial for the company to access information quickly	0.827		
	33	It is crucial for the company to respond quickly to market trends	0.698		
Business dependence	34	The company largely relies on one principal contractor	0.704	1.196	2.7
	35	The company largely relies on one main customer	0.765		
Current IT systém	36	Laboriousness	0.925	2.413	5.5
	37	Speed	0.942		
	38	Error-proneness	0.860		
Anticipated cost	39	Cost of making the IS ready for EDI	0.898	2.735	6.2
	40	Cost of staff training	0.860		
	41	EDI running costs or periodic fee payments	0.831		
Provider selection	42	Positive references	0.827	1.851	4.2
	43	Expertise in supporting EDI software	0.884		
	44	IT support provided to a high standard	0.859		

Based on the Cattel eigenvalue graph we determined the number of factors, which was set at ten new artificial variables, also corresponding to the Kaiser criterion, where the number exceeds 1 and accounts for 75% of the response variance (Table 2).

The extracted variables are thus the indirect benefits (1), industry pressure (2), management knowledge of IT (3), anticipated costs (4), satisfaction with the current system (5), the competitive environment (6), provider profile (7), operational benefits (8), degree of business dependence (9) and the company's awareness (10).

Table 2 also lists the respective input variables, their factor loading, as well as listing the respective identifier values of the newly extracted factors and the variability percentage each factor accounts for. Furthermore, the values of these factors have been calculated (for each statistical unit) for further statistical processing. The value of these new composite indicators was determined using the weighted average, where the chosen weighting of each sub-variable was its factor loading. (Table 2).

Additionally, the factors were treated under the Kruskal-Wallis method, to examine the differences in preferences among the respondents. At the 5% significance level we rejected the null hypothesis of no difference in responses between groups of respondents, for example, in the following cases. Each group of respondents who did or did not know about EDI responded differently to questions relating to indirect benefits ($p = 0.0162$), operational benefits ($p = 0.0350$), management knowledge of IT ($p = 0.0001$). There was also a noticeable disparity in how they rated the company's awareness ($p = 0.0002$), the competitive environment ($p = 0.0001$) or the cost of introducing EDI ($p = 0.0172$), between the groups of respondents with differently perceived EDI benefits.

Businesses identified the most important factors, which we can call motivators, as being in particular: improved labour productivity, reduced error rates, access to reliable, relevant and accurate information, reduced overhead costs, and better workflow. Conversely, rated as the main drawbacks were: low penetration among business partners, the cost of making the existing information system ready for the introduction of EDI, periodic fee payments, costs of training, time-consuming introduction, and the need to learn new skills.

Surprising was the finding that although in the international literature the peer group pressure factor is very highly rated, Czech companies as yet feel hardly any pressure from trading partners, nor on the part of the public administration. This would suggest that EDI penetration among Czech companies is still very low, almost 70% of businesses don't know what EDI is, and by contrast, only some 2% of respondents use the service. The prevailing method of communication (47%) between business partners is via email. A large portion of respondents (58%) are very satisfied with their current way of ordering goods. Other findings include the fact that 98% of businesses print off received invoices for further processing. The automated means of electronic documentary exchange is deemed beneficial for the company by only 41% of respondents.

This was followed up by testing the perceived benefits of EDI via several defined hypotheses about the independence of the variables under scrutiny:

H01: There is no dependency between the perceived benefit of EDI and the evaluation of the importance of the indirect benefit factors.

The null hypothesis can, on the basis of testing using the Chi-square test, be rejected at the 1% significance level ($p = 0.0001$, and $V = 0.2470$). We can thus accept the alternative hypothesis that there is indeed a relationship between the two variables, since this appears as a statistically significant dependency. If we consider the strength of the dependency, on the basis of Cramer's coefficient we are inclined toward a less than stringent dependency.

H02: There is no dependency between the perceived benefit of EDI and the evaluation of Management knowledge of IT.

Once again, the null hypothesis can be rejected here on the basis of the p-value at the 1% significance level ($p = 0.0069$ & $V = 0.2494$) although the dependency is rather a weak one.

H03: There is no dependency between the perceived benefit of EDI and the need for company awareness.

Even for this null hypothesis, after performing the Chi-square test, we can reject the notion of independence of the variables and note their weak to moderately strong relationship ($p = 0.0019$ & $V = 0.2730$).

From the pivot-table reports we can conclude that if the indirect benefits of EDI are on the up (better workflow, better company image, reducing inventory, greater data security), there is an associated greater Management knowledge of IT and the need for company awareness and a drop in the subjectively perceived costs of introducing EDI, as well as a rise in the perceived benefits of introducing EDI to the business.

Based on these findings we drew up the following overview of the key factors affecting the adoption of EDI, i.e. the determining factors (Figure 3), where we can also observe the tested dependencies of the reference variables; identified on the basis of testing the null hypotheses about the independence of the reference characteristics with the Chi-square test at the 5% significance level, shown on the chart by the coloured arrows.
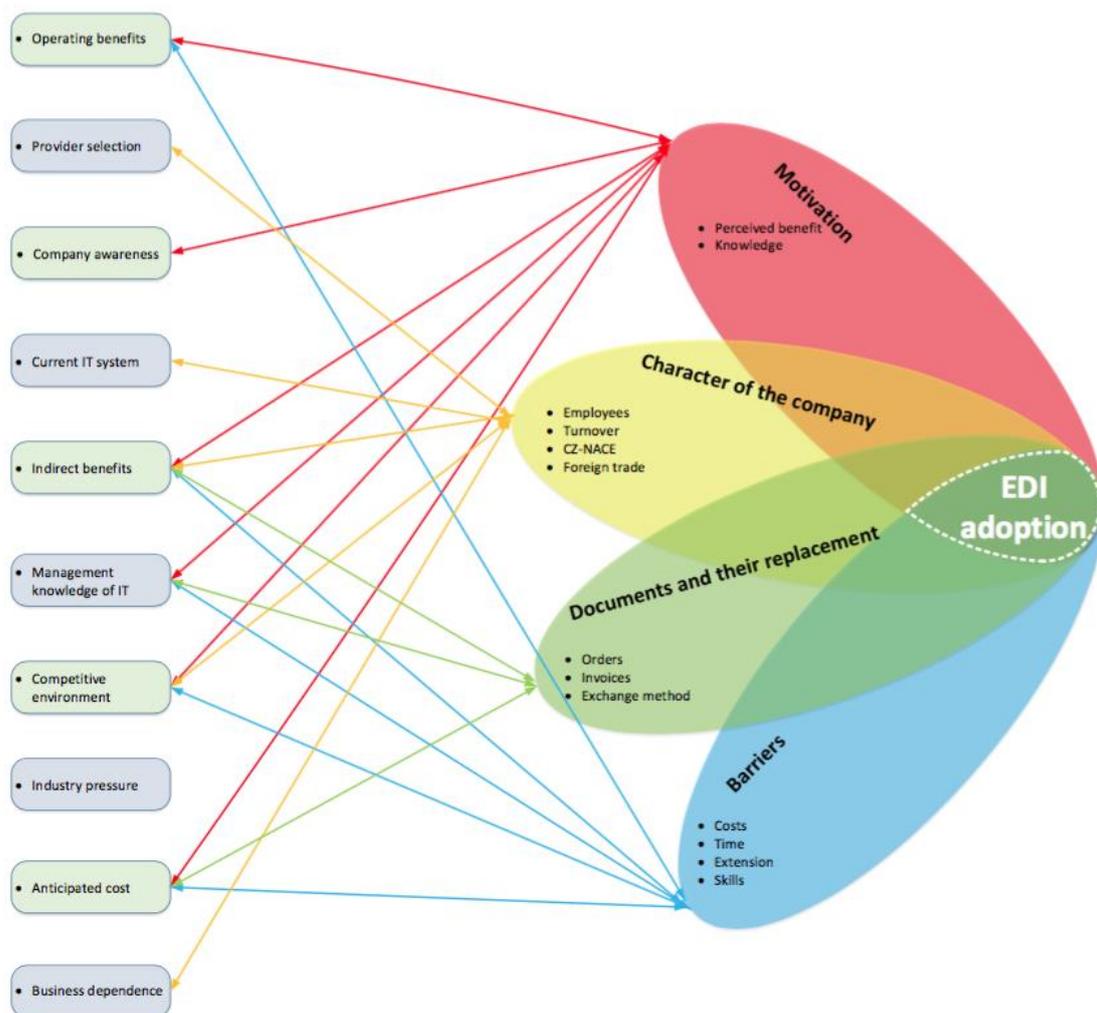
Figure 3 : Determinants of EDI adoption

5. Discussion and Conclusions

On the basis of the investigation conducted we can surmise that the awareness among Czech companies about the opportunities brought by EDI is very low, with over 2/3 of businesses never having come across the EDI concept at all. The data collected shows that a very important deciding factor about adopting EDI is knowledge thereof. With growing knowledge about EDI comes a growing perception among the companies of its benefits, and therefore their willingness to adopt. There is thus an open opportunity to grow the necessary subject-matter knowledge among company managers. The data obtained also indicates the rather modest coverage by the technology, which is directly related to unusually low pressuring of businesses by trading partners and competitors toward introducing EDI.

Having applied factor analysis and hypothesis-tested for the independence of qualitative characteristics, we can specify several key factors that determine the adoption of EDI, and also the dependencies between them. Yet the methods used only reduce the number of variables down to the newly extracted factors that account for 75% of the response variance, indicating dependencies between the variables, but cannot clearly determine the direction of any dependency or to quantify the dependency. For directionality we can only describe the results of the pivot-table report, where inferences can be made. This makes for a further research opportunity to subject the findings to logistical regression analysis, thereby to quantify the impacts of the respective explanatory variables (key factors) and to determine the direction and extent of influence of the various factors on the likelihood of Czech businesses adopting EDI.

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Analysis of mathematical programming applications in production enterprises

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Abstract

This paper focuses on a current topic of production management and operations research which serves as a tool for small and medium enterprises to cope with pressure put on them by continuously changing market conditions and global economy itself. Paper presents results of research conducted on sample file of Slovak production enterprises. The main aim of this paper is to explore the extent of optimization methods utilization in production practice in Slovakia and to analyze possible relationship between enterprise's size and used optimizing method. Representativeness of the sample file was confirmed by application of Pearson's chi-squared test (χ^2-test) due to criterion of enterprise's size. The results of this research have an implication for business practice and may serve managers in their decision-making process. In managerial practice enterprises have to deal with many different problems concerning their production. The majority of them can be resolved using mathematical programming. Achieved results provide an insight of current applications with stress on types of mathematical programming modifications used in optimization.

Keywords: mathematical programming; process optimization; enterprise size; operation management

JEL Code: C61; M11

1. Introduction

In the 21st century production enterprises face a severe competition which puts that much pressure not only on their quality requirements, but also on their production processes. It is the main aim of every enterprise's production management to ensure the best possible outcome and gain the competitive advantage which enables enterprise to establish a desirable market position. However, it is not a single set of managerial decisions which make it possible. A strive for excellence is a continuous process which does not only involve establishing a good market position, but it also focuses on implementing measures necessary to maintain it. One of the effective ways enterprises

can achieve excellence is through implementing specific measures in order to achieve flexibility and cost minimization throughout their processes. One of the basic tools is mathematical programming.

The theoretical aspects of process optimization are broadly covered at various Universities all around the world and that includes application of various optimizing tools such as mathematical programming. These methods of mathematical programming are extensively taught at the universities; still there is a question if and how such methods are applied in the businesses and more importantly how successful they are. Thus, we consider the closer look at the Slovak reality to be extremely valuable. Another uniqueness of this topic lies in the fact that no such study has been conducted for the last 10 years in Slovakia.

Table 1: Modeling possibilities of mathematical programming modifications in optimization

Type of programming	Characteristics:
Linear programming	– objective function and conditions are linear equations, – $\min c^T x : Ax = b; x \geq 0$
Non-linear programming	– objective function and conditions are non-linear equations, – $\min c^T x^n : Ax^n = b; x \geq 0$
Quadratic programming	– special type of non-linear programming, – objective function and conditions are linear or quadratic equations, – $\min c^T x^n : Ax^n = b; x \geq 0; n \in \langle 0; 2 \rangle$
Integer programming	– objective function and conditions only contain integer numbers, – $\min c^T x^n : Ax^n = b; x \geq 0; x \in Z$
Stochastic programming	– based on the probability theory, – parameters are random variables, – mainly used for modeling optimization problems with a high degree of uncertainty and optimization of multiple objectives
Fuzzy programming	– variables and constants in objective function and conditions are expressed approximately – by intervals, – suitable for optimization problems where it is not possible to quantify precisely the variables and/or their values change frequently

Source: Sákal and Jerz (2003); Thaoi (2010); Mula et al. (2010); Peidro et al. (2010); Banks, 1979; Lodi and Monaci, 2003; Sarker and Newton, 2008.

Application of mathematical programming has recently been the topic of research studies of various authors (Xu et al., 2016; Armutlu, 2008; Tibi and Arman, 2007; Závadský and Hiadlovský, 2014; Gong, 2008; Malhotra et al., 2014; Liao et al., 2016). One of the characteristics of optimizing tasks is the large amount of solutions matching the basic task conditions. The selection of a particular solution as the best to a problem depends on the overall objective that is implied in the statement of the problem. A solution which satisfies both the conditions of the problem and the give objective is considered to be the optimal one (Al-Yakoob and Sherali, 2007; Sodhi and Tang, 2012; Bruglieri et al., 2016; Thaoi, 2010; Závadský and Závadská, 2014; Vlachos et al., 2016;

Das, 2011). The analysis of any given optimizing problem involves the transformation of necessary data into the set of equations (Table 1).

Various authors (Sarker and Newton, 2008; Weber, 2009; Ben-Tal and Nemirovski, 2000; Avis and Umemoto, 2003; Chadha and Chadha, 2007; Floudas and Lin, 2005; Thuan and Luc, 2000; Grover and Malhotra, 2003) evaluated the advantages and disadvantages of the mathematical programming utilization. They all consider the possibility of applying these methods for the long-term production management to be the most significant advantage. Other advantages include the relative accuracy of results achieved through these methods specifically designed to meet the needs of certain enterprises. The use of mathematical programming in production management assumes the creation of the objective function which describes the problem as closely as possible, which enables to model the conditions in production enterprise as realistically as possible. One of the main disadvantages of mathematical programming utilization is the fact that sometimes the objective function may not be the best option to model the processes and the situation may arise when enterprise would have to resort to other methods of the operations research. Despite of this fact, the advantages of mathematical programming utilization in enterprises are far greater and more significant. The application of these methods can help enterprises solve many different problems.

2. Methodology and Data

The main aim of this paper is to explore the extent of optimization methods utilization in production practice in Slovakia and to analyze possible relationship between enterprise's size and used optimizing method. In order to fulfill our goal we use data provided by Slovak production enterprises via survey which was conducted in a period between April 2016 and July 2016.

Our research sample file was created as a representative sample of the base file. This file consists of Slovak enterprises classified by the SK NACE classification as production enterprises. Moreover we took into account other criteria, mainly the size of enterprise. We focused our research on medium-sized and large-sized enterprises, since we assume the higher extent of linear programming applications in these enterprises. The decisive criterion was set according to the European Standard No. 2003/361/EC.

Research was carried out on a file consisting of 1300 Slovak production enterprises. The enterprises were selected randomly and chosen respondents were addressed by email. The questionnaire was fulfilled by 236 Slovak enterprises which represents 18.15 % return. In key enterprises we used method of structured interviews with enterprise's representatives. Overall research sample consists of 248 Slovak enterprises.

Our questionnaire consisted of 16 questions divided into 3 categories. The first set of questions was focused on exploring various aspects of applications of optimizing methods. This section of questionnaire was fulfilled by all enterprises. The second part of questionnaire involved questions designed in order to gain data about linear programming utilization. This section was fulfilled only by enterprises which currently use these methods or have used them sometime in the past. Lastly we also added the socio-economic questions created in order to gain data about respondents. We asked enterprises to provide information about their size (the number of their employees), sector of economy and region where they operate.

Our sample file consists of 38.31 % large-sized enterprises with number of employees over 251. More importantly 61.69 % of enterprises in our sample file have between 51 to 250 employees (Table 2).

Table 2: Structure of sample file based on the size of enterprise

Number of employees	Number of enterprises	Percentage
51–250	153	61.69%
over 251	95	38.31%
Total	248	100.00%

With the use of SPSS Statistics and information about data base set we can verify the representativeness of the sample according to the size of the manufacturing enterprise. Based on data from the Statistical bureau of the Slovak Republic we can characterize the data base set. In 2013 there were 70 370 manufacturing enterprises in Slovakia. The number of medium–sized enterprises (based on number of employees) was 1 641 and 627 were large enterprises. The verification of the representativeness of the sample is based on data for year 2014.

To verify the representativeness of the sample we used chi-square test. We set the null hypothesis which assumes that the sample is representative. The alternative hypothesis is an assumption of non-representativeness of the sample. From the mathematician point of view the hypothesis are formulated as:

$H_0 = F(x) = G(x)$

$H_1 = F(x) \neq G(x)$

Statistics testing in SPSS software is based on following formula (1):

$$K = \sum_{j=1}^{r} \frac{(n_j - m_j)^2}{m_j} \approx X^2_{(r-1)} \tag{1}$$

where K is Pearson statistics,

r is line,

n is overall frequency in the base set,

m is measured frequency.

Consequently we find the critical value of K distribution for $(r-1)$ degrees of freedom and selected level of significance α from tables of critical values of chi square. However chi square tests requires the fulfillment of two conditions:

– no interval should have zero frequency;
– a maximum of 20% confidence intervals should have frequency less than 5 as discussed by Maloney and Byard (2013).

We have performed the test at a significance level of 95 %. If the critical value is lower than value of tested statistics, null hypothesis is rejected and alternative hypothesis H_1 is not rejected. Our calculated chi-square value was 21.171; it means that the null hypothesis cannot be rejected. Our sample is representative.

Furthermore we explored relations between applied enterprise's size and used optimizing method. Correlation coefficient was used to evaluate these relations and to discover significant dependences between factors. Particular coefficients were calculated according to formula 2 (Maloney, Byard, 2013).

$$r = r_{xy} = \frac{\sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n} (x_i - \bar{x})^2} \sqrt{\sum_{i=1}^{n} (y_i - \bar{y})^2}} \tag{2}$$

where:

x_i, y_i – are defined as a value of i-element belonging to dataset $\{x_1, ..., x_n\}$,

$\bar{x} = \dfrac{1}{n}\sum\limits_{i=1}^{n} x_i$ – the sample mean and analogously for $\bar{y}$.

3. Results

In the first part of the questionnaire we have obtained information about optimization of enterprises' processes in general, regardless of the used method. We have found out that 68.55 % of selected production enterprises use optimization methods regularly. Results bas on the size of enterprise are provided in Table 3.

Table 3: Application of optimizing methods structured by the size of enterprises

Application of optimizing methods	Size of enterprise				Total
	Medium-sized enterprises		Large-sized enterprises		
Yes	81	52.94%	89	93.68%	170
No	72	47.06%	6	6.32%	78
Total	153	100.00%	95	100.00%	248

The use of the optimization methods is equally divided among the positive and negative answer in the group of medium–sized enterprises. In the group of large enterprises we can mostly identify positive answers. 93.68% of these enterprises use optimization methods regularly. Only 6 enterprises with more than 251 employees do not use any of the optimization methods (6.32%). These findings indicate that the use of optimization methods in industrial production practice is proportionally dependent on the size of the enterprise.

If the respondent does not use optimization method, we set out to find the reason of this decision. The most frequent answer was that enterprise does not consider the optimization necessary. In many cases it was the fact that enterprises need to strictly uphold their production processes to customer requirements. Any changes including optimization of the production process is not possible in this situation. Another reason was the satisfaction of the enterprise with achieved results and therefore no need to change or optimize anything. Several answers were connected to financial aspect, since many enterprises consider optimization very expensive. This is the fact that we consider as one of the major reasons for non-using optimization methods in enterprises.

If an enterprise applies optimizing methods we further explored various aspects of optimization. Firstly we focused on what types of techniques these enterprises use. Based on our findings we can state that only 2 enterprises (0.8% of all enterprises) use nonlinear programming. This implies that only 1.18% enterprises which regularly optimize their processes choose these methods. 8.82% of enterprises which optimize their processes apply methods of dynamic programming. Network models are used by 21.76% of these enterprises. No respondent uses sequence models. More than half of enterprises which optimize their processes use simulation models. These enterprises compose almost one third of all respondents. Moreover we found out that 41.76% of production enterprises which apply optimizing tools choose linear programming. This group of enterprises represents 28.63% of all production enterprises in sample file.

These results indicate the importance of mathematical programming utilization in practice. Consequently, the relationship between applied enterprise's size and used optimizing method was further explored. Correlation coefficient calculated between these factors proved that there is a significant direct dependence between these enterprise's sized and utilization of optimizing tools (0.487).

4. Discussion and Conclusions

The main aim of this research was to analyse the utilization of explore the extent of optimization methods utilization in production practice in Slovakia and to analyze possible relationship between enterprise's size and used optimizing method. Achieved results provide a current image of Slovak business reality in production industry. There had not been similar studies covering the Slovak reality in the last decade. Previous results do not consider a wide use of computers as support systems for optimization therefore any comparison with our achieved results would not provide significant conclusions. Moreover, the attitude towards optimization had been different. These previous research studies focused on optimization of specific tasks. Our study provides results on optimization in terms of process approach.

Consequently, we consider a closer look at possible mathematical programming applications extremely useful. These provided examples draw an overview of various possible advantages of mathematical application in process optimization. Furthermore, this study provides a foundation for further research into this topic and may provide a source of information for other authors looking for enrichment of discussion concerning methods used to optimize production processes.

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Special cases of damage compensation – liability for damage caused by thing during the provision of medical services

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Abstract

This article discusses special cases of damage compensation according to new Civil Code, specifically liability for damage caused by thing during the provision of medical services. It compares previous Civil Code effective until 31.12.2013, which unduly burden the liability of the person, who did not breach a legal obligation, but to the contrary acted lege artis.

Keywords: Liability, medical services, damage caused by using defective thing, lege artis

JEL Code: K10

1. Introduction

In juridical science problematic of liability belongs to the most complex questions. There are variable forms of liability – moral, politic, legal – under the legal liability we can differentiate for example administrative liability, criminal liability, private liability (civil)... As a general sign of liability is considered obligation to stand harm, in case of event determined by law (e.g. Knapp 1995, pp. 200).

New Civil Code (low n.89/2012 Sb.) which is effective since 1. 1. 2014, changed legal definition of damage compensation. Elemental difference is in used terminology. New Civil Code do not use term "damage", but term "harm" which includes pecuniary as well as non-pecuniary harm.

According to §2894/1 the duty to provide compensation to another for harm shall always involve the duty to provide compensation for harm to assets and liabilities (compensation for damage). The totality of what belongs to a person constitutes his property. Assets and liabilities of a person consist of the totality of his property and debts. The

actual damage and the victim lost (lost profit) is paid. If the actual damage consists in the creation of a debt, the victim has the right to be released from the debt or provided with compensation by the tortfeasor. If the duty to provide compensation to another for non-pecuniary harm has not been expressly stipulated, it affects the tortfeasor only where specifically provided by a statute. A tortfeasor has the duty to pay damage regardless of his fault in cases specifically provided by a statute. Damage is compensated by the restoration to the original state. If this is not reasonably possible, or if is it requested by the victim, damage is payable in money. Non-pecuniary harm is compensated by appropriate satisfaction. Satisfaction must be provided in money unless real and sufficiently effective satisfaction for the harm incurred can provide for satisfaction otherwise. Non-pecuniary harm, not like damage, represents strike into any other sphere as pecuniary sphere of victim, even into the health sphere.

2. Methodology and Data

This paper is based on study and analysis of written sources, using a comparative approach emphasizing special cases of damage compensation. The paper is using descriptively analytical and evaluative method. Main source of the paper is new Civil Code, which is compared with previous Civil Code.

3. Change in conception of civil offence, merit of special liability

On the field of general adjustment new civil code left previous conception of civil offence. According it, liability was determined by any kind of violation of legal obligation. It did not matter, if liability was stipulated by law or by agreement.

New legislation differentiates between three types of basic offences:

1. Breach of good morals

   A tortfeasor who causes harm to a victim by an intentional breach of good morals has the duty to provide compensation for it; however, if the tortfeasor was exercising his right, he has the duty to provide compensation for the damage only if his main purpose was to harm another.

2. Breach of a statute

   A tortfeasor who is at fault for breaching a statutory duty, thereby interfering with an absolute right of the victim, shall provide compensation to the victim for the harm caused. A tortfeasor also becomes obliged to provide compensation if he interferes with another right of the victim by a culpable breach of a statutory duty enacted to protect such a right.

3. Breach of a contractual duty

   If a party breaches a contractual duty, such a party shall provide compensation for the resulting damage to the other party or the person who was evidently intended to benefit from the fulfilment of the stipulated duty.

> A tortfeasor is released from the duty to provide compensation if he proves that he was temporarily or permanently prevented from fulfilling his contractual duty due to an extraordinary, unforeseeable and insurmountable obstacle created independently of his will. However, an obstacle arising from the tortfeasor's personal circumstances or arising when the tortfeasor was in default of performing his contractual duty, or an obstacle which the tortfeasor was contractually required to overcome shall not release him from the duty to provide compensation.

Regarding to the merits of special liability, new legislative is contained in §2920 – §2950. Including:

- Damage caused by a person unable to assess the consequences of his acts
- Damage caused by a person with dangerous qualities
- Damage resulting from operating activities
- Damage caused by a particularly hazardous operation
- Damage to an immovable thing
- Damage caused by the operation of a means of transport
- Damage caused by an animal
- **Damage caused by a thing**
- Damage caused by a product defect
- Damage to a thing taken over
- Damage to a thing left at a particular place
- Damage to a thing brought inside
- Damage caused by information or advice

4. Damage caused by thing during the provision of medical services

Legislation of damage compensation caused by thing is contained in §§2936 – 2938, in case of providing health services it would be § 2936 and §2937/1 of the new Civil Code.

According to §2936 the person who is obliged to provide a performance to someone and, in doing so, uses a defective thing shall provide compensation for the damage caused by the defect of the thing. This also applies in the case of the provision of health care, social, veterinary and other biological services.

If a thing causes damage by itself, the person who should have had supervision over the thing shall pay compensation for the damage; if such a person cannot be otherwise determined, the owner of the thing is conclusively presumed to be such a person. A person who proves not to have neglected due supervision is released from the duty to provide compensation.

New Civil Code significantly amends the existing legislation. Up to now, person, who used thing to fulfil its obligation, bore the obligation to compensate damage, if the harm had its origin in the nature of the thing. According to §421a of Civil Code from 1964 – everybody is responsible even for damage caused by circumstances, which have origin in the nature of the instrument or in other things, which were used in performing this

obligation. Such liability can´t be exempt (paragraph 1). According section 1 liability applies even to providing health, social, veterinary and other biological services (paragraph 2).

This concept, however, at the same time constitutes a disproportionate burden for those who did not breach a legal obligation, and on the contrary proceeded with full professionalism and the principles of their profession /lege artis/.

The following graphs show the development of the number of selected devices per 1 million inhabitants in CZ in the ten years period, since the year 2006 to 2015.
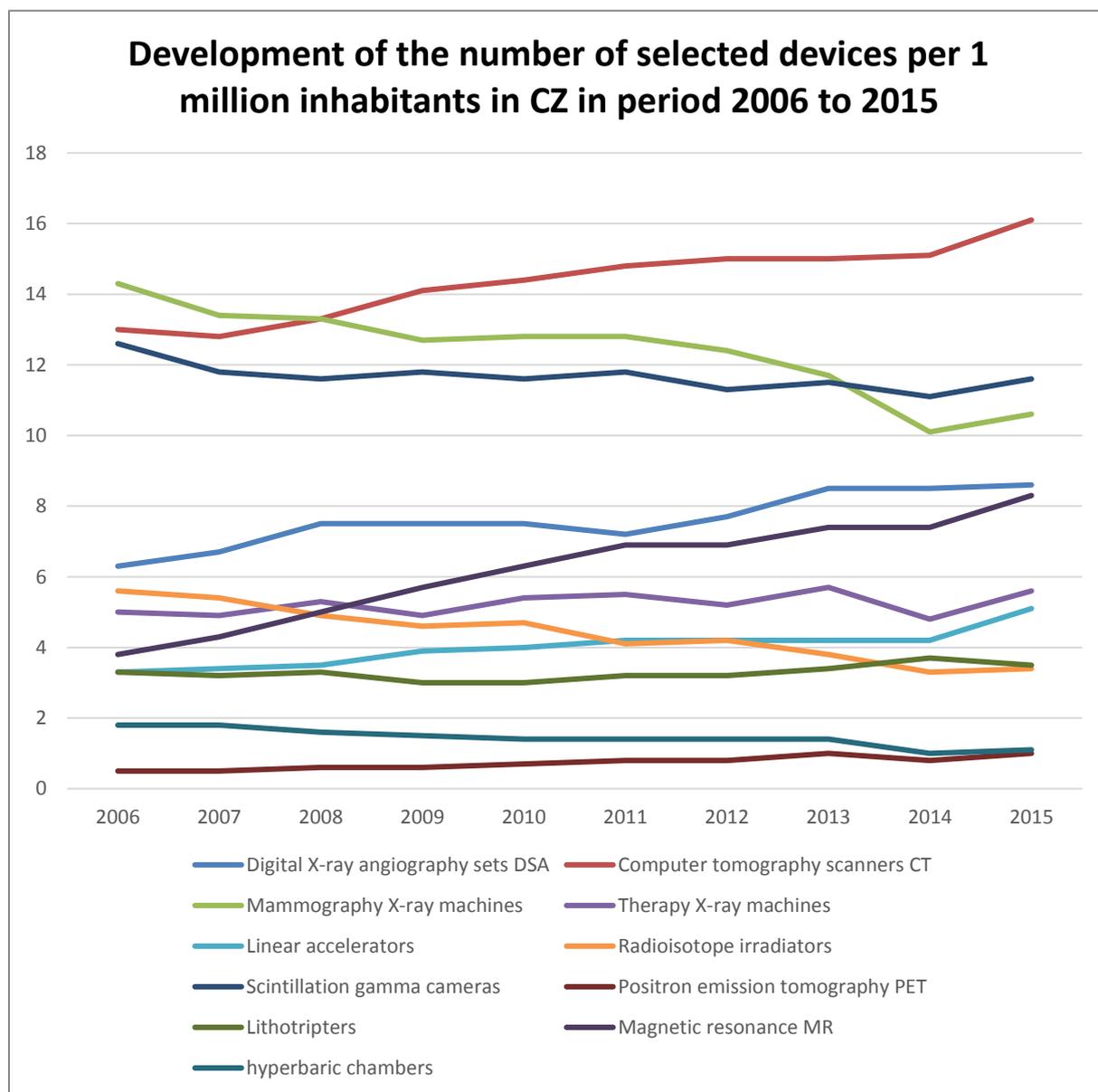
Figure 1: Development of the number of selected devices
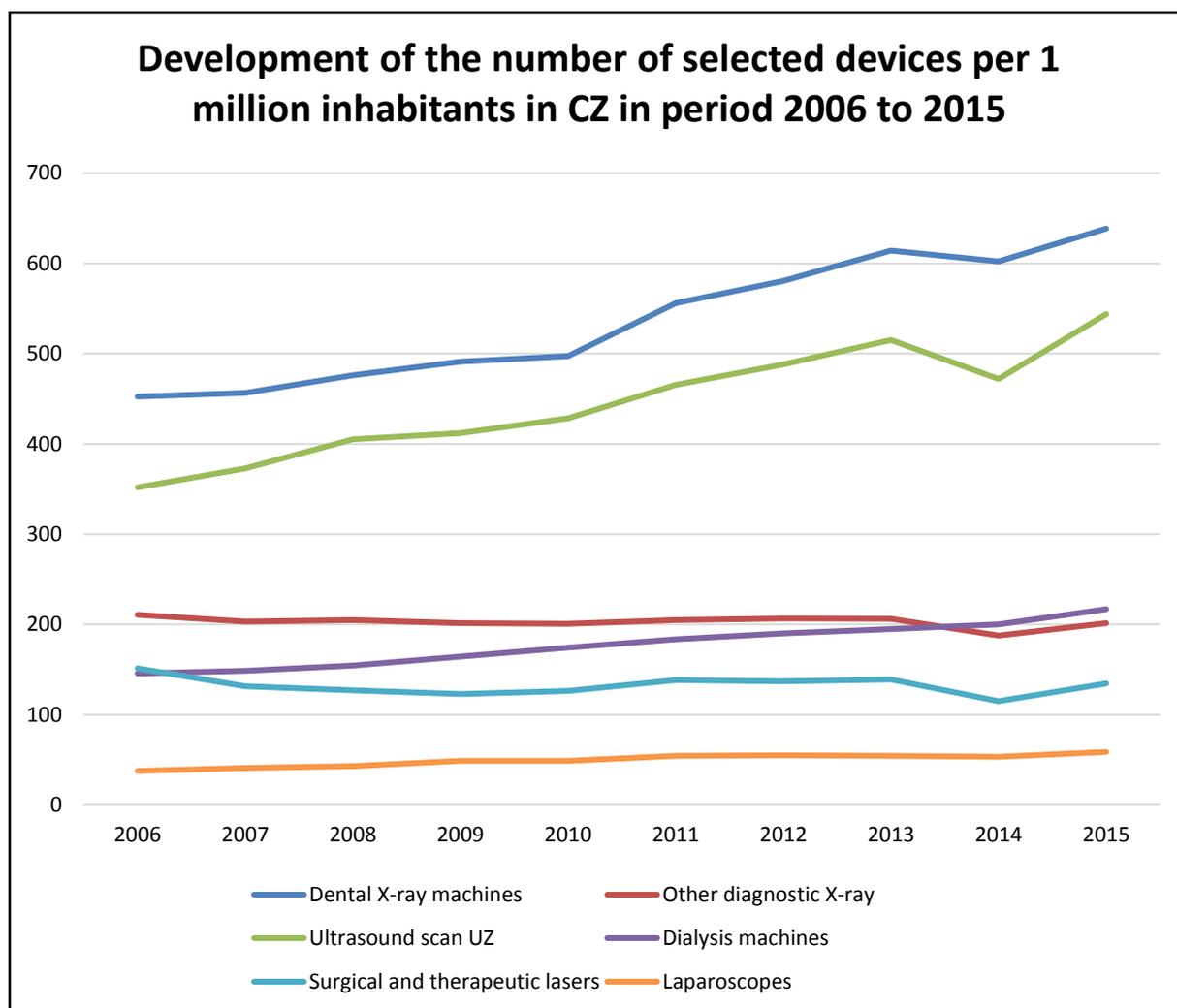
Source: ÚZIS ČR (2016)

Figure 2: Development of the number of selected devices

Source: ÚZIS ČR (2016)

It follows that the number of selected medical equipment during the period is mostly growing, which may be reflected in terms of risk of increasing responsibility in the field.

New definition lege artis – therefore appropriate professional level of health service provision is contained in Law No.372/2011 Sb. on health services, as amended. According to §4, paragraph 5 by appropriate professional level means the provision of health services according to the rules of science and accepted medical practices, while respecting the individuality of the patient, taking into account the specific conditions and objective possibilities.

The new definition allows to follow any recognized procedure that is in accordance with the rules of science, taking into account the individuality of the patient, while assessment accuracy of the medical procedure must make allowances for specific conditions and the objective possibilities during the doctor work (during assessment is necessary to emphasize the specific conditions and objective possibilities).

According to the previous definition, medical procedure had to be on the level of the currently available scientific knowledge. The new definition allows the doctor to choose any recognized procedure. He is not in fact bound by any mandatory standards and if he

chooses any of the recognized procedures, he proceeds in accordance with the law/lege artis (in more detail, Pl.ÚS 1/12).

5. Conclusions

1/ The new Civil Code in section dealing with use of the defective things (tools, instruments, drugs) in the provision of health services does not expressly state that the obligation is imposed regardless of fault – unlike the Civil Code effective till 31.12.2013. Fault is therefore not required, legislation does not specify exoneration, but does not exclude it either.

In case of dispute it will be on damaged person to demonstrate performance obligation, as well as harm, circumstance having origin in damage used thing and causal link between the harm and loss event. Basic principles in respect of damage caused by the thing remain unchanged.

2/ There is a spread of the legislation in cases where the harm "is caused by itself". In this case, damage is covered by person who supposed to oversight over this thing and if such person cannot be identified, owner covers.

3/ If the thing was all right (or was not defective), was used correctly and in accordance with the legislation, provider of health services did not neglect proper supervision and nevertheless damage on health was inflicted (unpredictable allergic reaction to the medicine), then according to the new Civil Code, the provider of health services is not responsible for such damage.

4/ Provider of health services is responsible for damage on health if tools, instruments or drugs are used inconsistently with the legislation and therefore are in contradiction with the requirements for appropriate professional level of medical services. In this case, it would not be a special liability for damage caused by thing, but the liability for the damage caused by the breach of the legal obligations of provider to act at the appropriate professional level.

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Filling the gap between theory and practice by business simulation games

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Abstract

In this study, we present our research related to the business simulation games' role in development of competencies demanded by employers. Based on our recent study of students from the Faculty of Economics, University of South Bohemia, we are able to provide a significant body of evidence how exactly can business simulation games contribute to filling the gap between theory and practice, especially by helping in the development of various competencies. Because these findings clearly show both educational effect of business simulation games and high preference of students to use them as a pedagogy, we think that their use should be much wider and serve as a way to enhance business education in general.

Keywords: business, simulation games, competencies, skills, education quality, pedagogy

JEL Code: A200, C630, I230

1. Introduction

The overall quality of education is being considered as one of the main factors of future successful development of any nation. In that respect, the situation in the Czech Republic is not according to the recent OECD PISA studies very good, especially from the student satisfaction point of view (OECD, 2015), and improving actions are being recommended.

Another issue that is frequently mentioned by media, employers, public as well as students, is a lack of practically oriented and relevant education, i.e. not sufficient development of student skills related to communication, problem-solving, creativity and responsibility. Higher education institutions (HEIs) are often described in this context as "ivory towers" focusing only on theories irrelevant for practice.

Reasons for such perceptions may be related to the lack of capabilities and resources available in HEIs, underfunding or some other deeper structural problems. Nevertheless, HEIs need to be able to provide an evidence that what they do, really has a

significant positive impact on their students and what they teach is both practically relevant as well as theoretically grounded.

In the developed countries, an effort has been put by HEIs into increasing number of graduates prepared to meet actual labour market requirements that are no longer based only on theoretical or expert knowledge, but especially on higher level of skills or competencies which represent „*the set of behaviour patterns that the incumbent needs to bring to a position in the order to perform its tasks and functions with competence*" (Woodruffe, 1992).

Key competencies have been identified and they can be defined as a generic complex of knowledge, values and attitudes, but primarily life skills such as problem solving, communication, collecting and analysing information, ability to work independently, leadership, creativity, ability to cooperate effectively and lifelong learning (Armstrong, 2011; Belz and Siegrist, 2000). These competencies allow individuals to act adequately and efficiently within the various *professional* and *personal life* situations. They represent and incorporate a wide range of long term qualifications and requirements for a flexible response to the changing labour market demands and they also ensure maximum performance in the defined tasks (Weiss and Kolberg, 2003).

Some research has been made in the last years to find out for which particular key competencies will employers on the Czech labour market look for when finding the right graduate candidates for their jobs. One such competency model of economics university graduates (shown in Figure 1) was created on the basis of the requirements of about 200 employers located in the South Bohemia Region. It illustrates the collection of the most important abilities that define graduates' successful and effective performance in a workplace setting. The competency model shows that the economics graduate should be "*an independent individual with interpersonal and lifelong learning skills and the abilities to collaborate in a team and solve tasks or problems efficiently*" (Dušek, 2014).
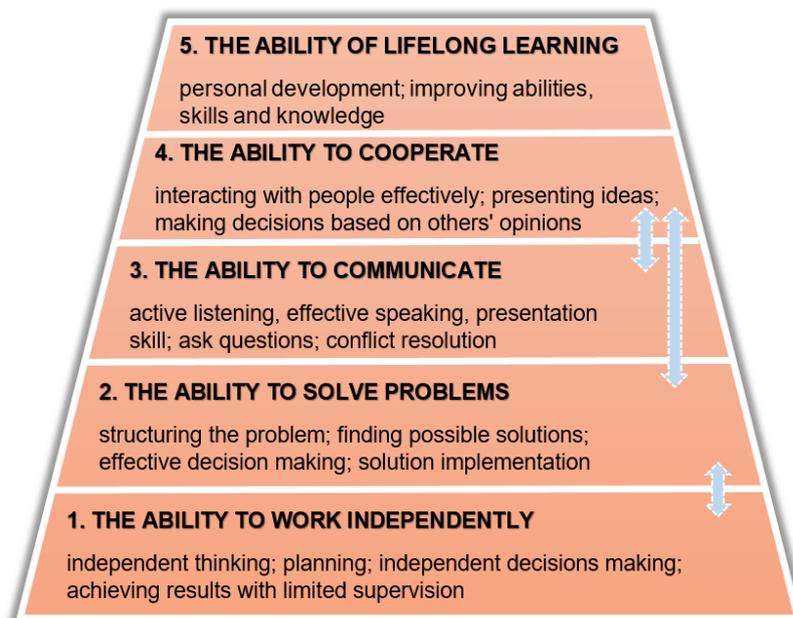
Figure 1: Competency model for the employable economics graduate (Dušek, 2014)

As suggested by Debling (1989) key competencies are behavioural and thus if students have certain basic individual capabilities, their competencies can be improved throughout higher education. So, their further well managed development should be in

the interest of those HEIs that want their graduates to be successful on the labour market – which, according to Hay (2008), should be very important especially for business schools.

The next step is then to implement suitable pedagogies enabling students to develop such key competencies. There are plenty of methods that have been proven to help in that, for example case studies (Anderson and Schiano, 2014), project-based learning methods (Bender, 2012), experimental and problem-based learning (Kolb, 2015) or business simulation games (Wolfe, 1973; Salas, Wildman and Piccolo, 2009; Avramenko, 2012; Tiwari, Nafees and Krishnan, 2014; Pratt and Hahn, 2015).

Because our scope here is to further explore the business simulation games' potential, it is also necessary to summarize the present state of knowledge in this discipline. A very good comprehensive overview is being provided by Anderson and Lawton (2008). They have shown that business simulations can have various impacts on learners in the following three domains – learning (knowledge), affective (attitudes) and behavioural (skills).

In relation to the learning domain, to be efficient, the business simulation games generally require a substantial time commitment which, according to the research reviewed by Anderson and Lawton (2008), may decrease the efficiency of learning in comparison to lectures, especially when the education content consists of quite simple facts, categories, concepts or principles. But when it comes to the learning of more complex concepts on higher levels of Bloom's taxonomy of learning objectives (Anderson and Krathwohl, 2001), such as self-reflective learning or planning, experience provided by a simulation game or practice can hardly be replaced by only a lecture. From this perspective, business simulation games' efficiency strongly depends on the learning objectives.

Nevertheless, the main strengths of business simulation games in the education are, according to Anderson and Lawton (2008), in the affective and behavioural domains. Generally, positive attitudes towards this type of experience, learning and learned discipline as such have been identified to be systematically adopted by learners experiencing this pedagogy (Gosen and Washbush, 2004) and also influencing their overall satisfaction with their studies – which may help to solve the problem of low Czech student satisfaction as stated above.

Also, behavioural domain has been studied a lot, mainly from the theory application perspective and development of skills. Although a lot of research is limited only to self-reporting because objective measurement is quite difficult (Anderson and Lawton, 2008), self-evaluations generally show positive outcomes. But further studies in this direction have been suggested by prominent researchers in the discipline and there is still a gap, although new possibilities of data collection during game-play have been helping recently (Dickinson, 2013).

For this reason, we have included also analysis of differences between planned and achieved sales, which is consistent with some of the recommendations of Anderson and Lawton (2008) and more specifically also findings by Teach (2014).

2. Methodology and Data

Several business simulation games with different learning objectives have been developed at the Faculty of Economics, University of South Bohemia to train the students during various levels of their studies – e.g. „Supermarketa" (supermarket simulator) and

„Cestovka" (tour operator simulator) serving as capstone simulations for synthesizing knowledge from different separate subjects and development of team-work, analysis, decision and planning skills at the end of bachelor study programme and „Greatail" (retail chain simulator) for master students that should help them in understanding of strategic level of decision-making and setting up KPIs. These simulators are original and completely under control of the authors which allows design updates and enhancement of data collection if necessary.

To explore further effect of one of these simulation games on participants and their competencies, we have set up for this study the following research question – *whether and how the business simulation experience influences the skills development and positive attitudes of participants.*

Based on literature, the following four hypotheses have been chosen to test in this study:

H1: The business simulation game experience improves, according to participants' self-evaluation, competencies demanded by employers.

H2: Level of competencies' development differs according to the participant role and engagement.

H3: Participants have a positive attitude towards this pedagogy, regardless whether they have been successful or not.

H4: During the business simulation game, participants improve their planning skill as measured by differences between their expected and achieved sales.

To answer the research question and hypotheses, we have collected data from 40 participants playing as 9 teams of the Greatail business game during Winter semester 2016. The data have been collected threefold – from student team simulation decisions and results (quantitative, data about planned and achieved sales for each team and 8 years of simulation), anonymous survey after finishing the simulation (quantitative, 41 questions, mainly 5-point Likert scale, 37 responses) and from their individual self-reflections (qualitative, 40 written reports).

For the data analysis, Excel and R software package (R Core Team, 2016) have been used. Namely nonparametric single sample Wilcoxon one-sided test for testing of H1, hierarchical cluster analysis and Kruskal-Wallis test for testing of H2, Spearman correlation coefficient and Kruskal-Wallis test for testing of H3 and Spearman correlation coefficient with one-sided test for testing of H4. The analysis results were also checked with the participants' self-reflections to improve the explanation when necessary.

The findings have also been compared with previous study by Krásnická et al. (2016) and generally also with conclusions of Anderson and Lawton (2008) and Teach (2014).

3. Results

3.1. Hypothesis 1

The first hypothesis assumes that the business simulation game experience improves, according to participants' self-evaluation, competencies demanded by employers (as shown in Figure 1). After finishing the simulator, students self-evaluated the simulation based course's contribution to concrete competencies' development on the 5-point Likert scale (where *5=strongly agree; 4=agree; 3=undecided; 2=disagree; 1=strongly disagree)*. Means including 95% confidence intervals are shown in Figure 2. If mean is great-

er than 3, the simulation has helped to develop the given skill. In relation to the students' self-evaluation, Greatail experience contributed notably to the development of abilities to collaborate and solve problems, finding and processing of information and systematic learning.
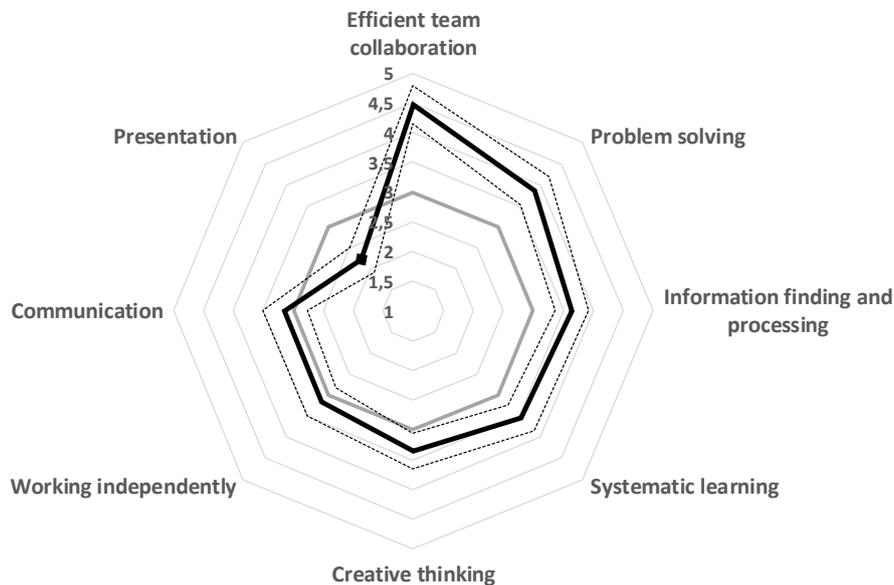

Figure 2 Level of competencies' development (means including 95% confidence intervals, n=37)

Statistical significance of the difference between median values of the above mentioned competencies and the value of 3 was tested by nonparametric single sample one-sided Wilcoxon (W) test.

Medians of five out of these eight most by employers demanded competencies have been proven to be statistically significantly different from 3, which means that we can generalize this on the whole population and their development through the simulation game experience should be positive. Four of them – information finding and processing skills (Q15, W test p-value = 0.0002), problem solving skills (Q19, W test p-value = 4.528e–06), efficient team collaboration (Q20, W test p-value = 2.899e–07) and systematic learning (Q21, W test p-value = 0.0034) – are significantly different from 3 on $\alpha < 0.01$, creative thinking (Q11, W test p-value = 0.0283) is significantly different on $\alpha < 0.05$.

Due to the size of the sample, it was not possible to statistically confirm or reject the hypotheses about improvement of working independently, presentation and communication skills, but at least for some participants, improvement was recorded also in these competencies which is in more detail visible when testing hypothesis 2.

Based on these findings, we can *confirm the hypothesis H1* that the business simulation game experience improves, according to participants' self-evaluation, competencies demanded by employers.

Even though the finding is limited by not available comparison with starting state of participants, it is important from several perspectives such as the education process and game experience design – it could be possible to strengthen the features of presentation or introduction of specific individual tasks when necessary.

3.2. Hypothesis 2

Participant role and engagement was not measured directly but there were 22 questions in the survey questionnaire that described perceived change of different individual competencies – from those quite general, e.g. communication, finding and processing of information or coping with stress, to those more related to the different areas of participants' studied discipline, e.g. management, commerce, law, statistics etc. All these skill development measures were using 5-point Likert scales.

To find out, which groups of participants with regards to their perceived competencies development exist in the data, hierarchical cluster analysis (Euclidean distances, Ward's method) has been used.

For the further analysis and statistical testing of hypothesis 2, four clusters have been chosen. When these clusters were compared, statistically significant differences have been found using Kruskal-Wallis (K-W) test in 13 out of 22 variables.

Out of these 13, five variables between clusters showed such a difference that was not only statistically significant but also changed the Likert scale median value for that cluster from agreement to disagreement or vice versa. These important variables were dealing with skills of opinion formulation and pushing them through (Q9, K-W test p-value = 0.0017), communication (Q12, K-W test p-value = 0.0009), leadership (Q18, K-W test p-value = 0.0040), problem-solving (Q19, K-W test p-value = 0.0006) and at last, statistics and data analysis (Q30, K-W test p-value = 0.0029).

Together with the other variables, we can describe the clusters in the following way by using only the statistically significant differences between them:

- Cluster 1 – *leaders* – 9 participants, high development of leadership (Q18) and communication skills (Q9, Q12, Q13), high engagement from time perspective (on average 31 hours).
- Cluster 2 – *analysts* – 7 participants, high development of information finding and processing skills (Q15), practical use of knowledge (Q24), statistics and data analysis skills (Q30), lower development of communication skills (Q12), high engagement from time perspective (on average 32.6 hours).
- Cluster 3 – *team players* – 14 participants, this group was the biggest, their skills development was generally very close to average, lower engagement from time perspective (on average 24.0 hours).
- Cluster 4 – *idlers* – 7 participants, low development of communication skills (Q9, Q12), problem-solving skills (Q19), statistics and data analysis skills (Q30), lowest engagement from time perspective (on average 21.9 hours).

One important difference which has been found, is related to the overall time spent. This variable was not included in the cluster analysis but shows an interesting pattern, even though in relation to the clusters it is not statistically significantly different (K-W test p-value = 0.305). But when only time being spent out of classes is considered, the K-W test shows p-value = 0.089 and median values are twelve hours for the clusters 1 and 2, ten hours for cluster 3 and seven hours for cluster 4.

All four clusters show no statistically significant differences with regards to participants' gender (χ^2 test p-value = 0.6889), team ranking (K-W test p-value = 0.1543) or team size (K-W test p-value = 0.1743). Because the obtained data are limited in size, to be able to find and tests such relationships more research would be necessary.

One limitation that should be mentioned here, is that the participants from the cluster 4 may have already felt developed in this respect before the simulation game. For

eliminating this, a study with different design and preliminary participants' testing would be necessary.

From the hypothesis testing perspective, because 13 out of 22 variables related to the perceived skills development showed statistically significant differences, eight of these on $\alpha < 0.01$, five on $\alpha < 0.05$, we can confirm H2 that *level of skills' development differs according to the participant role and engagement.*

3.3. Hypothesis 3

Being unsuccessful may lead to both to psychical discomfort as well as lower motivation. And from our perspective, this specific situation may also influence the overall results and satisfaction – because of that, it is necessary to test also specific hypothesis 3, whether the participants would keep a positive attitude towards simulation pedagogy, regardless whether their team has been successful or not.
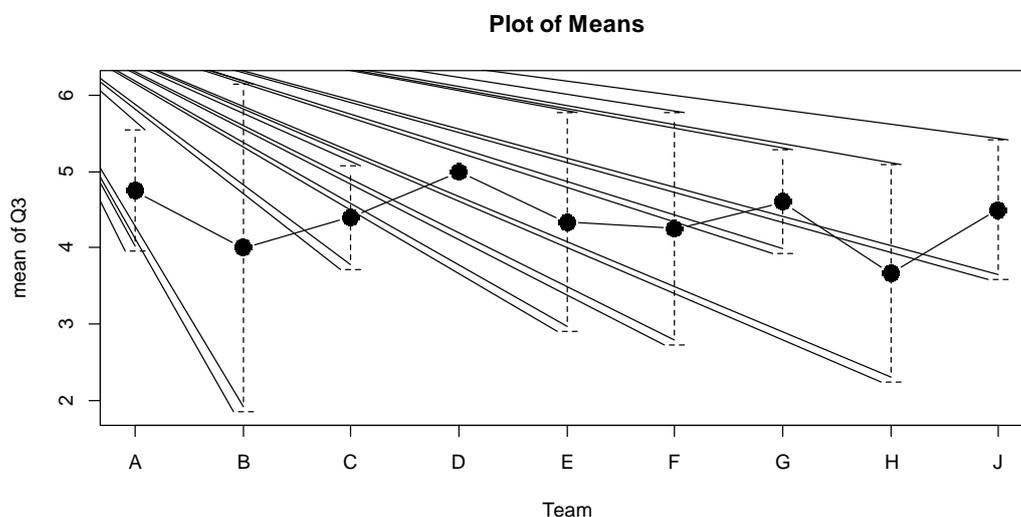
Figure 3: Simulation vs. traditional pedagogy – means

After finishing the course, students evaluated the experience on the 5-point Likert scale to determine whether they prefer this pedagogy over the one with more traditionally conceived seminars (Q3). Overall results show that only one participant was not preferring this pedagogy (with score 1 on the scale, from one of the successful teams) and two were not sure (3). All the others were agreeing (4) or strongly agreeing (5), thus preferring this approach. Especially members of teams D, A, C and G were very enthusiastic about simulation based learning method and they had very positive attitude towards this pedagogy. The most successful was the team E, the least successful was the team J which went bankrupt.

As some teams was more successful in the business game that the others, we have tested the hypothesis 3 at first with Spearman correlation coefficient between the final game rankings and Q3. The correlation coefficient was –0.041 and it was statistically insignificant (Holm's adjusted p-value = 0.8097) – no relationship has been found.

To further examine that, we have also tested statistical significance of differences between the team median values for Q3 by the Kruskal-Wallis test. Again, this test did not show any statistically significant differences (p-value = 0.3673).

So, we can *confirm the H3*, that the participants have positive attitude towards this pedagogy, regardless whether they have been successful or not.

3.4.   Hypothesis 4

One of the arguments against previous studies in this area is, that when measuring the effect of simulation games on learning, they rely too much on the self-evaluation of participants. That motivated us for including and testing hypothesis (H4) about planning skill improvement during the game, because it was on one hand a very important game objective and on the other hand it is possible to measure that objectively.

To answer this hypothesis, we have calculated and analysed relative differences between participating teams' planned and achieved sales in each year of the simulation game. As can be seen on the following Figure 4, when removing outliers, the trend of improvement in planning is obvious, especially in the last simulated years. The outliers were further checked with final reports and these extreme values can be explained either as mistake in data input (team D – cases 30 and 31) or wrong calculations (team J – cases 68 and 70).

To properly test the hypothesis 4, Spearman correlation coefficient between the game Year and relative differences between participating teams' planned and achieved sales in each year was calculated with the resulting value of –0.4177 (Holm's adjusted p-value = 0.0002). Because this correlation coefficient is not only negative but also statistically significantly lower than zero on $\alpha < 0.01$ we can *confirm the hypothesis 4* that during the business simulation game, participants improve their planning skills as measured by differences between their expected and achieved sales.
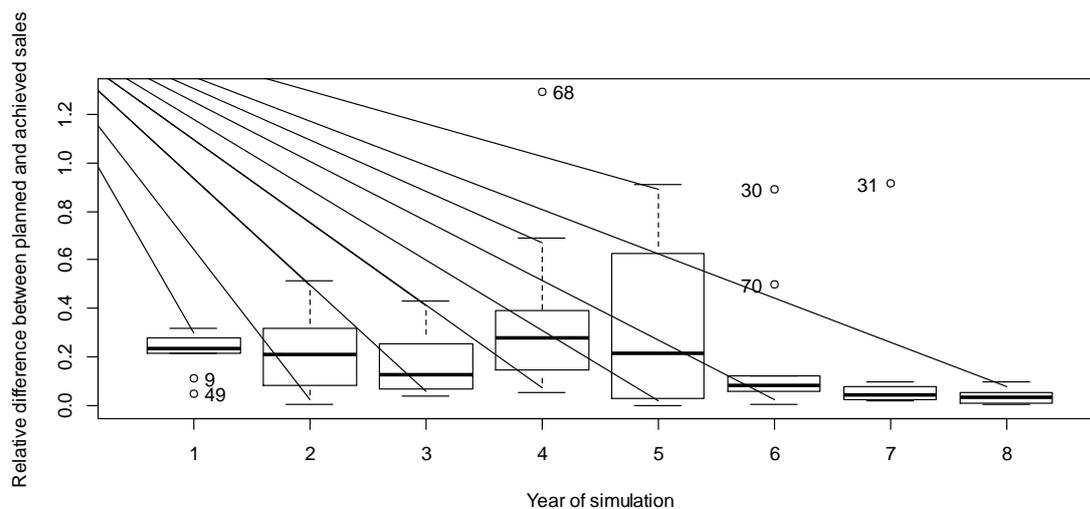
Figure 4: Boxplots of relative differences between planned and achieved sales in all eight years

4. Discussion and Conclusions

We have confirmed all four hypotheses in this study which generally supports findings of previous research in this discipline (e.g. Anderson and Lawton, 2008; Teach, 2014). This is important mainly because no such study was done before to explain business simulation games and their effect on development of competencies in the Czech environment. However, a similar research has been done by Krásnická et al. (2016) in the context of law education of business students and it showed comparable results especially with regards to skills improvement and positive perception of the simulation game by participants.

Also, this research has some limitations that should be mentioned. The main one is related to the sample size – it is based only on one game play and further studies ideally with other simulation games and more participants should be done in the future. Another limitation is unavailability of comparison base for those participants who showed no improvement in certain competencies. But because the findings are even with this limited dataset quite statistically robust and support existing theories, we can draw plausible conclusions.

From the research perspective, our results may lead to more detailed and enriching research in the following areas:

- How can different types of serious games contribute to the development of particular competencies? What are the consequences for the game design and use?
- How to efficiently and objectively measure and facilitate the individual skills development when working in a team?
- Are the roles that have been identified here more general and applicable also to other types of team games?
- How to support and facilitate proper team collaboration in such games?

One important finding should be discussed here more specifically. For education, if the goal is to develop a certain set of competencies, it is necessary to consider not only the general educational activity goal, but also roles the participants play as team members. Sometimes these roles may be even more important than the educational activity itself, as we have seen here in relation to the business games and hypothesis 2.

Also, when generally considering quite usual self-assignment of team roles, teamwork in different subjects during an education process may strengthen only those competencies that students are previously inclined to and leaving others underdeveloped. If the educators would like to avoid that, then it would be meaningful to randomly assign the roles or use more sophisticated process of team role selection.

One original aspect of this study was related to the competencies demanded by employers. We have shown that such competencies can be successfully improved by business simulation games, both based on participants' self-evaluation as well as based on objective measurement of planning skills. And because these simulation games as a pedagogy have also other benefits like proven higher preference by students as well as their higher satisfaction, we can recommend their much wider use in HEIs and integration into existing business curricula.

Acknowledgements

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Brands of regional products in the Czech Republic

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Abstract

Labelling of product origin arose spontaneously tradition and consumers automatically associated high quality or specific characteristics with such designations. Systems for labelling regional products have developed over time as third party activity, which assesses relevant criteria and guarantee their fulfilment by awarding a certificate. The aim of this paper is to define competitive environment in the designation of regional products in the Czech Republic. The article used secondary data from publicly available sources in the form of official web presentation of guarantors and coordinators of individual designation systems, methodological guidelines for granting and using brands, catalogues of certified products, etc. Benefits of using brands and trademarks representing Czech origin or quality of the product is quite debatable. The conformity of conditions for the acquisition and subsequent use of the individual designation does not provide sufficient space for differentiation from competitors. Regional brands may contribute to this, but only if they reach a unique position.

Keywords: regional branding, marketing management, consumer, quality, positioning

JEL Code: M31

1. Introduction

In terms of the purchasing behaviour of consumers, the place of origin of products is especially important for food and agricultural products. Cases with physically harmful goods imported from abroad, or campaigns to promote domestic products, contribute to increased interest about this information. However, the range of products tied to a specific region is much broader and their use value is equally diverse for customers, the producer and the region itself as a social grouping.

A region is generally defined as a more or less bounded territorial unit which, thanks to its unity, uniformity or conformity of characters or a certain organizational principle, differs from other territorial units. This is not a natural entity, but rather a political and social structure whose development is advocated by participants from both the inside and the outside. Furthermore, Chromý (2009) draws attention to the fact that the regions are transitory in time – not only do their importance or meaning, nature, function or integrity change, but also their definition (borders) and perception (by the local community and external entities).

Data about the origin of products are communicated in a simplified form using brands or trademarks. Labelling the origin of goods arose spontaneously through tradition. The names of some renowned products have become so common that consumers automatically associated high quality or specific characteristics of the goods with such designations. Typically, this special character of the goods was linked to a particular place (Horáček, Čada and Hajn, 2011). Systems for labelling regional products have developed over time as third party activity, which assesses relevant criteria and guarantee their fulfilment by awarding a certificate.

The supranational level of designation is represented in the Czech Republic by the European Union's system, which includes protected designation of agricultural products and food – Protected Designation of Origin (PDO), Protected Geographical Indication (PGI) and Traditional Specialty Guaranteed (TSG). National designation systems are managed by central government authorities (e.g. a Ministry) or by private or other entities operating throughout the Czech Republic. The brands covered by the national system include, for example, Klasa, Český výrobek, Česká potravina (Czech product, Czech food) – guaranteed by the Food Chamber of the Czech Republic, Czech Made, Česká kvalita (Czech Quality), Nositel tradice lidového řemesla (Bearer of the Tradition of Folk Crafts), Regionální potravina (Regional Food), Vína z Moravy, Vína z Čech (Wines from Moravia, Wines from Bohemia) and others. Many designations have negative effects in terms of worsening consumer orientation or doubts about the credibility of individual brands.

Systems of a regional character operate in individual regions, and in most cases are controlled by regional governments. Regional systems have a competitive nature, and include Product of the Year of the Liberec Region, Mls of the Pardubice Region and Chutná hezky (Good Taste). Jihočesky (South Bohemian Taste) and others. At the micro-regional level, brands are managed by independent and non-profit entities with a regional scope (e.g. Bohemian Paradise Association – brand "Regional Product of the Bohemian Paradise," MAS Moravian Wallachia micro region – trademark named PRAVÉ VALAŠSKÉ (TRUE WALLACHIAN), micro region Sokolov-East – brand "Original product of Sokolovsko"), etc.

The designation of local products was implemented by the Regional Environmental Centre of the Czech Republic as part of the "Natura 2000 – Lidé přírodě, příroda lidem (People for Nature, Nature for People)" project, whose implementation was financed by the European Commission from 2004 to 2006. Regional designation of products was one of the main parts of this project focused on increasing the knowledge of citizens about the Natura 2000 Europe-wide network of protected areas. In 2008, a marked interest in regional brands and efforts to also implement them for tourism services led to covering all of the activities related to designation, and the Association of Regional Brands was established (ARZ, 2016).

Interest in Czech products is also based on a consumer behaviour survey on public opinion of local raw materials and products (AMSP ČR, 2016).

The aim of this paper is to define competitive environment in the designation of regional products in the Czech Republic.

2. Methodology and Data

This paper is of a preliminary research nature, and therefore, the methodological approach is generally based on the structure of explorative research. The research methods are based on an analysis of secondary data. The current state of knowledge of the analysed problem is prepared on the basis of Czech and foreign professional literature; the concept of region and regional products is defined, and the various systems of the designation of these products in the Czech Republic (supranational, national, regional and micro-regional level) are described. Secondary data are obtained from publicly available sources in the form of official web presentation of guarantors and coordinators of individual designation systems, methodological guidelines for granting and using brands, catalogues of certified products, etc.

3. Results

The essence of this chapter is to specify protected designation of agricultural products and food according to the European Union (EU) system, specify brands and trademarks guaranteeing Czech origin and quality products backed mainly by state institutions, and to focus on designation which is covered by the Association of Regional Brands on the micro-regional level.

3.1.   Protected designation of agricultural products and food – EU system

For consumers, products bearing protected designation according to the EU (Fig. 1) are a guarantee of a certain quality and geographical origin or tradition.

Figure 1: Logos of protected designation of agricultural products and food according to the EU (SZPI, 2016b)

"Protected Designation of Origin (PDO)" identifies a product, for which all of the production stages take place in the defined geographical area (SZIF, 2016b). In the Czech Republic, six products have this designation – Všestarská cibule / Všestarská onions, Chamomilla Bohemica, Český kmín/Czech cumin, Nošovické kysané zelí / Nošovické sauerkraut, Pohořelický kapr / Pohořelický carp and Žatecký chmel / Saaz hops (European Commission, 2016). "Protected Geographical Indication (PGI)" identifies a product for which at least one of the production stages takes place in the defined geographical area (SZIF,

2016b). In the Czech Republic, the right to use this designation concerns 23 products, e.g. Budějovické pivo / Budějovické beer, Hořické trubičky / Hořické rolls, Štramberské uši / Štramberk ears, Třeboňský kapr / Třeboňský carp, Olomoucké tvarůžky / Olomouc curd cheese, Karlovarské oplatky / Karlovarský wafers, Valašský frgál / Wallachian frgal and others (European Commission, 2016). In both cases, these are products characterized by a specific quality, reputation or other characteristics attributable to the relevant geographical origin.

Four Czech products – Liptovský salám / Liptovsky salami, Lovecký salám / Lovecký salami, Spišské párky / Spišska sausages and Špekáčky / sausages (European Commission, 2016) are registered as "Traditional Speciality Guaranteed (TSG)". The special nature of traditional specialties is associated with the use of traditional raw materials, or it must be characterized by traditional composition or a traditional method of production or preparation, but not with geographical origin. "Traditional" means proven usage on the Community market for a time period showing transfer between generations, i.e. at least 25 years (Ministry of Agriculture of the Czech Republic, 2016).

3.2. Národní systémy značení

The presented brands concern food and non-food products, and they are the most used in the Czech Republic (Fig. 2).

Figure 2: Logos of brands covered by national systems (dTest, 2016)

An applicant for a "Czech product – guaranteed by the Federation of the Food and Drink Industries CR" label may only be a manufacturer registered to do business in the Czech Republic, and must supply the food product (group of products) or agricultural product under its label to the retail network. Such designated products must be manufactured in the Czech Republic and must meet a certain % of the proportion of raw materials of domestic origin (FFDI, 2016). This label is registered for different kinds of products, e.g. meat, fish, poultry and game, fruits and vegetables, jellies, jams, eggs, milk and dairy products, coffee, tea, cocoa, sugar, rice, tapioca, sago, coffee substitutes, flour, bread, bread products and confectionary products, ice cream, honey, yeast, baking powders, salt, mustard, vinegar, live animals, seeds, animal feed, malt, beer, mineral water, etc.

The "KLASA – National mark of quality" designation does not bind to Czech food origin in the sense that that it does not have to come from a Czech company[1]. The main condition for obtaining this designation is that at least one of the properties of the product must exhibit exceptional qualitative characteristics, and it must be unique compared to other similar products on the Czech market. The label is awarded for three years. As of April 2016, 1,091 products were designated with the KLASA logo in the following categories: Flour, Bakery and Confectionery Products; Delicatessen; Milk and Milk Products; Fruits and Vegetables; Meat and Meat Products; Fish Products; Non-alcoholic Beverages; Alcoholic Beverages; Ice Creams; Other Products – from 220 manufacturers (Klasa, 2016).

The CZECH MADE label has a long tradition in the Czech Republic and concerns products from various sectors. In 1995, its scope was expanded to the services sector. In 2002, the CZECH MADE label was adopted by the government as one of the first quality labels in the Czech Quality Programme – Support Programme for Selling Quality Products and Providing Quality Services. This is a complex label, which, unlike quality system certification, focuses on customer satisfaction. The entrepreneur must be registered in the Czech Republic. The label certifies that the product meets the requirements of SCJ[2] directives, and when it is to be awarded, how the product affects the environment and energy consumption is also taken into account. The label is granted for 2 years. A valid CZECH MADE license covers 10 products and 8 services (SOK, 2016).

License to use the ČESKÝ VÝROBEK (Genuine Czech) label is granted by the Nadační fond ČESKÝ VÝROBEK (Czech Product Foundation Fund). The goal of this non-profit organization is to inform consumers about the quality Czech products and support their sales. A company that applies for a license to use the ČESKÝ VÝROBEK label must be owned by Czech citizens, or by a Czech legal entity, and business returns are not transferred outside the Czech Republic. The label relates to products which were categorized into 44 main categories (NFČV, 2016).

Another organization that supports Czech products, Czech manufacturers and consumers is Český výrobek s.r.o. A distinctive logo symbolizing Czech origin (lime leaf the colour and shape of a heart, a stylized C as in "Czech" and the inscription ČESKÝ VÝROBEK (CZECH PRODUCT trademark) is intended to help orient customers interested in buying Czech products. The conditions for awarding the label are as follows: the product is made in the Czech Republic; the manufacturer employs Czech employees who take part in manufacturing the product; at least 50% of raw materials or components originated in the Czech Republic (if they cannot be acquired in the Czech Republic, then Czech work applies 100%). The licence for using the Czech product trademark is awarded for specific products (Český výrobek, 2016).

The registered trademark "Vína z Moravy, vína z Čech" (Wines from Moravia, Wines from the Bohemia), or "Vína z Moravy" and "Vína z Čech", may only be used on bottled wines that were approved by the Commission of the State Agricultural and Food Inspection Authority (CAFIA) as quality wines, or quality wines with special attributes. The origin of the grapes from the Czech Republic is very closely monitored, as well as the quality of the wines (Vinařský fond, 2016). The label is used to promote the wines and wineries of Bohemia and Moravia.

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[1]The products of some foreign companies can bear the KLASA logo, but only under the premise that that production takes place in the Czech Republic. National companies may also acquire the KLASA designation if they have a company in their ownership structure that manufactures food in the Czech Republic and supplies it to the Czech market.

[2]"Sdružení pro Cenu ČR za jakost (SCJ)" (Association for Czech Award for Quality) is the original name of "Sdružení pro oceňování kvality (SOK)" (Association for Awarding Quality).

The "Regionální potravina" (Regional Food) label is awarded to the winners of regional competitions based on the results of the evaluation commission of the relevant region[3]. The competition is intended for food or agricultural products from small and medium-sized food businesses (up to 250 employees). The product must be manufactured in the relevant region from raw materials from the region, and the proportion of these raw materials must be at least 70% (the primary raw material must be 100% domestic origin). Awarded products demonstrate uniqueness in comparison to conventional production available on the market (be it thanks to a traditional recipe typical for the region, an original manufacturing process or specific use of regional raw materials). Thus far, a total of 577 certified products in the following categories are available: Cooked Meat Products; Non-perishable Meat Products; Cheeses (including curd); Dairy Products; Bakery Products; Confectionery Products; Alcoholic and Non-alcoholic Beverages; Fruits and Vegetables; and Other. The project aims to support domestic manufacturers of local food and motivate their customers to search them out in shops, at farmers' markets or directly from the manufacturers. For such food, the customer has a guarantee of quality and will support the relevant region[4] by buying them (Regionální potravina, 2016).

3.3. Designation on the micro-regional level

There are dozens of regional brands in the Czech Republic, but a substantial proportion of them are members of the Association of Regional Brands (ARZ). The Association ensures the coordination of the designation system of local products and services at the national level. A regional coordinator operates in each region[5], who manages the relevant labels and communicates with local manufacturers and ARZ. Products are awarded the label by an independent certification commission (separate for each region) upon fulfilment of the uniform rules. A regional label primarily guarantees the product's origin in the relevant region, its quality, environmental friendliness and uniqueness in relation to the region (traditions, local raw-materials, manual or intellectual labour, motive and specificity in the region and exceptional quality). It is generally intended for craft and art products, food or agricultural and natural products. It also appears to a lesser extent in accommodation and food services and experiences that a particular place or an entire region uniquely presents. Brands involved in ARZ are characteristic through a unified visual style of brands and promotional materials (ARZ, 2016).

Other labels in the Czech Republic that are based on principles similar to the ARZ designation, include Regionální produkt Lužické hory a Máchův kraj (Lužické hory and Máchův kraj Regional Product), Regionální produkt Jizerské hory (Jizerské hory Regional Product), Regionální produkt Český ráj (Český ráj Regional Product), Kvalita z Hlinecka (Quality from the Hlinec Region), PRAVÉ VALAŠSKÉ® (Real Walachian), Tradice Bílých Karpat (Bílé Karpaty Tradition), Tradiční výrobek Slovácka (Traditional

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[3] The evaluation committee has 5–8 members who are appointed by the Ministry of Agriculture. They are representatives of the Ministry of Agriculture of the Czech Republic, the State Agricultural Intervention Fund, the Czech Food Chamber, the Agrarian Chamber of the Czech Republic, the regional office of the relevant region, the State Veterinary Administration of the Czech Republic and the Czech Agricultural and Food Inspection Authority

[4] Regional logo alternatives with the name of the region underline the origin of the food, thereby supporting the region from which the product originates.

[5] Since 2004, 27 regions – Krkonoše, Šumava, Beskydy, Moravský kras, Orlické hory, Moravské Kravařsko, Górolsko Swoboda, Vysočina, Polabí, Podkrkonoší, Haná, Českosaské Švýcarsko, Jeseníky, Prácheňsko, Broumovsko, Kraj blanických rytířů, Železné hory, Moravská brána, Zápraží, Znojemsko, Toulava, Opavské Slezsko, Krušnohoří, Kraj Pernštejnů, České středohoří, Poohří and Kutnohorsko have become involved in the regional labels system.

Product of Slovácko), Regionální značka Vltavotýnsko (Vltavotýnsko Regional Brand), Regionální značka ČESKÝ LES (ČESKÝ LES Regional Brand), Místní výrobek ze západu Čech (Local Product from West Bohemia), Original product of Sokolovsko (Fig. 3). ARZ points to the relevant brands.

Figure 3: Logos representing designation on the micro-regional level (ARZ, 2016)
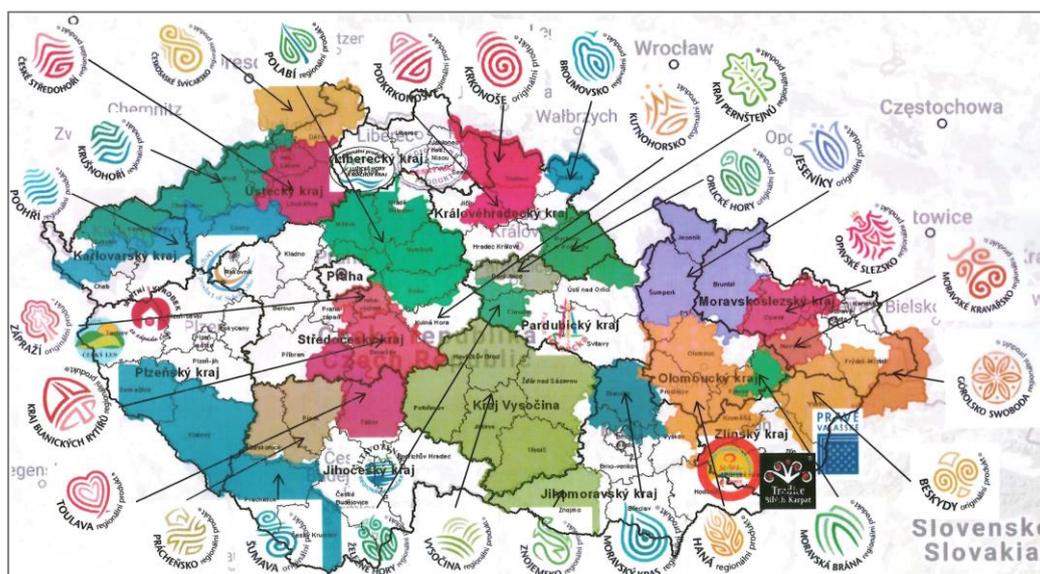
Figure 4: Competencies of designation covered by ARZ and other brands in the Czech Republic (own processing according to ARZ, 2016)

Each region uses symbols in its logo which are typical for the given area to ensure easy identification of the product with the place of origin. For example, the visual appearance of label "Místní výrobek ze západu Čech" (Local Product from West Bohemia) was prepared on the basis of drafts from children who emerged from an art competition among pupils at local primary schools. The logo consists of an apple as a symbol of an agricultural product, but also of the traditional Apple Festivities in Krasíkov, which are always accompanied by a craft fair. It also shows a house symbolizing production at home in contrast to manufacturing in factories, and home has the meaning of "local". The window in the building reminds of a button, but also of a decorated tart – both are associated with manual work. The four dots in it may also symbolize the four regions which form LAG Czech

West-Micro Region Konstantinolázeňsko, Stříbrský Region, Plánský and Micro Region Hracholusky (LAG Czech West, 2016).

The following map shows the overlap of the regions involved in the ARZ system from Czech regions and the scopes of other regional brands in the areas in which the designation covered by ARZ has thus far not penetrated (Fig. 4).

4. Discussion and Conclusions

The number of Czech foods that have a protected designation at the European level has stagnated in the last two years. According to the Food Chamber, applicants are being discouraged by the unresponsive approach of the Industrial Property Office (ČTK, 2016). The 29 existing designations of origin or geographical designations of food and agricultural products should be extended to PGI for "Český mák" (Czech poppy), followed by "Český česnek" (Czech garlic). A pending application for registration of Prague ham also remains from an earlier time period. Awareness of the label "Protected Designation of Origin" (PDO), "Protected Geographical Designation" (PGI) and "Traditional Specialty Guaranteed" (TSG) is relatively low amongst people (STEM/MARK, 2015), although it also concerns well-known products. It may therefore have meaning particularly for manufacturers to protect their products from falsification.

The most well-known labels are KLASA – national brand of food quality, Czech product – guaranteed by the Federation of the Food and Drink Industries CR and Regional food. This fact can be attributed to the number of certified products and extensive support from the Ministry of Agriculture of the Czech Republic, Food Chamber of the Czech Republic and other competent entities. The latest survey from the Wine Fund confirmed that knowledge is continuing to grow also about brands "Wines from Moravia, Wines from the Bohemia", which 63% of respondents know about according to current data (61% in 2014, 39% in 2007). Respondents associate the brand with high quality of good wines, good taste (66%), or a better taste compared to foreign wines, and guaranteed domestic origin (Bukajová, 2016). Although unlike in Austria and Slovakia, designation is voluntary in the Czech Republic and even a new draft of the Wine Act does not count on it being mandatory, many winemakers have joined with it, and awareness of the general public (not just wine lovers) was provided by a media campaign, the face of which was Ondřej Brzobohatý. Winning products in the Regional Food competition are also becoming more visible. Products are promoted both in the region where they were made, and at nationwide events – exhibitions and fairs; educational activities (conferences, courses, lectures, etc.); cultural, social and promotional events, and at tastings.

Even designation systems at the micro-regional level are not lagging behind in terms of certification of products. These are often managed by a Local Action Group or similar local group. The Association of Regional Brands stands out among these systems. ARZ helps regional coordinators search for funds for the designation system, is involved in the promotion and presentation of brands, maintains a joint website of the system – Portal on the Regional Designation of Products and Services, ensures exchange of experiences between regions that are members of the system, as well as promotion and presentation of the system and individual brands on a national and international level. Designation is intended for visitors to the region by helping them discover local products and the uniqueness of the given area, as well as local residents, who can support "their" local producers by purchasing the labelled products. Due to the label, manufacturers have gained various benefits, in particular unified promotion of their products, new contacts and the

possibility of new forms of cooperation. Compared to other regional brands, the nation-wide competence of ARZ and consistency of designation across regions can be considered a competitive advantage. Consumers have available clear information that simplifies purchasing decisions with regard to certified products.

From the supranational level to the micro level, in addition to local origin, the specified labels also try to inform about the quality of the products that bear the labels. If a given fact is supported, these products have the potential to find a response in Czech consumers. As evidenced by the survey ordered by the Association of Small and Medium-Sized Enterprises and Crafts of the Czech Republic, Czech products are preferred by 64% of respondents (N = 801), mainly due to quality. One of the reasons why people buy products from Czech raw materials is to support local manufacturers and producers, and they also want to be aware of the origin of the food they consume. Most purchases still happen at supermarkets, but goods are also purchased (28%) at small private shops where local products are available. Roughly half of the respondents are interested in the various certifications. Producers have reported that the main aspect is that the product is from the Czech environment that the customers know, whereas as certifications are not considered important. Consumers and manufacturers agree on the small support of Czech production by the state (in terms of public opinion, independent associations are most involved in this), and lack of awareness is also a problem (AMSP ČR, 2016).

Using a management analogy, the entire area of the designation of origin and quality products can be called "a jungle of labels". Existing designation systems implemented in the Czech Republic disorient not only consumers, but perhaps even the manufacturers. Although the research shows increasing familiarity of brands among customers, it remains more at the level of awareness rather than providing the expected information value. Emphasis on primarily placed on quality for food and agricultural products, but even here the designation of Czech origin is not an unambiguous guideline. Some change has been seen in shift from the mere guarantee of domestic processing and a certain proportion of domestic raw materials to quality assessment.

In the future, an increasingly greater tendency of consumers to prefer local products is expected, for which it is necessary to correctly identify their added value. Regional brands may also contribute to this, but only if they reach a unique position.

Acknowledgements

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Influence of Strategic Management on the Importance of Crises in Farms in the Czech Republic

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Abstract

The paper deals with a sub-research of the management of small and medium-sized enterprises in the Czech Republic. It is focused on the use of strategies in farm management and evaluation of the significance of the crisis managers of these enterprises. Data were gathered as questionnaires and interviews from 34 enterprises operating in the Czech Republic. The research was made in the period of 2014–15. Only about 25% of the farms have formulated strategy for the future direction of their enterprise. The crisis did occur in all organizations, in varying degrees and intensity. The significance of this crisis managers farms was assessed by an average mark of 3.5 (where 5 was the highest).

Keywords: strategy, management, farms, crises

JEL Code: M10, L20

1. Introduction

Comparing the Czech agriculture to the agriculture in the EU-15, there is significantly higher average size of enterprise mostly owned by legal persons that farm leased land in more than 80%. Comparison between economy of agriculture in the Czech Republic and agriculture in the EU-15 confirms the existing reserves to increase the competitiveness of Czech agriculture (ÚZEI, 2010).

The Czech agriculture in relation to European Union deals with the issues in terms of increasing the competitiveness of agricultural and food products to third countries on the basis of a higher quality, safety, diversity and value-added products to maintain the agricultural cultural landscape by reducing the pressure of agriculture on biodiversity loss, a deeper connection agriculture and rural development and non-food use of agricultural production, particularly as renewable energy sources (MZE, 2006). These strategic objectives are supported by measures of agricultural policy of the Czech Republic,

in particular by the subsidy policy. The production has always been the priority for agriculture within its performance in the truest sense of the word (Hrabánková et al., 2008).

The competitiveness of agriculture in individual countries is also affected by economic policy measures (Grega, 2004). The greatest risk to the future of Czech agriculture might be: the lack of qualified future generations, sale of land to people who are not farmers – limiting long-term development of enterprises, political stability and business environment, CAP (Czech and CAP – existent concept of Czech agriculture and food industry and bad for building the CAP, which will mean that we will not be able to take advantage of growing demand for food in the world), size (our strength and weakness – unwillingness to associate to sales organizations and inability to respond to global market coupling (opening the EU market to other countries) and inability to increase competitiveness through effective research and practice (innovation) (Pýcha, 2015).

There are only a few options for Czech farmers to make the situation better. One of the options is to choose a strategy of differentiation. Since it is not possible to reduce on a large scale the cost of production, it is necessary to specialize to the realization of such products that are not normally offered in the EU, and where the competition is lower. Another option is to enrich the offer in the market with any component of the marketing. Another possibility is to broaden the current range of additional services. This is currently offered only to a limited extent in Czech agriculture (Tomášková, 2008; Budíková and Králová, 2010).

Any entity, a company or municipality, should constantly try to improve itself (Řehoř, 2015). Aims of development, created and realized, within strategic management bring comparative effect (Lednický, 2006) or competitive advantage to organizations (Vodáček and Vodáčková, 2009). Developing organizational strategy can help organisations to avoid or limit the severity of rapid change induced by crises or disasters (Ritchie, 2004). At present time, as environment for conducting business and for private enterprise is highly competitive and since external and internal conditions for managing and economizing change dynamically, it is crucial that every company has clearly defined conception of their future. They define this conception by clear and proper strategy (Řehoř, 2013). Strategy is about how an organization sets about getting to where it wants to get (Thompson and Martin, 2010; Švárová and Vrchota, 2013.).

Strategy is the pattern of decisions in a company that determines and reveals its objectives, purposes, or goals, produces the principal policies and plans for achieving those goals (Andrews, 1971; Freeman, 2010). There are the main influences which determine the strategy and style of management to to problem of crisis (Booth, S.A., 2015). A number of authors have attempted to define a crisis to help improve their understanding of this phenomenon. The crisis of an enterprise, as defined by Synek (2011), means such stage of its life of adverse developments affecting its performance potential, radical reduction in sales volume, a decrease in net asset value, reduced liquidity for a long time, which is immediately threatened its existence in if that trend would continue.

The ability of business owners/managers to think strategically in the midst of a crisis is a key factor in an organization's long-term survival, but at present there is very little advice available on how to do this most effectively (Vargo and Seville, 2011). Some managers shine during a major crisis, while others don't. As a strategic manager, one must follow a comprehensive protocol that includes the implementation of teams, systems and tools to respond to a crisis (Springer, 2008). Strategic management of crises requires planning and preparation as well as the consideration of events and impacts that managers, victims and stakeholders would rather not think about. It is also im-

portant to have a crisis communications plan in place (Keown-McMullan, 1997; Coomgs, 2004; Švárová and Vrchota, 2014).

2. Methodology and Data

This paper aims to describe and assess the impact of strategic management to determine the significance of the crisis managers of agricultural enterprises in the Czech Republic and subsequently characterize relations between occurrences of the crisis. In the interviews, the managers evaluated and discussed the crisis in their organizations in past years, and consequently, their rating was summarized under the five-point rating scale, where 1 represented the crisis, that was not seen as an important in terms of the business and 5 represented the crisis seen as very important.

The data were collected from 34 companies in the Czech Republic in 2014. Research sample was selected using non-probable random selection, with regard to circumstances of the data collection. The data necessary for conducting the research were collected by a questionnaire survey and they were supplemented by qualitative data, obtained through in-depth interviews as well as case studies.

Representatives of different companies responded to questions concerning mainly crises that they had to solve during their operation on the market. Each of the selected companies identified at least 3 crises they had to deal with trying to minimize the impact on their business activities. Crises that were defined this way were consequently divided into 19 categories. The total number of crisis occurrence was 753 – it is a total. The authors examined 143 crises.

Data were tested using two-sample Wilcoxon test and his asymptotic variant. This test is a non-parametrical two-sample test, which is most frequently used, when the condition of data normality is not met. Let $X_1, \ldots, X_n$ and $Y_1, \ldots, Y_m$ be two independent random samples from two continuous distributions, whose distribution functions can only differ in displacement. $x_{0.50}, y_{0.50}$ states for the median of the first and second distribution. The hypothesis that the distribution functions of the two distributions are the same is always tested, in other words, the medians are tested for equality. The result of test is compared to the alternative hypothesis (the first of medians $x_{0,50}$ of companies which are strategic managing, is greater than the latter) (Freund, Wilson et al., 2010; Friedrich and Majovská, 2010).

In the first stage, all $(n + m)$ values $X_1, \ldots, X_n$ and $Y_1, \ldots, Y_m$ are arranged in ascending order by size. The entire process takes place electronically using test statistics software and this step is not described in the article, because it is a lapidary operation. Furthermore, the totals of orders $X_1, \ldots, X_n$ are identified and stated as T_1. The sum of the values in the order of companies which are not strategic managing $Y_1, \ldots, Y_m$ will be stated as T_2.. The next step was to calculate the test statistics for U_1. and U_2., while applies that $U_1 + U_2 = mn$ (Friedrich and Majovská, 2010).

If statistics $\min\{U_{(1)}, U_2\} \geq$ tabulated critical value, for the selected ranges of both selections and chosen level of significance, then than we may reject the null hypothesis of the identity of the compared groups on the significance level $\alpha = 0.05$ and $\alpha = 0.1$. Since for both samples in all test cases applies that n, m are greater than 30 the asymptotic variant of the Wilcoxon test (Mann-Whitney test) is undertaken, which is used for n and m higher than thirty.

Critical codomain for right-side alternative id $W = \langle K2, n \rangle$. Non-negative values k_1 and k_2 are strictly defined in critical literature. H0 is rejected on the level of significance

α, if $U_0 \in W$ (Freund, Wilson et al., 2010). Subsequently, the analysis of individual instances of crises and their relationships using correlation will be performed. Correlation is a measure of the relation between two or more variables. The measurement scales used should be at least interval scales, but other correlation coefficients are available to handle other types of data. Correlation coefficients are ranged from -1.00 to $+1.00$. The value of -1.00 represents a perfect negative correlation (the relationship between two variables is such that as one variable's values tend to increase, the other variable's values tend to decrease) while a value of $+1.00$ represents a perfect positive correlation. A value of 0.00 represents a lack of correlation. Correlation itself does not constitute a causal relationship between two variables, but it is one of the criteria of causality (Ferjeník, 2000; Meloun, 2002; Babbie, 2009).

3. Results

The survey included 34 farms, where only 15% of them applied strategic management and 85% does not use strategic elements when controlling – see Table 1. The number of crises in enterprises with a strategy is lower (about 15%) compared to those that are not engaged in the formulation of their strategy. Average importance of crises in both samples is almost the same (3.53, 3.55) so that it can be assumed that the strategic control does not affect the significance of the crisis. The following table compares the overall representation of the crisis in farms. It also compares enterprises with and without the strategic management in terms of the occurrence of crises.

Table 1. Selected statistics for farms

Strategically managed farms	Number of farms	Number of farms in %	Number of crisis	Number of crisis in %	Average importance of crisis	Dispersion	Maximum value	Minimal value	Standard deviation
YES	5	15%	21	15%	3.53	0.78	5	2	0.92
NO	29	85%	122	85%	3.55	1.14	5	0	1.07

As the Table 2 shows, the strategic management is increasingly faced with crises of a technical nature (14%; 4%) than enterprises without a strategy. Likewise, it is a very significant difference in the incidence of crises associated with red tape and administrative requirements. This crisis is reported by 29% of enterprises with the strategy compared with 10% of enterprises without the strategy. In contrast, companies without strategic management have more crises in the areas of employee´s, owner´s processes and collecting bills. The other areas of crises reported no significant differences between the samples.

Using the Mann Whitney U test at the significance level of $\alpha = 0.05$, we tested the data, where Y = farms do not use strategic management and X = farms use strategic management.

Table 2. The types of crises occurring on farms

Type of crises	Total	Total in %	Non-strategic managed farms	Non-strategic managed farms in %	Strategic managed farms	Strategic managed farms in %
Technical breakdowns	8	6%	5	4%	3	14%
Inputs, Supplies	11	8%	10	8%	1	5%
Employees	17	12%	17	14%	0	0%
Owners	5	3%	5	4%	0	0%
Natural disasters	9	6%	8	7%	1	5%
Processes	5	3%	5	4%	0	0%
Capacity	4	3%	2	2%	2	10%
Selling prices	18	13%	16	13%	2	10%
Customers, demands	17	12%	14	11%	3	14%
Collecting bills	10	7%	10	8%	0	0%
Regulations, bureaucracy	18	13%	12	10%	6	29%
Competition	7	5%	5	4%	2	10%
Others	14	10%	13	11%	1	5%
Total	143	100%	122	100%	21	100%

The Table 3 revealed that both groups are almost identical, regarding the meaning of the crises. The null hypothesis H0 failed to be rejected because p-value is equal to 1 and is significantly greater than the selected $\alpha = 0.05$. That is why we continue to say that strategic management has no statistically significant effect on the importance of crisis by the managers of farms. This conclusion is also graphically illustrated in Figure 1, where both samples are compared.

Table 3. Mann-Whitney U test

	Strategically managed	Non-strategically managed	Z	p-value
Farms	87	508	0	1

Figure 1 shows the agriculture enterprises with and without strategy. It is interesting that both groups of enterprises reported a similar level of the median value of 3.4 points, and the minimum value of 1.4 points. The enterprises without strategic management reported greater maximum values at 5.0 points, which is the maximum value for all the sectors, but the middle quantile ranges from 3.0 to 3.5 points. Similarly, 25% to 75% of strategically managed enterprises reported the values at the level of 3.0 to 4.0 points.
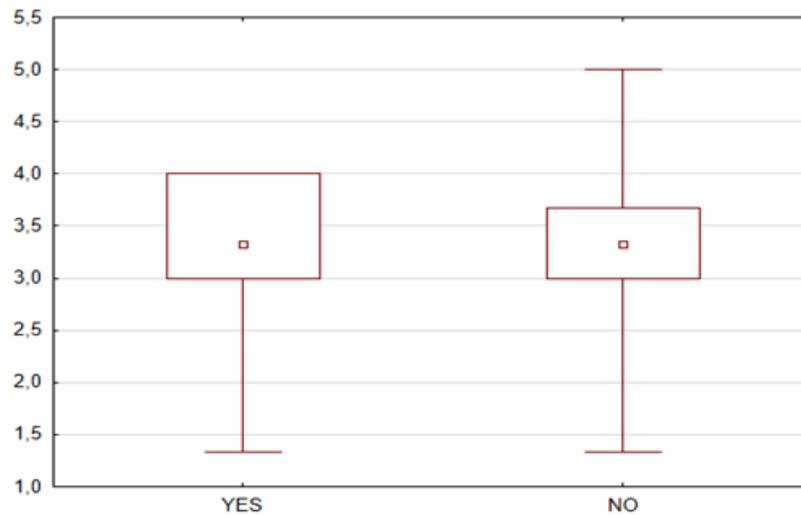
Figure 1. Median and interval of data layout in strategy and no-strategy managed companies from sector C

Subsequently, the correlation matrix was created for the farms to identify various relations between the crises. For greater clarity of the entire correlation analysis the crisis in the correlation matrix are expressed by abbreviations, as described by the Table 4.

There is also a positive correlation between the quality of production and crises related to customer requirements (31%), where it is seen that clients in these sectors demands quality. The most significant positive linkage is the impact of the crisis associated with customer needs and crises associated with low production capacity (37%). In agriculture, it is evident that there is a very strong bond between the crises of employees and theft (35%), this relation is also important in terms of the whole sample – see Figure 2.

Table 4. Used marking of crisis

Type of crisis	Code	Type of crisis	Code
Inputs, Supplies	IS	Natural disasters	ND
Financial capital	FC	Owners	Ow
Competition	Co	Employees	Em
Regulations, bureaucracy	RB	Placement of business	PB
Collecting bills	CB	Outdated product	OP
Customers, demands	CD	Quality of production	QP
Selling prices	SP	Legal form of business	LF
Entrepreneur – personal crisis	En	Thefts	Th
Processes	Pr	Technical breakdowns	TB
Capacity	Ca		

	IS	FC	Co	RB	CB	CD	SP	En	Pr	Ca	ND	Ow	Em	PB	QP	Th	TB
IS		1%	-20%	-23%	-3%	-6%	26%	-17%	-6%	-25%	-16%	7%	-23%	-17%	23%	1%	11%
FC	1%		10%	14%	-20%	-31%	18%	-8%	21%	-11%	-14%	-13%	-7%	-8%	-10%	27%	10%
Co	-20%	10%		-1%	-17%	7%	6%	-13%	-19%	4%	-4%	20%	-16%	18%	-16%	10%	10%
RB	-23%	14%	-1%		-31%	6%	13%	3%	23%	23%	5%	-3%	-19%	3%	-7%	-7%	13%
CB	-3%	-20%	-17%	-31%		13%	-26%	-16%	-4%	-4%	-13%	-9%	21%	-16%	25%	3%	-33%
CD	-6%	-31%	7%	6%	13%		-39%	0%	-18%	37%	-15%	25%	6%	0%	31%	-10%	7%
SP	26%	18%	6%	13%	-26%	-39%		-13%	11%	-9%	10%	24%	-39%	-13%	-16%	-5%	-2%
En	-17%	-8%	-13%	3%	-16%	0%	-13%		-9%	-9%	-12%	-10%	28%	-6%	-8%	-8%	-13%
Pr	-6%	21%	-19%	23%	-4%	-18%	11%	-9%		15%	7%	-15%	-14%	-9%	21%	-11%	4%
Ca	-25%	-11%	4%	23%	-4%	37%	-9%	-9%	15%		7%	11%	4%	-9%	21%	-11%	4%
ND	-16%	-14%	-4%	5%	-13%	-15%	10%	-12%	7%	7%		-19%	-41%	-12%	-14%	-14%	-4%
Ow	7%	-13%	20%	-3%	-9%	25%	24%	-10%	-15%	11%	-19%		-3%	25%	-13%	16%	-1%
Em	-23%	-7%	-16%	-19%	21%	6%	-39%	28%	-14%	4%	-41%	-3%		3%	14%	35%	-31%
PB	-17%	-8%	18%	3%	-16%	0%	-13%	-6%	-9%	-9%	-12%	25%	3%		-8%	-8%	18%
QP	23%	-10%	-16%	-7%	25%	31%	-16%	-8%	21%	21%	-14%	-13%	14%	-8%		-10%	-16%
Th	1%	27%	10%	-7%	3%	-10%	-5%	-8%	-11%	-11%	-14%	16%	35%	-8%	-10%		-16%
TB	11%	10%	10%	13%	-33%	7%	-2%	-13%	4%	4%	-4%	-1%	-31%	18%	-16%	-16%	

Figure 2. Correlation occurrence of crises in farms

There is also a strong positive correlation (28%) among employees and personality crisis of the manager; hence the owner of the enterprise. It suggests that there is a greater interdependence of relations in the workplace compared to other sectors.

Negative feedback in the agricultural sector appears to be the strongest (–41%) for the crisis related to employees and natural conditions. Other significant crises (–39%) are associated with employees and sales prices and sales in a pair of price and customer requirements. This may be regarded as interesting, if any one of these crises occurs, there is 39% probability that there will not be another. Among the important links also include a technical problem, together with the maturity of receivables (–33%). Regulation and bureaucracy have negative bond to maturing debt (–31%).

4. Discussion and Conclusions

In Agriculture and the related sectors are of strategic importance for the provision of public goods, particularly by ensuring the strategic level of food security, maintaining the landscape and environmental protection. Strategic management is essential for long-term competitiveness of these organizations. Farms with a functioning strategic management are able to look into their future and their managers are prepared to the upcoming issues in advance and they are able to deal with them. Crisis is perceived as a phenomenon more common than rare. It is therefore essential that enterprises respond to the aspects and impacts of the crisis by reflecting them in their corporate strategy and managers learn to manage crises effectively.

The moment of acute crisis, the managers of agricultural enterprises deals with the question of who will manage the process of recovery of an enterprise, and they start looking for a crisis manager. Properties of crisis manager are certainly crucial to the success of the process of crisis management. Especially they need to decide how to avert the crisis and use it as an opportunity to improve the organization. The best crisis managers also know what changes are needed in corporate governance, organizational culture, and information technology (that confirms Lerbinger, 2012). Average importance of crisis was assessed with 3.5 points. Authors have not proved in testing hypotheses that

there is an influence of the strategic management on importance of crises by the farm managers. Both groups of organizations attach similar importance to the crises.

Strategic management is increasingly confronted with bureaucracy crises. It is connected with the facts that the strategic plans that are created most often because it is often a precondition for a subsidy. Getting subsidies, however, is associated with high administration and the possibility of failure to obtain the required amount of funds. Businesses without a defined strategy are facing multiple crises associated with employees. The results of correlation analysis indicate that the agricultural sector has got a very strong link between employee crises and theft (35%) and subordinate relationships with superiors (28%). The human factor in agriculture plays an important role. However, the written ethical principles are truly respected only by those who follow these principles on their own. Education and understanding of compliance of rights and obligations of the employees is a matter of internal motivation, which is unenforceable (as stated by Cimrmannová, 2015).

According to survey results, only 15% from a total of 34 agricultural organizations formulated their strategy. The organizations managed this way can adapt to changes in the environment. They also can flexibly change its strategy and fight against potential crises. Unfortunately, almost 85% managers in the Czech Republic are not yet able to look further into the future. All organizations should deal with a strategic management. They should have a strategy that would adapt to the current situation and future developments as quickly as possible. When designing the strategy, it is important for the managers to detect new opportunities as soon as possible and to be aware of crises that can spoil these opportunities and threaten the functioning of the organization. The conclusion has been confirmed by other authors. Smallman (1996) notes, that there is a need for managers to move from a current dominant reactive paradigm to a proactive, holistic approach to dealing with chaos and change. Proactive planning through the use of strategic planning and issues management will help reduce risk, time wastage, and poor resource management and reduce the impacts of those that do arise (that notes Heath, 1998; Thompson and Martin, 2010).

Acknowledgements

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Identification of human behavior based on analysis of cellphone location data

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Abstract

We live in a world full of ongoing data exchange between internet services and their users. Many users willingly provide information about themselves in exchange for obtained services. However, not all service providers know how to acquire spatial data about their customers or for what purpose they should use them. This paper presents a case study based on spatial data analysis. The spatial data are collected by a customer cellphone.
The proposed algorithm uses solely series of user locations. The algorithm can create a timeline of user's whereabouts by identifying clusters of individual entries, which can be labeled as places visited by the user. Furthermore, we can successfully estimate the location of residence and the workplace of the user as presented on four different subjects with distinct behavioural patterns. Finally, the usage of various kinds of spatial data is discussed along with the possibility of deployment of similar algorithms for commercial purposes.

Keywords: pattern recognition, clustering, spatial data, mobile application

JEL Code: C880

1. Introduction

According to many surveys, the mobile web usage already overtakes desktop; hence, more users are accessing different web services through their cellphones and tablets more frequently than using their desktop computers. (StatCounter, 2016) This situation brings substantial demands on the service providers. The services user interface must be adjusted to many different mobile devices, they must be efficient from the data traffic point-of-view and so on. (Chae and Kim, 2004)

On the other hand, the mobile platform allows to create substantially more intimate relationship with the customer. In contrast to the desktop computer, the cellphone is always at the reach of the user. Hence, it is possible contact him/her anytime. Moreover, the service provider can aggregate and analyze location data of the user cellphone as well as information from the service or connected services (e.g. *Facebook*). This brings a great

potential to better understand the user behavior and needs. On the other hand, there are many ethical issues. (Duckham and Kulik, 2005) The key vendors that are focused on behavioral analysis of the customers, i.e. Google and Facebook, openly explain what data about the user are acquired and for what purpose. (Facebook, 2016) On the contrary, many different mobile applications request access to the content of the mobile device as well as to its location and do not explain its purpose. An example of such an app is a recently released photo manipulation application called *Meitu*, which was developed in Hong Kong. This app requires a lot of permissions, such as access to device's IMEI and IMSI, access to user's data and so on. (TechCrunch, 2017) As mentioned, the key advantage of such data analysis in the potential to understand the user better. Both *Google* and *Facebook* use this analysis for better advertisement targeting. Appropriate advertisement is more efficient for the contract owner and also less disturbing for the customer. Moreover, *Google* use the behavioural analysis to provide appropriate information for the user at the proper moment. Common situation is that user receives information about traffic accident on the highway that will be probably used to reach the location of the next meeting. This would not be possible without the knowledge of current user's location, information about the next meeting and traffic data. Hence, the analysis of the customer based on fair terms can substantially improve the overall user experience.

We focus on user location data analysis in this article. Many services can benefit from knowledge in what kind of location the user is at a certain moment. Is he/she at home/work/usual mall? We describe common services that are aimed on analysis of the user location. Nonetheless, they are mostly closed. Therefore, we describe principle of our algorithm that is able to distinguish the user's place of residence and the workplace from other locations based solely on the analysis of location history of the user. It allows to get some semantic knowledge from raw spatial data. Finally, we discuss our testing on multiple subjects and the test results.

2. Review

The review is divided into two parts. The first one presents one of the most progressive location services that substantially use the user location. In all cases, they provide some information related to the particular user location. We describe them to explain what benefits can our algorithm bring to such service. The other part of the review briefly outlines the state-of-the-art research in the area.

2.1. Location based services

Most probably the leader in the area of location based services (LBS) is the *Google* company. Their key LBS product is *Google Now* service that provides information about weather and traffic conditions in target location as well as news selected for the user or related traffic incidents.
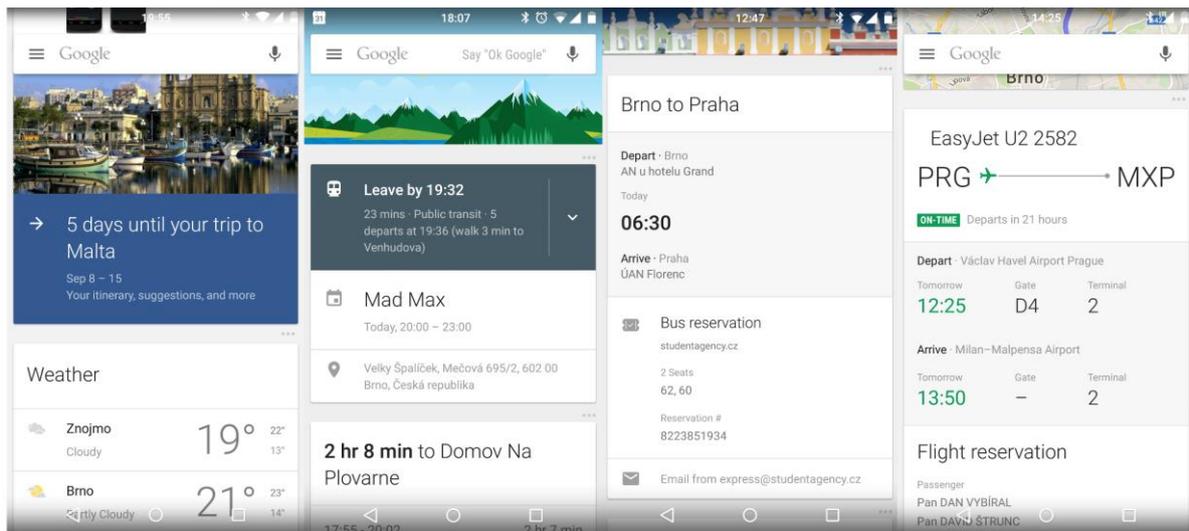
Figure 1: Examples of different cards in Google Now service.

The *Google Now* service functionality is based on data from other *Google* services or applications (*Calendar*, *Chrome* browser, *Gmail*, *Inbox,* location, etc.). This information is stored inside *Google Knowledge Graph* (GKG) database. (Bohn, 2012) GKG uses semantic analysis to deduce useful information like where the user lives, what are his/her habits, what are his/her plans. On the basis on GKG, the *Google Now* service provides information for the user in the form of so-called cards (see Fig. 1). The *Google* services benefit from the interconnection of all these different tools. A meeting can be automatically added to the calendar from an email. The *Now* service can inform about traffic conditions on the route to the meeting and weather in the target location and so on. The scenario on the Figure 1 is a real-life scenario, which occurred in September 2015. A trip to Malta was planned along with all the necessities to undertake such a trip. A flight ticket was bought through an airline's webpage, along with a bus ticket to the city, where the departing airport was located. Both tickets were delivered to the *Google Inbox* service and processed by the *Now* service. Few days before the departure the service showed a reminder that the trip will occur soon, without any interaction or data entry from the user. At the day of the departure a card showing the bus ticket number (obtained from the email ticket) was shown. After the user arrived to Prague, a card showing information about the flight was shown instead, along with information downloaded from the airlines services about the boarding times and gates. Some other cards can be seen on the Figure as well, such as weather info of the current city where the user resided and an event reminder with public transit and traffic info.

On the end of the year 2016 *Google* presented new service *Assistant*. (Google, 2016) The *Assistant* is aimed at natural communication with the users. Through the natural conversation, user can obtain required information or do some actions. Interesting possibilities brings interconnection with Internet of things devices. The Assistant can dim lights, start the music and many other things outside common business actions.

One of the biggest competitors of the *Now* and *Assistant* services is the *Siri* assistant created by *Apple* (TrustedReviews, 2016). The *Siri* is integrated into the *iOS* operation system. It builds on the same advantage as the *Now* or *Assistant* services. The Apple services can store information about the user emails, agenda, contacts, music etc. Hence, the assistant can also combine these pieces of information to provide some useful help. In the *iOS* version 9, *Apple* presented service *Proactive* (The Verge, 2015). The *Proactive* functionality is now aggregated on a single place (like in case of the *Now*), it is spread among

the system. For instance, if a user regularly calls some contact in a specific time, the iOS puts this contact in at appropriate time on the top of the list. Many functions are similar to the *Now* services. The *Proactive* can inform you about traffic, add an event to the calendar from the email etc.

Similar assistants are created by *Microsoft* (*Cortana*) and *Amazon* (*Alexa*). The *Cortana* is part of the *Windows* family operating systems. (ZDNet, 2014). It uses *Santori Knowledge Base* to understand semantic of the user data. Nonetheless, no precise information on its design was published. Moreover, *Microsoft* is pulling back from the cell phone market; therefore, the *Cortana* is not interesting from the LBS point-of-view. (The Verge, 2016). The *Alexa* assistant is very similar to the *Google Assistant*. In some cases, the *Assistant* slightly wins, but *Alexa* primary purpose is to work with *Amazon Echo* smart speaker that is placed at user's home. Hence, it can not benefit from some location information. *Samsung* and other companies also develop other similar assistants. (The Verge, 2016) However, they are still under development.

2.2. Location analysis research

Google conducted research in 2011 on how to extract various patterns from user's location history. They have been using now discontinued service *Google Latitude* for obtaining user's location. The goal of their research was to detect travel patterns along with commonly visited places including home and work. (Kirmse et al., 2011). Similar research was conducted earlier using different time-clustering algorithms and discusses the problematic of choosing the proper algorithm for clustering the location traces. (Kang et al., 2004)

Research about location sharing privacy was also conducted. It studied various user's privacy preferences with three different groups of people in various contexts. The outcome was that the privacy preferences are highly dynamic, context-aware and depend on the target sharing entity. The second part of the article shows that it is fairly possible to predict the nature of location sharing of a user. (Xie et al., 2014)

Forecasting the user's location was proposed regarding proactive mobile applications, which would trigger certain actions ahead of time. This research also assumes the possibility of change in user's location patterns (for example when the user changes jobs, or relationships). A learning mechanism was used, and it was able to predict up to 94 weeks into the future of user's location with 43% accuracy. (Alvarez-Lozano et al., 2013)

3. Methodology

As is evident from the review, the key players (*Google*, *Apple*) that are providing some location services benefit from the interconnection of many different pieces of information (user agenda, location, emails...). Nonetheless, this is possible only because these companies provide their own mobile platform and store all the user data. Common applications can not rely on such complex semantic knowledge. In most cases, the user does not want to allow the access to sensitive information in the device (contacts, emails, etc.). Therefore, we focused on analysis solely of the user's location. Even though the location could be sensitive, it is frequently required by many applications and users are used to providing this information. Also, many users already have their location history enabled because they use various services offered by *Google*.

Google offers a fairly simple way of exporting all of the user's data to a usable format (in the case of location history it is JSON), which the user can use for their analysis or provide to other services (such as our service). Our algorithm can process any exported data or any other location data, which will be stored in the database in the correct form. It does not matter with what service or which application the data was acquired. The only important part is that it contains the key information: latitude, longitude and the date and time of acquisition. Our algorithm is user-based. Therefore the data must be linked to a certain individual. Every user has a set of location points associated with him/her.

It is important to sort the location data properly before further analysis. Because we were interested in classifying places visited by the user, the data must be sorted in the scope of days (because a user visits a certain amount of locations per day). Therefore, for every user, a timeline is created. A timeline consists of a structure holding entries for years, months and days. Because every entry contains a date and time of acquisition, it is then assigned to its corresponding day, which is then in turn assigned to a month and year respectively. It is possible to visualize this timeline as a connected series of points during a period of time, chronologically ordered.

The core part of the algorithm works with places visited by the user. As mentioned, the user's cell phone can acquire from tens to hundreds of entries per one day; however, the user realistically visits only a few places in one day. It is important to differentiate a location entry, which is obtained from a service or a mobile app (the cell phone acquired a location) from a visited place (a specific restaurant). Visited place can be comprised of many location entries if the user resided at the same location for a period of time. Therefore, we are clustering all location entries to previously mentioned places of visit. Location entries are clustered to a place of visit only when there are two or more chronologically consecutive entries in an 80-meter radius (the specific value can be adjusted in regard to the accuracy of entries). The time value of the first consecutive entry is then determined as the starting time of the visit and the time of the last consecutive entry is determined as the end time of the visit. The visits location is then calculated as the center point of the locations of all currently clustered entries. If there is only one entry in the radius, it is classified as a traveling point, not a visit of a place. These visits are time focused. Hence, every record of this kind has a starting and ending time, along with the location.

Our algorithm is designed to distinguish between places, which the user visits coincidentally and between his/her place of residence and the workplace. The obvious problem is that not every user follow the same daily routine. Many users are active at work during the morning and afternoon hours (office jobs), some are active during the night (security officers) and some work in various types of work-shifts, which can not be predicted (retailers, emergency service employees, etc.). We decided to focus on the first and most common type of user – those active during the day.

Our algorithm searches through all of the places of visit and calculates how many times has the user visited the place in his/her location history. Because the center points of places of the visits might vary during days, these places of visits are also clustered to regularly visited places in the same way as location entries were clustered to places of visit. However, in this case, the condition of time consecutiveness is not required, as the user can visit some place more times per their location history. Therefore, entries of this type are location focused. Every regularly visited place holds a number of visits of the user at specified hours and the average stay duration. For example, a restaurant was visited by the user 20 times, 15 times the user arrived between 3 pm and 4 pm and five times between 8 pm and 9 pm. The same statistics are stored for the time the user has left.

In the last part, the algorithm runs through regularly visited places and assigns them a score, depending on the rulesets used for a particular daily routine. As mentioned, the current version of our algorithm is focused on users active during the day. These users usually obey the following rules:

1. Leave home between *morning leave*
2. Arrive at workplace between *morning arrive*
3. Leave workplace between *afternoon leave*
4. Arrive at home between *afternoon arrive*

The intervals are as follow:

- *Morning leave*: 5AM to 2PM
- *Morning arrive*: 5AM to 2PM
- *Afternoon leave*: 1PM to 6PM
- *Afternoon arrive*: 1PM to 6AM

Approach to deducting these rules was purely axiomatic and based on common sense. The time intervals can be adjusted. However, these selected intervals worked well, as discussed in the Results chapter. The score assigned by the algorithm to each of the regularly visited places is calculated according to the following ruleset:

- If the regularly visited place was visited less than V times, the place's R score is 0 and H is 0. If it was visited more times than V times, both scores are 2.
- If the average stay duration longer than T, H and W scores are multiplied by 1.5, else H and W scores are multiplied by 0.5
- If the amount of times a visit at a regularly visited place started in the *afternoon arrive* interval is greater than the amount of times a visit at a regularly visited place started in the *morning arrive* interval, the H score is multiplied by 1.5, else the W score is multiplied by 1.5
- If the amount of times a visit at a regularly visited place ended in the *morning leave* interval is greater than the amount of times a visit at a regularly visited place ended in the *afternoon leave* interval, the H score is multiplied by 1.5, else the W score is multiplied by 1.5

The V constant is used for filtering less frequented places. In the current implementation, it is calculated from the number of all place visits at all regularly visited places. Nonetheless, it can be adjusted according to various needs.

At the end of the calculation, all regularly visited places have a score value of H and W. The H and W values are scores, which are used for determining if the regularly visited place is a candidate for classification of the user's home, or workplace respectively. If the value is zero, then the place is definitely not the place of residence or work. Regularly visited places with the greatest H value is classified as the user's place of residence, whereas the regularly visited place with the highest W value is classified as her/his workplace.

4. Results

The algorithm was tested on real data from 4 different users. All users agreed that their data will be used for the purpose of testing this algorithm and can be published publicly. Each of the four users has slightly different daily routine, which is essential for the validity

of the results. Also, three users provided three months worth of location entries, whereas the fourth users provided only data from two weeks.

The first user regularly moved within the city of Brno. The times when he/she left home and arrived to work were some time in the morning. After work, which he/she left at irregular times in the afternoon, he/she visited various venues around Brno. In the three months period, the data was provided, he/she visited her/his hometown. Also, he/she traveled abroad few times. This user had non-stop data connection, thanks to which the location entries were regularly collected in short time intervals and represented real place visits, with definite beginnings and ends of the visits. Both the place of residence and place of work were classified correctly by the algorithm, along with the second candidate for the place of residence in his/her hometown.

The second user's behavior was highly regular. He/she left home and arrived to work at about the same time every day. This user does not live in Brno directly, but only works there, so he/she commutes to the workplace city. He/she did not visit any other venues besides his/her workplace in Brno. However, he/she visited a lot of different cities during the recorded period. This user did not utilize a mobile data connection, only local Wi-Fi networks. The user's cell phone recorded location only at places, where it could connect to known Wi-Fi networks, therefore not many location entries were recorded. However, a Wi-Fi network was available both at his/her home and his/her workplace, the location was always recorded there, and the algorithm could correctly classify both places even in this case.

The third user's behavior was the most disordered. He/she traveled between his/her home and workplace highly irregularly, in vastly different times every day. He/she left home sometime in the morning in the most of the cases; however, he/she left his/her workplace at any time in the afternoon or even night. This user had a data connection, and a lot of location entries were recorded at various venues, often in different cities. Even though this user's behavior did not entirely correspond to the targeted behavior for our algorithm, both the places of residence and work were classified correctly.

The fourth and last user provided only two weeks worth of location entries. He/she works as a consultant and often works from home, or at a client's place of business. He/she also spends a lot of time at a different place than home and often travels to different cities and countries. This user's cell phone also reported location only at different blocks of time. Sometimes there were hours without any data entry, whereas at various times there were a lot of entries at once. The algorithm correctly classified the user's place of residence; however, the workplace was placed at the same spot. It is not strictly an error. Nonetheless, the user visited his/her firm's office, but there are no location entries for those visits (there could be a weak mobile network signal and no Wi-Fi available). Also, the other workplace was incorrectly detected in the user's hometown, where he/she frequently stayed. This place was wrongly classified because of the nature of travel. The user traveled to her/his hometown during the night and arrived in the morning.

Detailed description of the results including the maps is published in Vybíral, 2016.

5. Discussion and Conclusions

We presented our algorithm that identifies home and work locations on the basis of the location data. Similar functionality is used e.g. in the Google services. This algorithm can be used for improvement of many mobile applications. The applications can understand the nature of the location and therefore provide related functionality.

The algorithm can be used only after a certain amount of data is collected. The minimum amount of data was determined as three weeks. If the period is longer that these three weeks, algorithm's results are substantially more precise as is obvious from our results. This limitation is entirely understandable. Making a deduction of one's behavioral patterns from such a short period is almost impossible.

Our algorithm was also tested on data collected over longer time intervals, such as a year. In this case, the algorithm started to classify more places as candidates for the user's home, mainly because the user frequently visited her/his favorite restaurant or another kind of venue. It is, therefore, necessary to classify as a home or a workplace only those places of regular visits, which have the most amount of visits. An alternative would be to use a service, such as the *Google Places API*, to detect if there are any venues nearby the distinguished places. In that case, the place would be classified only as a place of interest and not a home.

Potential flaw of our algorithm is that it has a relatively low accuracy of calculating the location of regularly visited places. They are computed only as center points of multiple location entries, which are in turn also rarely accurate. This accuracy could be improved by incorporating a better clustering algorithm or by placing the visited places directly over nearby points of interest obtained from the *Google Places API*.

In future we would like to focus our effort to create a new models for people with different behavioral patterns (night shifts etc.).

Acknowledgements

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The Impact of Hofstede's Dimensions on Telework

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Abstract

The aim of this paper was to analyze the statistics, last experiences from researches and compare to scientist background. This paper consists of research based on data, where we tried to analyze how relationship between factors such as cultural dimensions may affect decisions for further application. How strong effect cultural dimensions have, how Hofstede's Cultural Dimension Theory can resolve questions. Which cultural dimensions influenced rate of the employee's telework in European countries. How application of flexibility and effective forms can improve organizational culture.

Keywords: Telework, Telecommuting, Flexibility, Dimensions, Decision Making,

JEL Code: M 14

1. Introduction

Today offers many challenges. Human needs, changes in thinking and new attitudes influenced values ranking. It started the examination of the trends for a number of Management Theories that work in the 21st century. The organization is understood as a living entity, the focus is on the selection and formation of staff. In the foreground is to focus on needs and achieve common goals. Just adaptation, not only to individuals but also teams, groups and organizational culture will bring success.

Employers primarily try to increase work efficiency and to ensure the continuous operation of the business. Some employment flexibility can be potential for increasing employment in terms of "redistribution of work" for a larger number of workers (Van Lomwel & Van Ours, 2003).

The term flexibility should be more understood as an adaptation to sudden changes in the situation that has arisen with the purpose to extract something thriving and efficient for individuals and organizational culture. In a similar way, Ailenei & Bunea characterize the labour market flexibility. Basis of the law can absorb information flows, changes, mistakes and try to turn them into productive activity (Ailenei & Bunea, 2010).

Flexibility responses to overcoming obstacles. Also according to labour market, flexibility positively affects the functioning of the labour market. Higher flexibility with a stable macroeconomic environment is combined with higher employment rates, greater competitive and productive economy, where we can use wider masses into employment (HM Treasury, 2003).

The objective of employment flexibility should harmonize needs of the employees and the employers. Flexibility gives employees options to create individual work plan and increase their work efficiency. The implementation of flexibility may not be caused by the demands of business. Flexibility is often initiated by the employees themselves, which can lead to personal reasons, such as the obligation to care for family members, home care, study or other activities which prevent them from performing work full time (Rodgers, 2006).

Telework recorded the highest growth in recent years. Increasing numbers of tele-workers are not exclusively the result of the employers needs to adjust to the market requirements, but it occurs due to the higher availability of ICT products and faster Internet connection. Various sources reported in different countries, different number of employees working in the form of telework. Differences are due to the following: Authors sometimes counted only formal full-time teleworkers. Contract Teleworkers or Once Week Teleworkers, in the Western Europe are known as the "Home Office". Tele-workers have a standard contract of employment in the organization for eight hours daily, but getting the opportunity to work from home a flexible number of days. This number is nowhere precisely defined as formal terms of the oral agreement between employers and employees. Walinski states that contract teleworkers, employee tele-workers or "Home Office" in the world have over one billion employees (Walinski, 2015).

2. Teoretical Framework

2.1. Telework (Telecommuting)

The definition of telework in the European Framework Agreement is kept deliberately broad. Article 2 of the European Framework Agreement on Telework of 2002 stipulates that: "Telework is a form of organizing and/or performing work, using formation technology, in the context of an employment contract/relationship, where work, which could also be performed at the employer's premises, is carried out away from those premises on a regular basis" (Eurofound, 2002). While this definition allows for wider agreement on the definition in the European Member States, the lack of a clear and ambiguous definition presents a problem for measuring and comparing the incidence of telework across countries. A slight deviation from the definition in the agreement appears in the EWCS (European Working Conditions Surveys) that measures only telework "from home", while the European Framework Agreement covers workplaces away from the employer's premises other than home as well. This deviation, however, can be considered negligible, since the evidence from other national and sectoral statistics show that "home" is a work site for the large majority of teleworkers. It should be emphasized that such definitions differ across Europe and there are no comparable national statistics on telework available yet. Since telework is relatively new, the majority of countries have just started gathering statistics on telework, therefore, the national data do not yet have a solid ground (Baltina, 2012).

The term "telework" (telecommuting in the US) was coined by Jack Nilles in 1973. It widely spread primarily at the beginning of the 21st century. Its growth was not prompted exclusively due to the companies reactions to the market needs, but also thanks to the fact that ICT products turned to be less financially demanding and the fast Internet coverage spread. At present, based on the Reuters data every fifth employee in the world works in the telework mode at least a part of working week (Reaney, 2012).

2.2.   Categorization of Telework

To interpret the data provided by surveys more reliably, the most commonly used categorization of telework forms must be introduced. It can be categorized by the place of performance as part of localization flexibility, as follows (Wojcak & Polakova, 2014):

a) *Home Office* – Represents the form in which the employee works at home utilizing ICT.

b) *Satellite Centre* – Is the form in which employee works in a centre established by the employer outside the employer's premises, e.g. at the client's place. IT programmers or database administrators are the occupations working typically in this mode.

c) *Street Work* – Is the form in which the employee works at a public place, e.g. in a café or at means of transport. This form has been implemented just recently due to the accessibility of the Internet and new developments of mobile devices.

2.3.   Telework Application

If we would like to answer the question of whether to introduce teleworking organization, we already have to highlight their major advantages and disadvantages. The most serious problem with teleworkers is social isolation from the team of co-workers as agreed by a number of authors (Cooper and Kurland, 2002; Pratt, 2003 Gajerndran & Harrison, 2007; Golden, Veiga & Dino, 2008; Pyoria, 2011). Problem is vented by the American Psychological Association and coincides with the results of our research in the recent ten years presented at conferences and published in a monograph.

This isolation results from the fact that the teleworker is not during working hours in personal contact with co-workers. Personal communication face to face is preferred and also due to non-verbal communication. If people know well personally, it is an advantage thus achieving effective communication. Another disadvantage of the teleworker is awareness. Teleworkers may not have much correct information about what is happening in the organization (Wojcak, 2013).

For employees working directly in the organization to assist misunderstanding formal dialogue with colleagues but in the world of telecommuting is not feasible. If we think of communication solutions that result in the embedded telework, as we have in the case of communication: email, conferencing, video calls, we can use a variety of cottages: *Hangouts, Whatsapp, Facebook, Skype*, but they are not completely substitute for standard communication. When teleworkers missing sense of respect from colleagues face to face, the possibility of immediate help in the event and discussed the situation in the organization. A serious problem is usually the lack of understanding of organizational culture, or in an amendment notice to change staff behaviour.

2.4. Organizational Culture

Organizational culture is a set of creeds, values and standards that share a given social group, and that decisively influences the behaviour of members. This file has been building for a long time based on the collective experience to meet challenges that the group has faced and is facing, and therefore serves as a valid new members (Sajgalikova, 2013). It is obvious that the organization itself is a culture that develops, changes and reacts to changes.

These critical factors (credit, values and group norms) significantly influence the thinking of the organization and the goals. If culture is not shared with others in the group may occur misinterpretation which can lead to a gradual decline in the ability to navigate the organization and understand the reasons why they were ever made. Those findings may be missing teleworkers and may not be able to give the performance if they work directly in the organization. This may result in that their intrinsic job satisfaction often leads eventually to demotivation, because feedback can be often negative.

The main advantage for organizations is to reduce costs. It is essential to reduce the cost of office, parking spaces, utilities. In terms of impact dimension of organizational culture according to telework, we need to briefly define what these dimensions are. Hofstede stresses that the cultural dimensions are only a framework to help assess a given culture and thus better guide decision making. There are other factors to take into consideration such as personality, family history, and personal wealth. The proposed dimensions cannot predict individual behaviours and do not take into account individual personalities (Hofstede, 2001).

One of his most notable accomplishments is the establishment of the Cultural Dimensions Theory, which provides a systematic framework for assessing the differences between nations and cultures. The theory is based on the idea that value can be placed upon six cultural dimensions (Hofstede, 2010). Dimensions are *Power Distance Index* (PDI), *Individualism* (IDV), *Uncertainty Avoidance Index* (UAI)**,** *Masculinity* (MAS), *Long Term Orientation* (LTO) and *Indulgence versus Restraint* (ING).

Power Distance Index – Organizational culture can be described as the concept of structured power hierarchy in the organization whose members expect the organizational culture. To a high degree it is influenced by factors such national culture, power relations, educational attainment and type of employment.

High PDI System is desirable and reflects the inequality gap among workers. Senior managers are mentors, those know answers. The high degree of symbolism, centralization and accepted response is social inequality, using the formal means of communication.

Low PDI Culture of normal value, symbolism and status of an individual should not be a welcome ingredient in the modern perceptions that ensures closer contact management and rejoice employees for achieving organizational goals. Decentralisation is a typical sign of progress change.

Individualism – The degree to which individuals are integrated into groups. This dimension has no political connotation and refers to the group rather than the individual. Cultures that are individualistic place importance on attaining personal goals.

High IDV – Collectivism The team is good behaviour, avoiding confrontation, in order to preserve harmony, violate standards. Collectivist culture relies on the power of the masses, where decision making is in the form of "We". Act collectively, which follows the tradition and creates strong relations.

Low IDV – Individualism The degree to which people prefer to act as individuals rather than as members of groups. For individual expression is characterized by creativity a certain degree of futuristic thinking "say what they think is the basis for discussions". Independence and autonomy in private life and in the workplace, form of thinking "I".

Uncertainty-Avoidance Index – This dimension measures the way how society deals with unknown situations, unexpected events and the stress of change. How comfortable are people with changing the way they work or live.

High UAI – Cultures that score high on this index are less tolerant of change and tend to minimize the anxiety of the unknown by implementing rigid rules, regulations, and/or laws. Time is money, strict rules are just top of the hill in very closed and conservative company culture.

Low UAI – On this index cultures are more open to change with fewer rules, laws and more loose guidelines, great for new challenges – less stress is perfect factor how to feel great. Companies do not look for perfect employee, saying "maybe" or "I do not know" is acceptable in many cases. Rules are not strict, just enough and tolerant for mistakes and new exploring.

Masculinity – The distribution of emotional roles between the genders. This dimension measures the level of importance a culture places on stereotypically masculine values such as assertiveness, ambition, power, and materialism as well as stereotypically feminine values such as an emphasis on human relationships.

High MAS (Masculinity) Cultures that are high on the masculinity scale generally have more prominent differences between genders and tend to be more competitive and ambitious. Masculinity – different rules and responsibilities for men and women, deeper formalization and divided positions how to edit own behaviour for needs of company.

Low MAS (Femininity) Those cultures that score low on this dimension have fewer differences between genders and place as a higher value on building relationship. Femininity stands for a society in which social gender roles overlap. Both men and women are supposed to be modest, tender and concerned with the quality of life.

Long-term Orientation – This dimension describes a society's time horizon. Short-term oriented cultures value traditional methods take a considerable amount of time to build relationships. This means the past and the present are interconnected and that what cannot be done today can be done tomorrow, where is innovation pressure for further aims and vision.

High LTO (Long Term) It is therefore on adapting the concepts and innovation for the future. Slow recovery and persistence points to respect commitments have been made through the Social Fund and the socially binding.

Low LTO (Short Term) It respects traditional values in order to stay competitive in the market. Low investments that have high returns expected results. Status of the organization is essential above all that it has to pay for unlimited costs.

Indulgence vs. Restraint – This dimension measures a culture's ability to satisfy the immediate needs and personal desires of its members. Restraint has strict social rules and norms under which satisfaction of drives is regulated and discouraged.

High Indulgence (51–100) Low stress rate, enjoying life, low emotional and feelings control, close relationships, where life is not too serious. In the first place is needs satisfaction, spending money for pleasure and fun.

High restraint (0–50) Pessimistic attitude with strict rules, negative and bad feelings. Standards are used for compliance and regulations. Restraint stands for a society that suppresses gratification of needs and regulates it by means of strict social norms.

3. Survey Objective and Methodology

The main purpose of our investigation was to find out a relationship between Hofstede's Dimensions of organizational culture and the introduction of telework. We investigated relationship based on Eurostat data for 29 EU countries and their values belonging to different dimensions of Hofstede. How telework influenced the number of countries depending on chosen cultural dimensions will show correlation analysis. The core data of telework used in the survey are reports on EUROSTAT website, documents and guidelines of the European Union that we used in our research and results.

We used logical induction, synthesis and deduction in developing results and drawing conclusions. To determine addiction research was used Pearson Correlation Coefficient. Results are interpreted in graphic and narrative form. The identity of the States in the creation of figures were used country code by ISO 3166-1 Alpha 2. For Hofstede's Dimensions we used the following abbreviations – Power Distance Index (PDI), Individualism (IDV), Masculinity (MAS), Uncertainty Avoidance Index (UAI), Long Term Orientation (LTO), Indulgence (ING).

Hypotheses and Alternative Hypotheses:

Ha: Significant correlation between the percentage and number of teleworkers rate of PDI.

Ha': No significant relationship between the percentage and number of teleworkers rate of PDI.

Hb: Significant correlation between the percentage and number of teleworkers rate IDV.

Hb': No significant relationship between the percentage and number of teleworkers rate IDV.

Hc: Significant correlation between the percentage and number of teleworkers rate MAS.

Hc': No significant relationship between the percentage and number of teleworkers rate MAS.

Hd: Significant correlation between the percentage and number of teleworkers rate of UAI.

Hd': No significant relationship between the percentage and number of teleworkers rate of UAI.

He: Significant correlation between the percentage and number of teleworkers rate LTO.

He': No significant relationship between the percentage and number of teleworkers rate LTO.

Hf: Significant correlation between the percentage and number of teleworkers rate ING.

Hf': No significant relationship between the percentage and number of teleworkers rate ING.

4. Results and Discussion

For determining the existence of dependency between the application of teleworking and hosted dimensions we used Pearson's Correlation Coefficient:

$$\rho_{x,y} = \text{corr}(X,Y) = \frac{\text{cov}(X,Y)}{\sigma_x \sigma_y} = \frac{E[(X - \mu_x)(Y - \mu_y)]}{\sigma_x \sigma_y}$$

Coefficient results of the investigation are shown in Table 1.

Table 1: Correlation Coefficient between the percentage and number of Teleworkers & Hofstede's Dimensions

	Correlation coeff.
Teleworkers % / PDI	−0.489
Teleworkers % / IDV	0.011
Teleworkers % / MAS	0.343
Teleworkers % / UAI	−0.012
Teleworkers % / LTO	0.016
Teleworkers % / ING	−0.118

When interpreting the Correlation Coefficient we used tools created by Cohen (Cohen, 1988) for the interpretation of the Correlation Coefficient in the social sciences. The absolute value of the correlation of less than 0.1 is trivial, 0.1 to 0.3 small, 0.3 to 0.5 medium, large is 0.5.

Table 1 shows that our major dimensions are PDI and MAS. The results of the analysis to see some heavy dependence correlation coefficient −0.489 at PDI. This is a negative correlation coefficient of which shows that countries with low distance of power have a greater number of teleworkers. This indicates that, if the rate of power within the organizational culture is higher, telework applications contrary to a lower degree. In Figure 1 is also seen declining representation in increasing Power Distance Index.
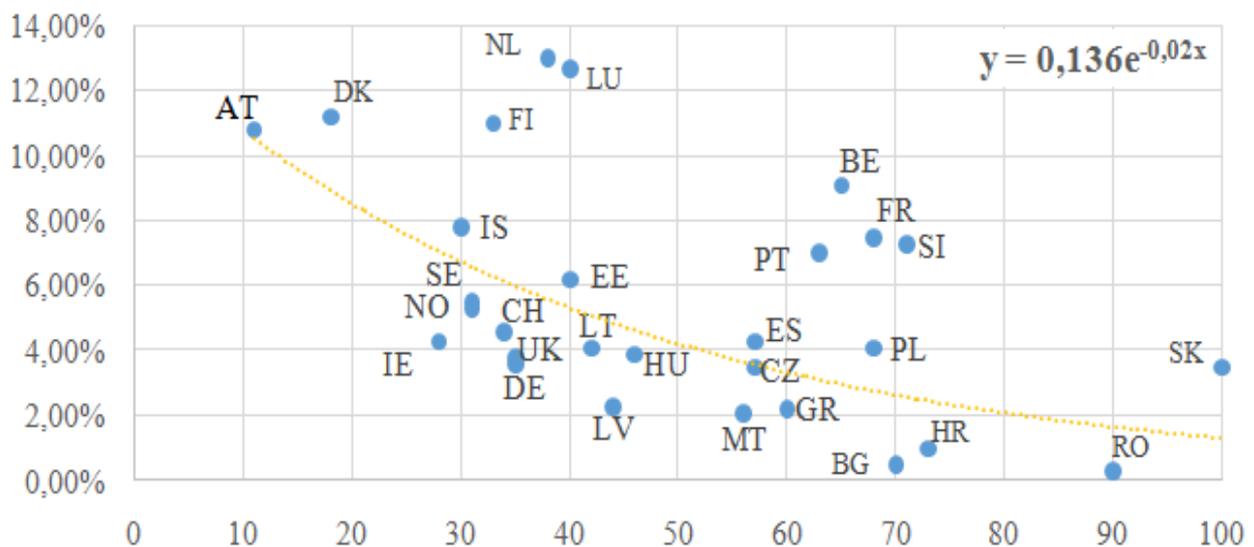
Figure 1: Illustration of the Application of Teleworking (percentage of teleworkers per capita) in each country, depending on PDI (0–100)

The Correlation Coefficient of 0.343 indicates the middle statistical dependence between the number of teleworkers and MAS. This coefficient is positive, and concludes that states with higher rates of MAS telework more frequently applied (Figure 2).

Hofstede's rate of the selected dimension in the Figures shown in the horizontal axis in the range of (0–100). Teleworkers percentage of the number of workers in the state shown on the vertical axis. Regresion equations are shown in Figures 1, 2.
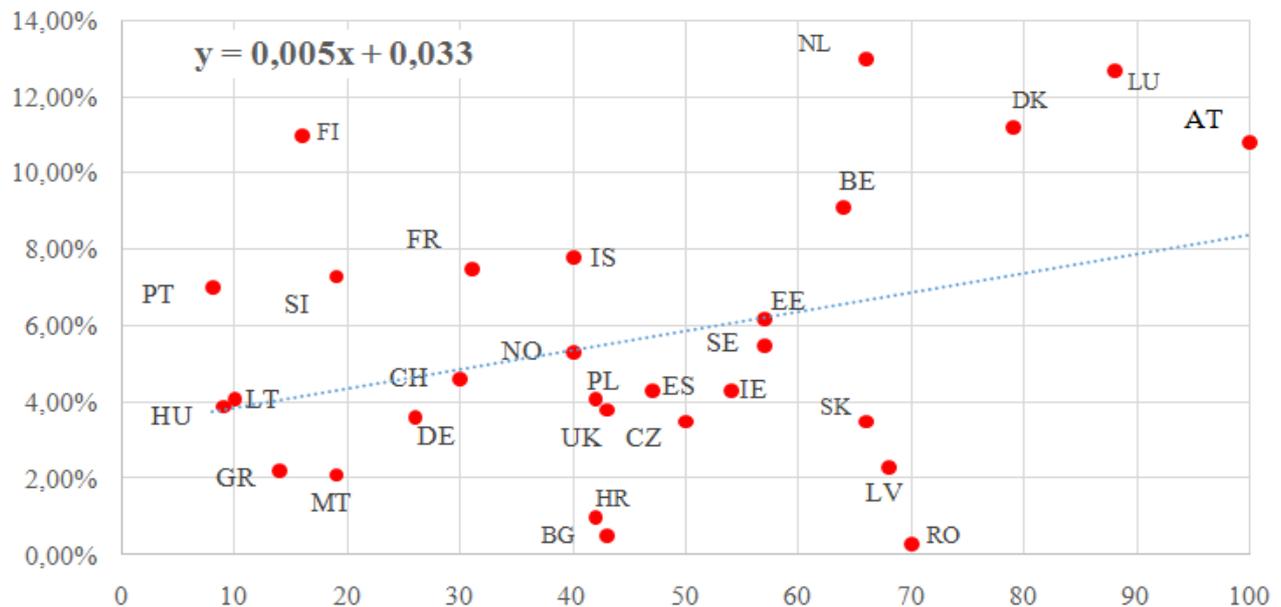
Figure 2: Illustration of the Application of Teleworking (percentage of teleworkers per capita) in each country, depending on MAS (0–100)

Regression equation was resulted as a polynomial equation of the sixth degree as best describing the variable MAS on the application of telework. For PDI is the result of an exponential equation as best describing the application of telework. From these final results we can accept hypothesis *Ha* and *Hc*, other hypotheses have a low Correlation Coefficient or common addiction, and therefore be dismissed, addiction has not been demonstrated.

5. Conclusion

The degree of dependence between the MAS and the number of workers has body *Correlation Coefficient 0.343*. It presented by Cohen threshold between low and medium dependence. It highlights the dependence that states with higher rates of Masculinity slightly more frequently used teleworkers. For this mild addiction, masculinity is the perception of the organization, focusing on profit, to reduce costs, the competitiveness among colleagues, the competitiveness that the organization moves forward. The opposite of higher MAS is femininity, focusing on quality of life, the solidarity, the harmony of relationships. Telework allows both. Organization can save and employee can improve quality of life. This is particularly the perception of telework as a benefit that allow to schedule "when I work and where I will do work".

The degree of dependence between PDI and the number of teleworkers has a correlation coefficient of 0.489 which is the upper limit depending central (from 0.5 in terms of social sciences high dependency). A higher rate frame sizes PDI represents such an organization in which it is difficult to have more equal relationship with a higher position in the organization. Employee here has limited creativity as demonstrated in the severity and the application of telework. Role is to be in the workplace to accomplish the

tasks. There is no discussion how to improve the organization. This kind of behaviour is a disadvantage for the form of telework.

Teleworker necessary due to the isolation of the right facilitate communication with others in the organization. Result analysis of law in considering this dimension indicates that in order to operate effectively reducing costs and improving employee motivation through the implementation of telework is an issue currently high PDI. Supervisors have the extreme privilege versus subordinate, at a very high rate, it can lead to the fact that the boss of the proposals and discuss with subordinates as abusive, and respond accordingly. When subordinates perform the role of the procedure, without much innovation on its own initiative, with fear to ask the boss, misunderstanding of the procedures. Then it can lead to complications in the organization, the failure to fulfil the tasks and employee frustration. Higher rates of PDI staff has an inner need to be tantamount to colleagues at work, discuss with confusion. Telework as a solution to social problems with transport, environment and opportunity for people to better organize their personal and professional life, the possibility of increasing knowledge, education, increasing independence and the consequent increase creativity and the possibility of a genuine contribution to the organization requires a lower level of PDI.

The results show the interaction MAS and PDI when examining the dependence of the number of teleworkers. Some states with higher PDI have the lowest percentage of teleworkers, but it is the states with higher rate of MAS. Lower MAS is turning into feminity, we expected a higher correlation to the application of teleworking with femininity on quality of life. We researched formal telework also called "Contract telework". Recently, is visible rising of the informal telework, which is provided as a benefit for satisfaction, because only a satisfied employee is an efficient and productive.

It therefore appears that differences between cultures have significant similarities. Most Theories of Motivation are focused on content, process and on individual needs, goals and consequences. Intercultural research suggests that universal acceptance of these theories is problematic. There is no flexible "manual" how to adjust culture in companies over the world. Further formal relations in organizations must be changed. Successful companies have to melt barriers between positions and reduce PDI level over all positions. Managers head new challenges, in future they have to find out new ways how to apply those skills, innovate processes and motivate employees for another needs.

Informal attitudes contribute to open workplaces where the provision of flexible forms will help increase innovation and satisfaction, when employees will feel that they are makers of the organizational culture. Management needs to continuously edit the new knowledge and apply it in the field. These approaches are only poorly developed. The future will show how managers can deal with changes in the needs of employees, prevent fluctuations of the best people and reach all planned goals.

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Benchmarking in Travel Agencies Management through Regression Analysis

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Abstract

Paper is focused on one of the management methodologies benchmarking in business subjects operating in tourism. Main goal is to determine the effectiveness of given travel agency due to comparison of the inputs consumption of the subject with an average effectiveness. The results will be obtained with using regression model for selected tour-operators in Czech Republic. These companies are members of The Association of Czech Travel Agents or belong to the most important tour-operators. Partial goal is to measure the level of concentration in this area according to portion in total sales. Necessary data is gathered from firms' financial statement, namely from profit and loss account that is available in business register.

Keywords: benchmarking, tour-operator, regression analysis, effectiveness, sales

JEL Code: M11

1. Introduction

The situation on the Czech market in tourism appears to be fairly stable in the past few years. In particular, the comparison with the period of the transition process from a centrally planned to a market economy. Thanks to transparent and more rigorous legislation regarding the establishment and business operations of travel agencies have been no significant variations in the number and structure of these entities. Their effectiveness is influenced by many factors. Above all, it is the level of competition, technical and technological development in the field of IT (especially in the field of communication and transport), economic and political situation in individual destinations and activities of professional organizations (e.g. The Association of Czech Travel Agencies, Czech-Tourism, etc.).

According to information from the Ministry of Regional Development, Czech Statistical Office and Tourism Satellite Account of the Czech Republic, the share of this sector in GDP and total employment is growing steadily. It must therefore be paid to the tourism sector increased attention. Main goal of this paper is to determine the effectiveness of given travel agency due to comparison of the inputs consumption of the subject with

an average effectiveness and measure the level of concentration in this area according to portion in total sales.

2. Benchmarking in Tourism

Benchmarking is a universal management method used for the comparison of observing subjects, both in manufacturing companies, and also in the case of service providers. Benchmarking is focusing on improving firms' performance, procedures and management (Ahmed and Rafiq, 1998). Benchmarking is a continuous systematic process for evaluating the products, services and work of organizations that are recognized as representing best practices for the purpose of organizational improvement (Spendolini, 1992). Benchmarking is also a continuous search for, and application of, significantly better practices that lead to superior competitive performance (Watson, 1993). Benchmarking is a disciplined process that begins with a thorough search to identify best-practice-organizations, continues with the careful study of one's own practices and performance, progresses through systematic site visits and interviews, and concludes with an analysis of results, development of recommendations and implementation (Garvin, 1993). The aim of benchmarking is the support of process or product improvement by the determination of a stated standard and of the related operations required. The insights obtained from benchmarking provide an organization with a foundation for building operational plans to meet and surpass the standard and promote an overall awareness of business improvement opportunities (Wöber, 2002).

An allied performance-based use of satisfaction measures depends on a company's internal implementation of the scores. Different work teams may be evaluated for their impact on customer satisfaction, i.e. setting motivation and encourage systems within a travel agency. Similarly, seasonality differences in the company's performance can be monitored by assessing satisfaction scores over the months of the year (Baum and Lundtorp, 2001).

Kozak (2004) considers two categories of benchmarking in terms of its micro- and macro-applications: organization benchmarking and destination benchmarking. Organization benchmarking deals with the performance evaluation of only a particular organization and its departments. In contrast, destination benchmarking draws a broader picture including all elements of one destination such as transport services, airport services, accommodation services, leisure and sport facilities, hospitality and local attitudes, hygiene and cleanliness, and so on. Since destination benchmarking has been neglected from both the practical and academic perspective, the focus is on developing a specific benchmarking methodology that would be relevant in the context of international tourist destinations.

Survey for benchmarking and efficiency of Czech tourism industry is missing but it is possible to use a technical efficiency analysis of the French hospitality sector which is carried out and includes different categories of hotels – mid-price, economy and budget. A hierarchical category Data Envelopment Analysis (DEA) model is employed to take account of the heterogeneity across the categories (Corne, 2015).

According to McDonald and Morris (1984,) the business performance can be measured and compared directly from financial ratios. But Cubbin and Tzanidakis (1998) have proposed that regression analysis could be more suitable than simple financial analysis. That is why this paper is trying also compare chosen financial indicator (return on sales) and construction of linear regression line. Certainly there are more various

methods how to define and measure the level of business subject's performance in literature publications and other sources. But using of that would overreach the recommended extent of this contribution.

2.1. Efficiency and Concentration of Czech Travel Agencies

Before using of regression analysis to measure performance effectiveness of travel agencies it is possible to find out the answer on the same question due to financial ratios. There are the results of return on sales (ROS) for TOP5 travel agencies in Czech Republic in 2015 in Table 1.

Table 1: Selected Financial Indicators for TOP5 Czech Travel Agencies

	Sales [ths. CZK]	Cost [ths. CZK]	Profit BT* [ths. CZK]	ROS**
1. EXIM TOURS	3,674,152	3,250,656	423,496	11.53
2. FISCHER	3,272,198	3,030,019	242,179	7.40
3. ČEDOK	2,479,436	2,414,364	65,072	2.62
4. BLUE STYLE	1,453,656	1,390,288	63,368	4.36
5. FIRO-TOUR	1,400,000	1,283,230	116,770	8.34

* BT – before tax
** ROS – return on sales in %

The best result 11.53% is in the case of Exim Tours and this company is also the first according to absolute profit before tax. Minimum 2.62% belongs to Čedok and it means quite big difference (almost 9%) in comparison with maximum. But the worst organization according to absolute profit in CZK is Blue Style. However this firm has return on sales higher by more than 2% in comparison with Čedok.

In the frame of cross-sector analysis it is possible to assess the case where the ratio of two variables Y and X is compared to some characteristic value, b. If Y is proportional to X, then for the ith company the difference between $Y_i X_i^{-1}$ and b can be described as an effect impacting on the individual company, i.e. as an indication of individual firm's unit from the standard.

Let's consider the most important tour-operators in Czech Republic with varying cost/sale combinations, marked as [X, Y]. For a certain level of sales Y, the observed costs X of each firm could be recognized as the costs of a company with average efficiency, plus an effective factor s representing the effectiveness difference between the individual travel agency and the travel agency with average efficiency, symbolized by the following equation:

$$X = \frac{1}{n}\sum [X, Y] + s \qquad (1)$$

In the frame of observed information it is quite necessary to pay attention on structure of travel agencies. There are big differences in sales between individual companies. That is why it could be useful to divide them onto three groups: firms gain sales less than 100 million of CZK, subjects with sales between 100 million and 1 billion of CZK and travel agencies with sales more than 1 billion of CZK. There are only five companies in the last third group and these are the same like in Table 1.

There is a histogram with distribution of travel agencies into given intervals from the first group in Figure 5. Figure 6 then illustrates number of companies with sales

higher than 1 billion of CZK for given intervals. These situations indicate different results and most subjects are located in the lower intervals.
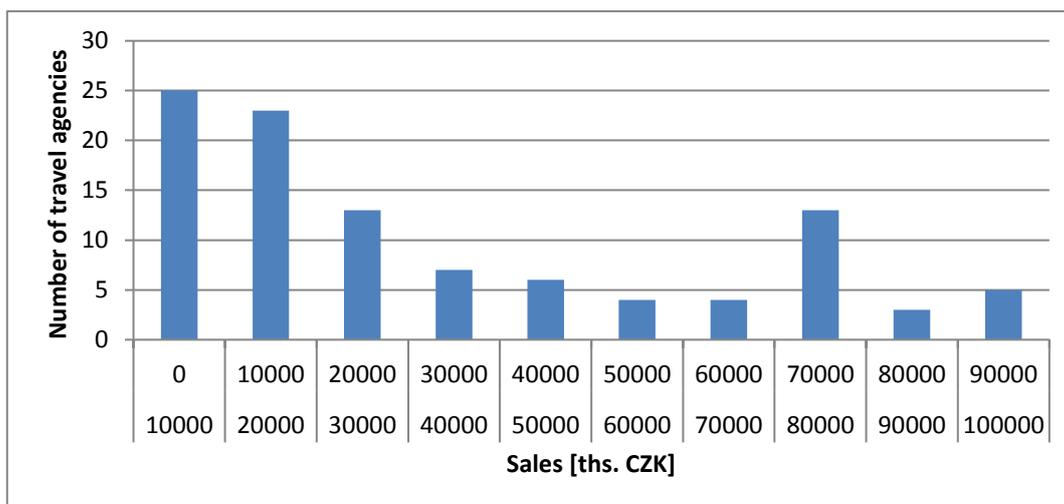

Figure 5: Histogram for travel agencies (sales < 100 mil. CZK)
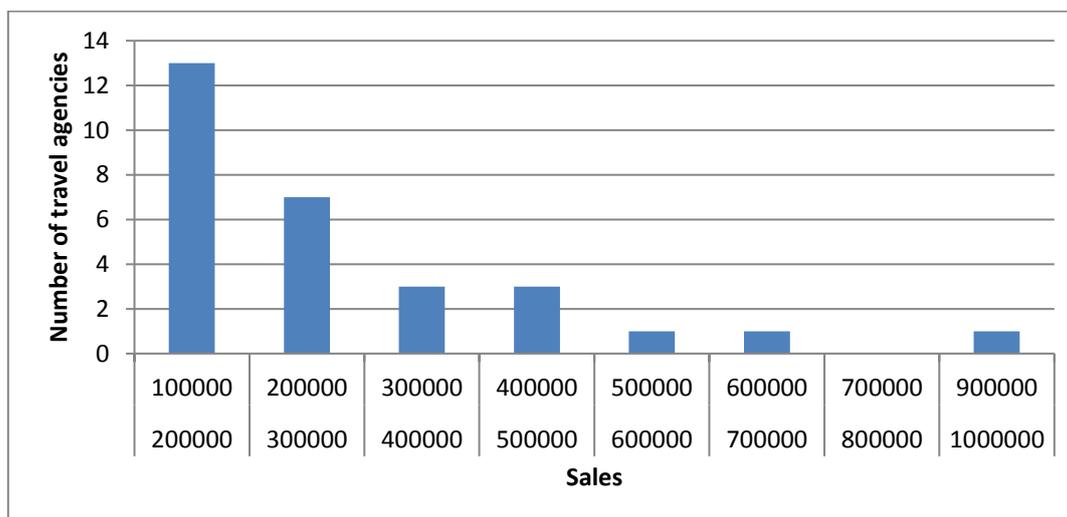
Figure 6: Histogram for travel agencies (sales 100 mil.-1 bill. CZK)

3. Methodology and Data

Research material was gathered from both Association of Czech Travel Agents, and list of travel agencies from website www.cestovni-kancelare.cz. Then 137 travel agencies with necessary information in business register were selected. This register has provided mainly financial statements, namely profit and loss account in the same date which was 31st of December 2014.

Firstly, one of the indicators of financial analysis (return on sales) was used to measure efficiency of TOP5 travel agencies. Then regression analysis with linear function has showed relationship between two variables (sales and costs) and confirmed the results from the previous financial ratio as well. Because of a big differences between levels of sales reached by observing travel agencies the regression lines were construct-

ed for four various groups: all 137 subjects, TOP50, TOP10 and TOP5 companies according to their sales.

Finally, a histogram was used to determine concentration in the most important travel agencies in Czech Republic. Considering quite big different outputs there are two figures illustrating situation for firms with sales less than 100 million of CZK and subjects with sales between 100 million and 1 billion of CZK. According to author it is not necessary to present histogram for the rest five companies with sales more than 1 billion of CZK.

4. Results

To determine relative effectiveness of an individual company, an assessment or benchmark of the inputs of the organization with average effectiveness with the same class of sales as the firm in question is needed. It could be gained with the support of regression analysis. Figure 1 represents the observations and a regression through them. Inputs – costs X are showed on the horizontal axis and outputs – sales Y are showed on the vertical axis both in thousands of CZK.
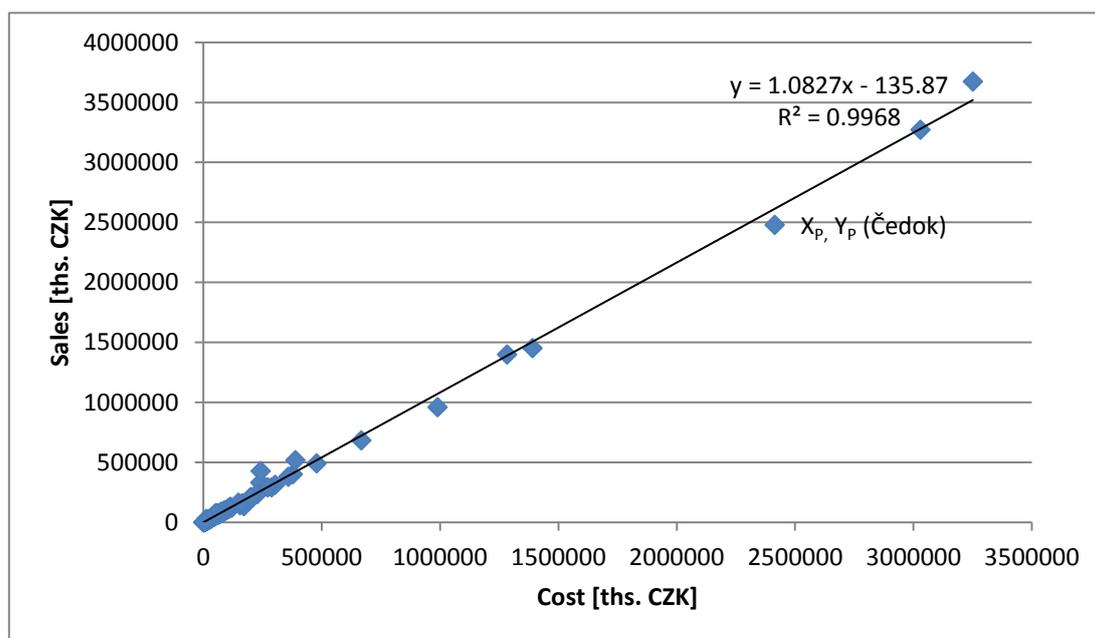
Figure 1: Cost/sales regression line – all observing travel agencies

The points mean situation for subjects with given input–output combinations. The indicated regression line presents a benchmark X' of the costs with an average efficiency for a certain level of sales Y. For example, in the case of travel agency Čedok (P) with detected costs X_P (2,414,364) and sales Y_P (2,479,436) the benchmarked cost with average efficiency (estimate) is given by X_P' which corresponds to the point of intersection where the connect line between point [X_P, Y_P] and horizontal axis could intersect the estimated regression line. The difference between the determined and the forecast benchmark costs ($X_P – X_P'$) is the estimate s_P' of effectiveness s_P. Similarly, for all other travel agencies, a benchmark s' of its true effectiveness s is indicated by the difference between the observed and forecast costs with average efficiency $s' = X – X'$. Subjects below the regression line are below average effectiveness and organizations above the regression line

are above average effectiveness. A level of particular effectiveness for each firm may be determined by indicating the difference between real and estimated costs as a portion of the estimated costs, i.e. the effectiveness indicator is given by the following formula:

$$e = \frac{X - X'}{X'} \tag{2}$$

The regression analysis presumes that the subject with an average effectiveness grows linearly with output Y:

$$Y = a \cdot X + b \tag{3}$$

According to this equation, a growth by one unit in sales increases costs by a, and for zero sales there are fixed costs b. In case of Czech travel agencies it is possible to form the following formula through calculation with using linear regression and sales and costs of these companies:

$$Y = 1.0827 \cdot X - 135.87 \tag{4}$$

Due to regression statistic it can be observed evaluation of reliability (i.e. coefficient of determination) which could prove dependence of two given variables. In this case this indicator is 0.9968. It is very positive result indicating very high dependence.

However, there are quite big differences between levels of sales of individual companies in Figure 1. It indicates significant concentration in this group of subjects. The large majority of firms gained sales less than 0.5 billion of CZK and only eight from 137 subjects have sales higher than this amount. That is why it is suitable to divide travel agencies according to their output. First observing group is TOP50 travel agencies.
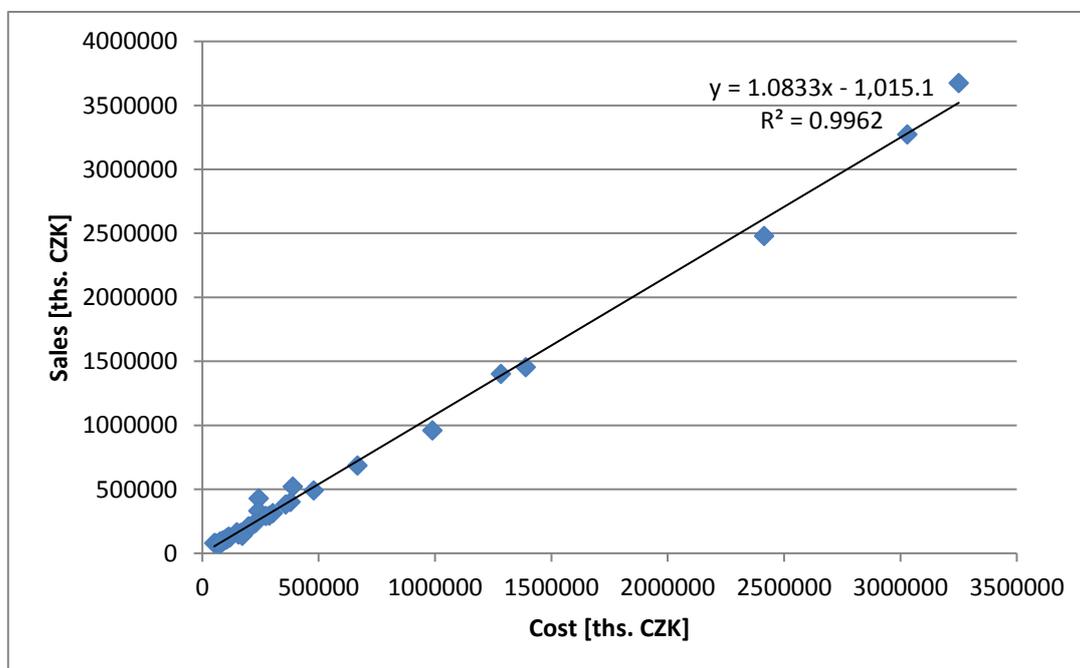
Figure 2: Cost/sales regression line – TOP50 travel agencies

Figure 2 illustrates regression line for TOP50 companies in given branch according to their sales. This situation is very similar like in previous situation with 137 the most

important travel agencies. In this case it is possible to form the formula (5) through calculation with using linear regression and sales and costs of these companies.

$$Y = 1.0833 \cdot X - 1{,}015.1 \qquad (5)$$

Due to regression statistic it can be observed evaluation of reliability again. In this case this indicator is 0.9962 and it is almost the same number like in previous example. It is again very positive result indicating very high dependence. It confirms very strong relationship between variables.

Figure 3 illustrates regression line for TOP10 companies in given branch according to their sales. This situation indicates that all 10 subjects are very close to given line and it is possible to form the following formula through calculation with using linear regression and sales and costs of these companies:

$$Y = 1.0766 \cdot X - 12{,}920 \qquad (6)$$

Evaluation of reliability is 0.9926 which is slightly lower than in first and second situation but it is still very positive result indicating high dependence.
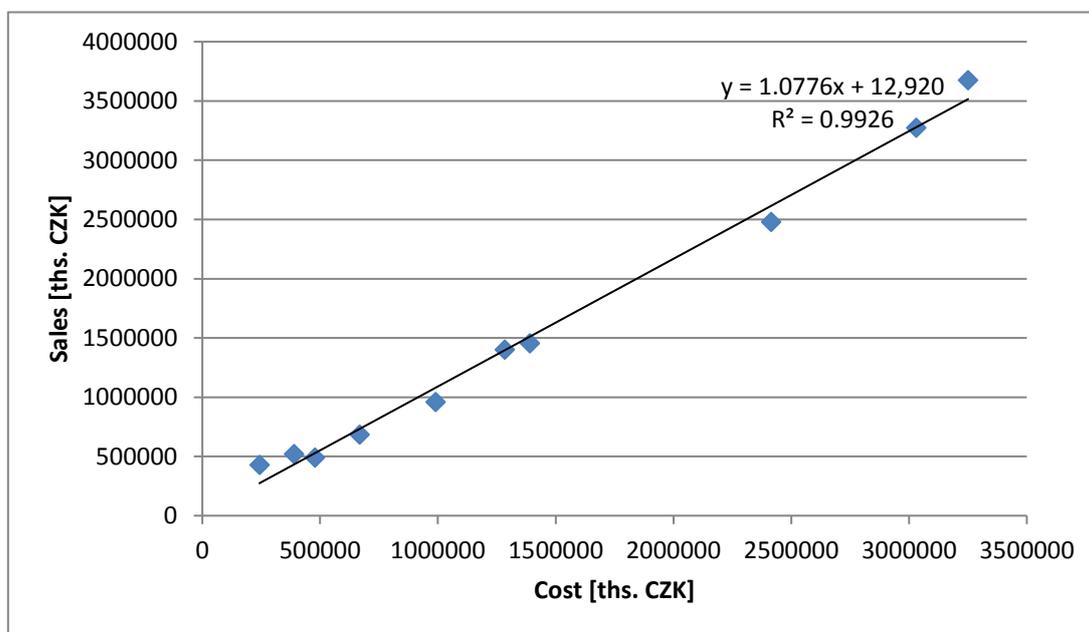
Figure 3: Cost/sales regression line – TOP10 travel agencies

Figure 4 confirms strong relationship between sales and costs. It also confirms the results from Table 1. There are two firms with the highest efficiency according to return on sales (Exim Tours and Firo-Tour) and they are above the regression line in Figure 4. Company with the lowest ratio (Čedok) is truly under the line. There is also information about equation of straight line and evaluation of reliability (0.9914).

In case of benchmarking through financial indicator (ROS) the best result 11.53% belongs to Exim Tours and this company is also the first according to absolute profit before tax from TOP5 tour-operators according to sales. Čedok has reached minimum 2.62% and it means quite big difference (almost 9%) in comparison with maximum. But the worst organization according to absolute profit in CZK is Blue Style. However this firm has return on sales higher by more than 2% in comparison with Čedok.
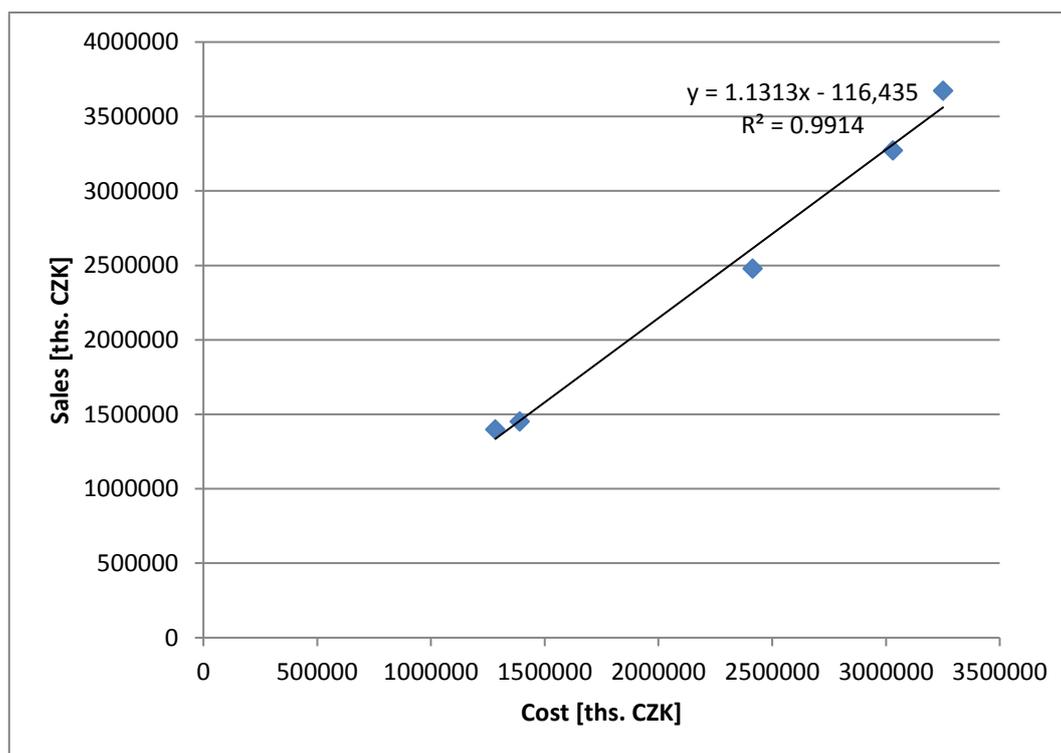
Figure 4: Cost/sales regression line – TOP5 travel agencies

The regression analysis is then offering more transparent procedure how to determine relative effectiveness of an individual company, an assessment or benchmark of the inputs of the organization with average effectiveness with the same category of sales as the firm in question. Due to regression statistic was observed evaluation of reliability (i.e. coefficient of determination). In this case this indicator is 0.9968 for all 137 travel agencies. It is very positive result indicating very high dependence. It confirms very strong relationship between variables indeed, because this number is approaching to value 1. Simply we can say that the level of outputs/sales is heavily influenced by inputs/costs.

Table 2: Concentration of travel agencies

	Sales [ths. CZK]	Share of number of all firms [%]	Share of total sales[%]
TOP5	12,279,442	3.65	52.07
TOP10	15,359,918	7.30	65.13
TOP50	21,427,103	36.50	90.85

Next results confirm very high concentration in this branch. It can be proved by calculation of portion of sales reaching by given group companies (137 firms and total sales are 23,585,144 thousand of CZK). These results are showing in Table 2. It indicates that probably one third of all observing travel agencies represents more than 90 % of their sales and only five subjects create more than 50 %.

5. Discussion and Conclusions

According to achieved results there is conclusion the very high dependence of level of sales reaching in travel agencies on their costs was confirmed. The using of regression analysis to benchmark observing companies is possible and more suitable than financial indicators. Another conclusion is considering structure of subjects providing services in tourism industry – travel agencies (tour-operators). Only 3.65 % companies create more than half of total sales (137 observing subjects).

Previously published papers do not contain such information from this branch. Considering industry structure it is possible to find similar situation in retail. This sector is similarly characterized by very high concentration due to very high market share of several big trade chains. Nevertheless, the same factor for both branches is many small and medium sized companies as well. Further observation could consider others factors influencing the outputs and performance efficiency of travel agencies (such as number of employees, type of tourism or target group of customers, etc.).

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Selecting Characteristic Patterns of Text Contributions to Social Networks Using Instance-Based Learning Algorithm IBL-2

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Abstract

The presented research focuses on selecting typical patterns of textual entries written using a natural language (English) in a social network *booking.com*, which publishes sentiment of customers that used an accommodation service. This work deals with the possibility to find the patterns via text mining based on a machine-learning tool known as Instance-Based Learning (IBL). To reduce high computational demands of the basic algorithm IBL-1 (k-nearest neighbors), IBL-2 does not store sample candidates the function of which is successfully carried out by the already stored samples. The textual data are represented as *bag-of-words* with sparse vectors. Because the non-linearly increasing computational complexity depends on the number of samples as well as on their vocabulary, the potential candidates are firstly freed of common insignificant terms and then the vector sparsity is strongly decreased by removing words having a low frequency in relation to the number of samples. Then, IBL-2 rejects to store samples that duplicate the functionality of the already stored ones. As a result, the database contains only (or mainly) significant samples that represent characteristic patterns, which may be used for classification or another type of a following social network analysis.

Keywords: machine learning, instance-based algorithms, IBL-2, text mining, social networks, typical patterns, computational complexity reduction, classification

JEL Code: C38

1. Introduction

Advanced data analysis often employs machine-learning tools for classification, which is a process where appropriate labels (class names) are assigned to unlabeled data in-

stances. A class includes instances that share certain common features, thus it represents knowledge obtained by generalization of information, which is hidden in the data. In the area of producing classifiers, inductive machine learning is based on algorithms that are trained using labeled specific samples. After obtaining knowledge by training, a classifier plays a role of a model. Today, many classification algorithms are available. In the following sections, the application of the Instance-Based Learning Algorithm IBL-2 (Aha et al., 1991) to text-mining is presented. The text-mining process here aims at social networks that produce big data volumes and are easily available in various Internet web-sites. Social networks deal with many different topics including economic ones, where the textual content available in the natural language form may provide valuable knowledge related to the commented topic. One of the possible analytic methods is to collect many relevant existing social-network entries and discover knowledge hidden in them.

The reason of applying IBL-2 is based on an idea that not all available data samples are necessary for classification. The fundamental algorithm IBL-1, which is also known as k-NN (Murty and Devy, 2011), or k nearest (that is, similar) neighbors, belongs to a group of algorithms known as *lazy* ones (Aha, 1997). Training k-NN is simply storing labeled samples into a database, which is a very fast training process. However, the classification itself is subsequently a relatively more complex process because it needs to compute the similarity (distance) of an unlabeled item to the all stored labeled samples. If the training set contains many mutually similar (near) samples, the classification process can uselessly demand longer time and larger memory. The main idea of the IBL-2 algorithm is to store only those samples that represent something distinctive and reject samples that just duplicate the functionality of those effective ones, which are already stored.

In the following sections, the description of the applied IBL-2 principle is given, then features and pre-processing of data used for experiments, results of experiments, and finally conclusions.

2. Instance-Based Learning and IBL-2

Instance-based learning (Aggarwal, 2014) is a group of algorithms based on looking for the most similar training-data instance and assigning its known label to an unlabeled instance. It is also possible to use the $k > 1$ most similar training instances and to assign the resulting label by voting and applying the majority one. It is necessary to have a database of labeled samples and decide how to compute the similarity. The similarity degree is defined as the distance of an item to another one, and can be computed using several methods. Often, the linear Euclidean distance is used if there are no specific reasons to apply another method, for instance, Hamming, Mahalanobis, Manhattan, and others; see, for example, (Cha, 2007). In this paper, the Euclidean distance measure was applied.

As mentioned above, IBL-2 tries to improve IBL-1 by removing unnecessary training samples, thus decreasing the computational complexity (time and memory), yet retaining the information contents of the left data. The principle is simple and based on filtering the sample candidates before storing them into a database. If the database is empty, the first sample is stored. Then each subsequent candidate is tested: If its classification is correct by any of the stored samples, it is rejected because its functioning can be substituted by an already stored sample. In the opposite case, the misclassified item

is included into the database as a new, useful sample. The whole operation repeats until all the training candidates are processed. As a result, the database contains only necessary samples, which can decrease the time and memory requests during the future classification.

Naturally, it is possible that some of the rejected candidates might be handy in the future classification tasks – less samples in the database can mean more limited knowledge. This is a price that should be paid if the computational complexity is too high – however, for big data, it is usually inevitable. Such knowledge limitation may have an impact on the classification accuracy, resulting in a higher error. However, the practice shows that this error is not too much higher, ordinarily several percent. As the results of this research showed, it was between 1-3 percent, which could be accepted for the given application. If the classification error would not be acceptable, alternative methods have to be found.

One of real problems with big data is a too long training or classification time – it can be caused not only by slow processors but also by insufficient memory (RAM) because then an operating system has to use much slower virtual memory (disk). The upper boundary for the computational complexity of the nearest neighbor algorithm depends on the number of samples in the database as well as on the space dimensionality (here, the vocabulary size). Using the "big O" expression, IBL-1's complexity can be formulated as $O(m{\cdot}k+m{\cdot}d) = O[(m{\cdot}(k+d)]$, where m is the number of samples in the database, k is the number of nearest neighbors, and d is the dimensionality. Sometimes it is expressed as $O(m{\cdot}k{\cdot}d)$, which depends on a particular implementation. If the analysis would deal with $k=1$, then $O(m{\cdot}k{\cdot}d) = O(m{\cdot}d)$, or $O(m{\cdot}k+m{\cdot}d) = O(m+m{\cdot}d) = O[(m{\cdot}(1+d)]$. Thus, especially for the typical situation when $d \gg 1$ (high-dimensional space), it is possible to write $O(m{\cdot}d) \approx O[(m{\cdot}(1+d)]$. Here, $O(d)$ means computing the distance to one sample and $O(m{\cdot}d)$ finding one nearest neighbor. More can be found, for example, in (Arya et al., 1998).

It can be easily seen that the complexity increases non-linearly and can be considerably decreased by reducing m or d from the data pre-processing point of view. This fact was taken in consideration for the design of experiments – reducing the words having no information contribution from the labeling point of view as well as lowering vector sparsity, which was part of the data pre-processing and is described in the following section.

3. Experimental Data

For the experiments that were supposed to reveal the IBL-2 efficiency in the area of the social-network contribution analysis, the data-set consisting of entries available in the *booking.com* social network (www.booking.com) was chosen. This social network contains opinions of accommodation services written by customers after the verified usage of the service. The customers can write their positive or negative experience freely via the Internet in any natural language. Such entries are then publicly accessible in the *booking.com* web-site and can be used for any analytic process – either by other potential customers or by the service providers. One of possible analytic processes can be, for example, improving the competitiveness. For this purpose, the result of the analysis should be the knowledge discovered in the collection of the textual data created by the customers – a process known as *text-mining*. The hidden knowledge can be obtained by the generalization of information included in the data.

The collected *booking.com* data contain opinions written in more than 30 languages. For the presented research, English entries were selected because they represented the largest data-set with two millions textual units. As several previous analytic works demonstrated (Žižka and Dařena, 2011; Dařena et al., 2014; Žižka and Svoboda, 2015), a sufficiently large random selection could provide valuable and reliable generalization providing significant knowledge based on relevant words and phrases included in the data, both for negative and positive opinions (Žižka and Dařena, 2015). Thus, there were two data classes representing positive and negative sentiment.

3.1.   Data Pre-processing and Its Representation

The described experiments used random selections of 1,000, 5,000, 10,000, 25,000, and 50,000 textual reviews. The five different volumes of the data-sets were chosen to study the IBL-2 behavior related also to the data volume. Each data-set included 50% of positive and 50% of negative reviews to avoid known problems with analyzing unbalanced classes (Mani and Zhang, 2003).

The textual form was transformed into the numerical one using the standard testified *bag-of-words* representation (Sebastiani, 2002), where a textual document is converted into a set of words that are taken as mutually independent variables (a word position in a document plays no role). Such a representation loses some information but significantly decreases the computational complexity – a word occurrence probability is unconditional on other words, which also very noticeably reduces the computation requirements. The document multidimensional space is then represented by individual vectors per each document. In the studied case, the coordinates of the vectors were numbers representing frequencies of words included in the original reviews.

The number of dimensions is given by the number of unique words in the whole document collection, that is, its particular vocabulary. Typically for such a social-network data, the vocabulary is very large (may be tens of thousands of words, or more) but individual entries are much shorter (one word up to maximal hundreds). The vocabulary of the investigated data depended on the number of documents in each data-set. The smallest data-set (1,000) contained 3,423 unique words, while the largest one (50,000) had 34,334 such words. On the other side, the average number of words per document was almost the same – some 20 words only (the median was 16). The resulting matrix, where a row represented a document and a column a word, consequently included very sparse vectors, where the majority of a vector coordinates was just zeros.

The computational complexity of the IBL-1 and IBL-2 algorithms depends directly on the number of dimensions (vocabulary size) because the sought-after nearest neighbor of an unlabeled document can be found by computing all the distances to the labeled documents and such computation has be carried out using the high number of dimensions. To lower that non-linear complexity, the number of labeled samples as well as of dimensions should be decreased. Reducing the sample number was the own goal of IBL-2, so the experiments used the reduction of dimensions, which was based on excluding words occurring only in few documents, or common words that did not provide information related to the defined labeling. The exclusion of the common words applied a simple but testified approach in English (Sebastiani, 2002): all special characters, numbers, and words having just one or two letters were omitted, which was the first step.
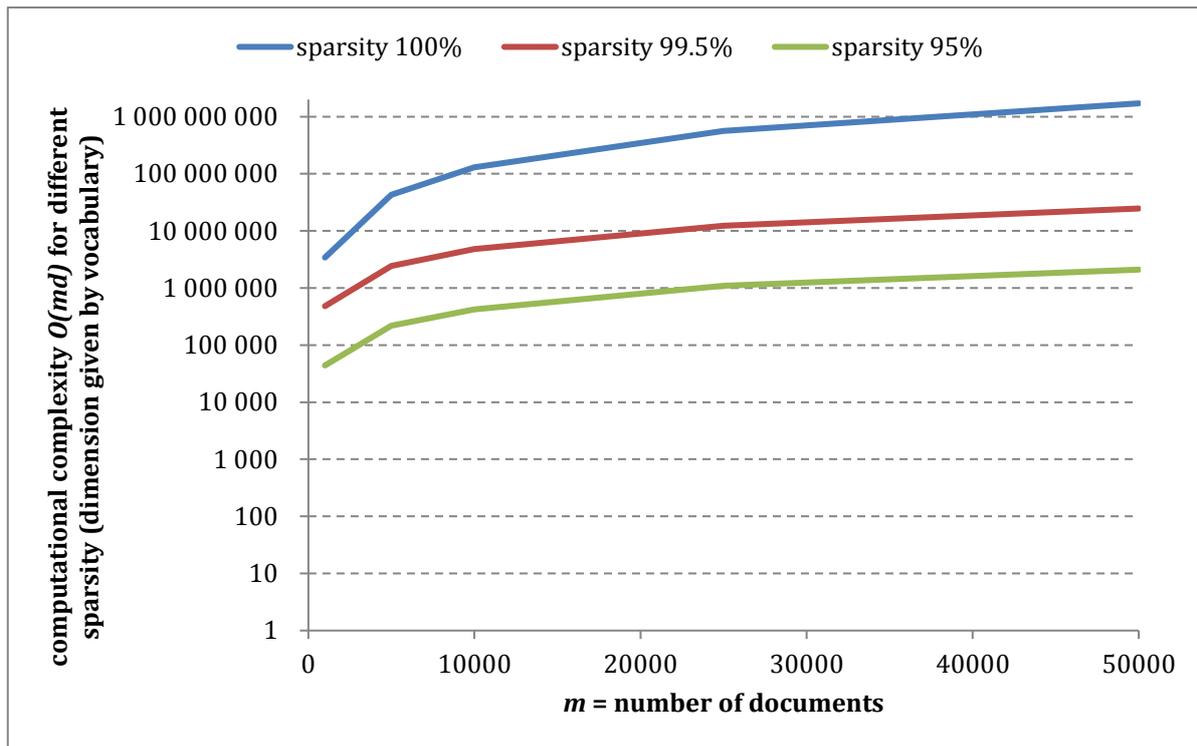
Figure 1: The computational complexity of the IBL-1 and IBL-2 algorithms depending on the number of samples and words.

3.2. Word-Sparsity Reduction

In the second step, the typically existing vector sparsity, see for example Chapter 13 in (Manning et al., 2009), was reduced. A simple, often employed function, known as *sparsity reduction*, was applied to the rest of words. The sparsity-reduction function is, for example, included in the package Text Mining in the R programming language (Dayal, 2015), as *removeSparseTerms(term-matrix, s)* that removes terms t_i for which their relative frequency $< m \cdot (1.0 - s)$; t_i stands for an *i*-th term (*i*-th matrix column), *m* for the number of documents (matrix rows), and $0.0 < s < 1.0$ is the sparsity parameter saying how many (at least) documents a weighted word (term) must occur in. Only those words the relative frequency of which is greater or equal than $m \cdot (1-s)$ are retained. For example, if the sparsity parameter value $s = 0.95$, then $m \cdot (1-0.95)$ retains words which occur in *m* documents with the relative frequency greater than $m \cdot 0.05$ (that is, 5%).

The reduction of number of words results in the substantial decrease of the dimensionality, which is favorable not only for improving the computational complexity but also for lowering the known problem *curse of dimensionality*, see for example (Radovanović et al., 2010), as well as for removing at least partially some noise produced by mistyping, irregular words, abbreviations, and so like.

Figure 1 shows how the computational demands (in any units) can grow depending on the number of documents *m* and vocabulary size for the given data parameters. *Sparsity 100%* here means the full text, that is, no words with sparse frequency related to the document number. The vertical scale is logarithmic.

In Figure 2, the basic statistics of the used data is illustrated for all the groups having different number of reviews. The graph shows both the total number of words in a document set as well as the average number of words per document, without the spar-

sity reduction, plus with two *s* values (0.995 and 0.950). The vertical scale is logarithmic. Interestingly, for all five data-sets, the sparsity reduction resulted not only in a significantly lower number of words but also in almost the same number of total and average number of words.
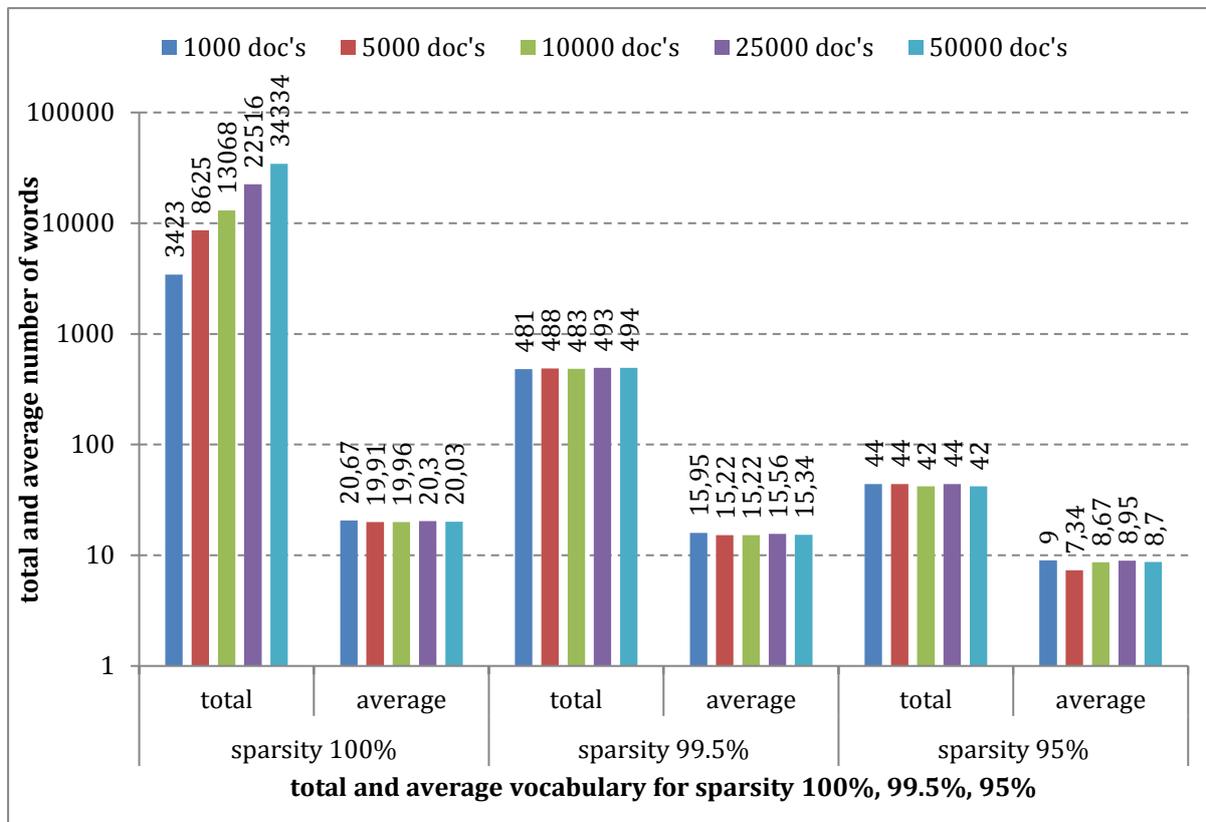

Figure 2: The experimental data characteristics (vocabulary, dimensionality) for various data-set volumes and the sparsity reduction parameter.

4. Results of Experiments

The results of experiments are concentrated in Figure 3, 4, and 5. Figure 3 shows the very significant computational time fall resulting from the sparsity reduction. The vertical axis is logarithmic, in seconds. Note that this is the total CPU time measured both for training and testing using the 10-fold cross-validation method. Unlike IBL-1, IBL-2 training process is more demanding because it looks for the nearest neighbors during the classifier training process – IBL-1 just stores all samples, which is negligible when compared with the classification itself.

Figure 4 demonstrates the results of applying the IBL-2 algorithm to the selection of only important document samples, again for all the data-sets and sparsity reductions. It was observed that for larger data-sets, the number of selected positive samples was lower than the number of the negative ones. Till now, this phenomenon has not been completely explained. One possible explanation might be that the negative reviews commented more different negative service features than did the positive comments for its favorable ones, which mostly focused on positive features that were not represented
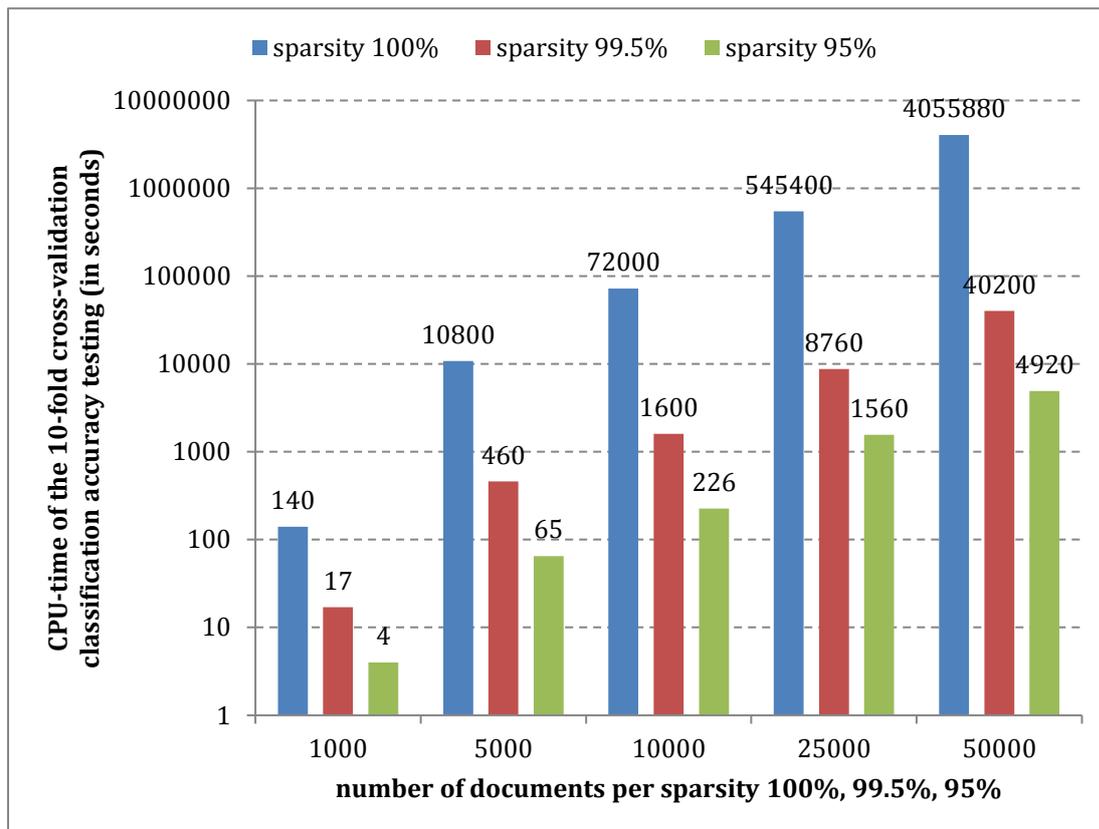
Figure 3: The computational time dependence on the data-set volume and sparsity reduction. The time relates to the 10-fold cross-validation measurement.

by so many different properties and included typical common attributes like *low price, short distance from airports, helpful hotel staff, good food, cleanness,* and so like.

After reading a limited number of negative reviews and comparing their contents with positive comments, it proved to be apparent that the customers complained about more different problems that were, however, also more individual. In such a case, more samples should perhaps be used for generalization.

Finally, Figure 5 illustrates the classification accuracy errors for different data-sets and sparsity values. The classification testing used the 10-fold cross-validation method. Apparently, smaller data-sets provided larger errors, which was no surprise because larger data usually contain more information. The comparative results of IBL-1 (k-NN) are not here demonstrated because of saving the article space. However, when using the full data-sets under the same data pre-processing conditions, the IBL-1 classification error was lower only within the interval 1%–6%.

5. Discussion and Conclusions

As demonstrated, the IBL-2 algorithm together with the sparsity reduction significantly decreased the volume of training samples while preserving the classification error almost without any change, which fluctuated only between 0.5% and 2.5%. The highest error was for the smallest data-set (1,000 samples), which was expected because more
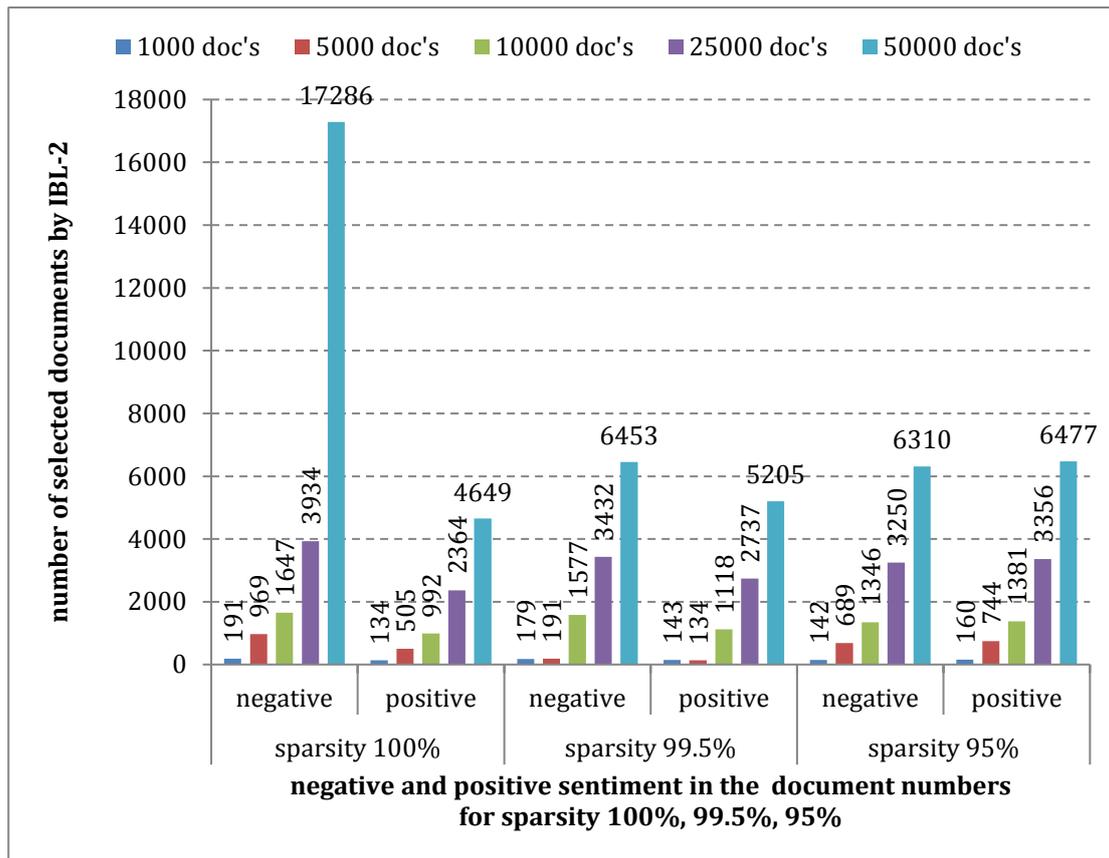
Figure 4: The results of rejecting training samples that duplicated the functionality of already accepted ones. The graph illustrates also the rates between positive and negative comments for different data volumes and sparsity coefficients.

examples can provide more information – this is typically general for machine-learning algorithms. For larger datasets (5,000 and more) and sparsity = 95% the classification accuracy was even slightly better, up to 1–2 %.

The volume reduction was substantial which resulted in big savings of computational time. Such positive impacts of applying the combination of IBL-2 and sparsity reduction is the most evident for the largest data-set (50,000 samples), where also the rate between the positive and negative reviews kept the original balance 50% : 50%. This is a very positive finding out because the analysis of textual contributions to social networks has normally to deal with very large data volumes, so the lowering of the computational demands is welcome.

Using IBL-2 could be also just one of a series of steps in analyzing such data type. After generating a database with selected significant samples, additional analytic tools can be applied in the hope of discovering as best knowledge as possible. Such a procedure may find its position in economy as well as in other areas where the knowledge discovery plays a significant role.

This research continues with applying IBL-3, which removes noisy training instances, thus improving the classification accuracy as well as further decreasing the number of samples in the training database. The initial results are very positive and the complete results are planned to be published soon, including the direct, more detailed mutual comparison between IBL-1, IBL-2, and IBL-3.
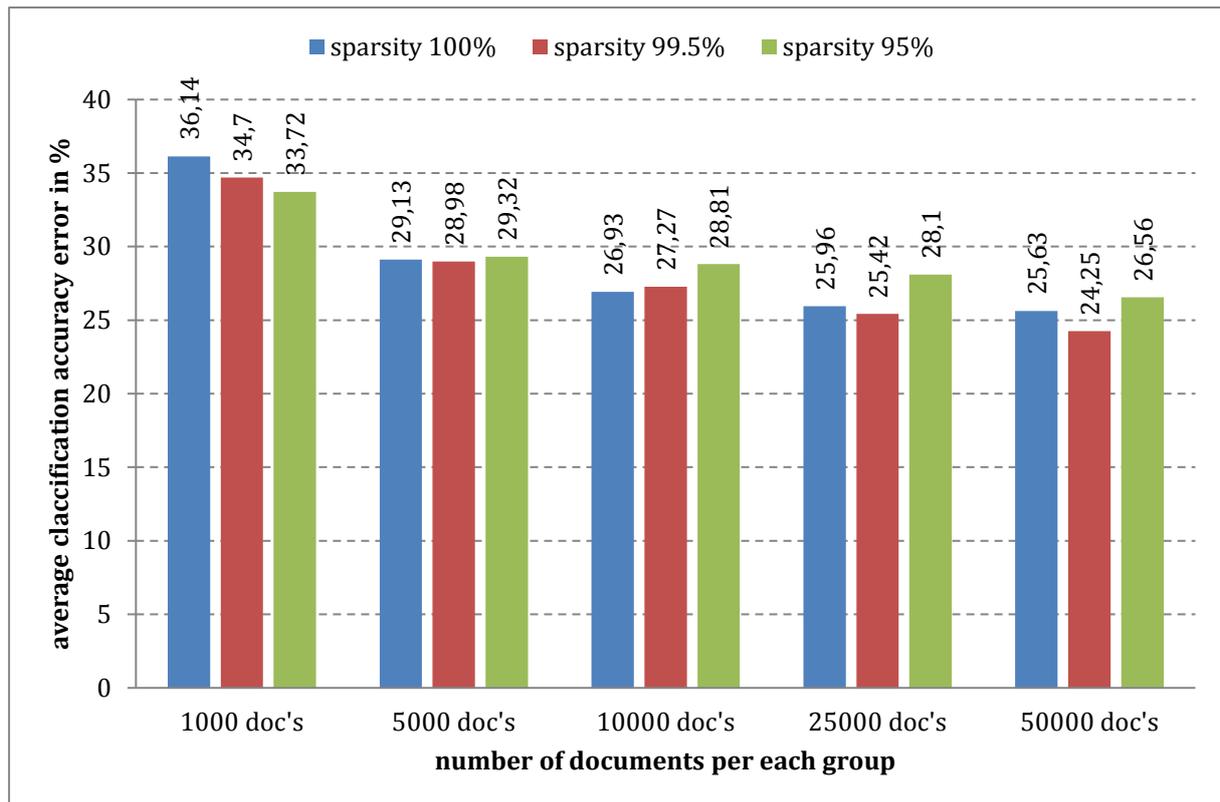
Figure 5: IBL-2 classification accuracy errors for different data volumes and sparsity coefficient values.

Acknowledgements

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