

of the University
of Pardubice
**Faculty of Economics
and Administration**



SCIENTIFIC PAPERS OF THE UNIVERSITY OF PARDUBICE

Series D

Faculty of Economics and Administration

No. 45 (1/2019)

Vol. XXVII

SCIENTIFIC PAPERS OF THE UNIVERSITY OF PARDUBICE

Series D

Faculty of Economics and Administration

No. 45 (1/2019)

Vol. XXVII

Registration MK ČR E 19548

ISSN 1211-555X (Print)

ISSN 1804-8048 (Online)

Contributions in the journal have been reviewed and approved by the editorial board.
Contributions are not edited.

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ABOUT JOURNAL

Scientific Papers of the University of Pardubice, Series D journal aims to be an open platform for publication of innovative results of theoretical, applied and empirical research across a broad range of disciplines such as economics, management, finance, social sciences, law, computer sciences and system engineering with the intention of publishing high quality research results, primarily academics and researchers.

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DOES GENDER MATTER IN FINANCIAL LITERACY? A CASE STUDY OF YOUNG PEOPLE IN TIRANA

Gentjan Çera, Bruna Tuzi

***Abstract:** Financial literacy has become an important issue because many studies have established a connection between financial literacy and financial decision making for people. The aim of this study is to identify the differences in financial literacy based on the gender of young people in Tirana, Albania. A questionnaire was designed, covering financial knowledge, financial attitude and financial behaviour. Principal component analysis was performed to identify the main factors for both genders. Even though similarities were found, evidence reinforced the existence of the differences in gender regarding financial decision making as a consequence of financial literacy. Compared to young females, young males reflected to deal with risk, willingness to act and reading to improve financial knowledge. In contrast to this, young females were more concerned about money management and how to spend money related issues.*

***Keywords:** Financial Literacy: Knowledge, Attitude, Behaviour, Gender*

***JEL Classification:** D01, D14, G40.*

1. Introduction

Finance has become a complex labyrinth in which many people are faced with challenge of navigating successfully. Hence, financial literacy has become an important issue, not only in developing countries but also in the developed ones. Low levels of financial literacy have existed as a problem long before the global financial crisis occurred (Sherraden, 2013). At the beginning of the 2008 crisis, it was further emphasized that low levels of financial literacy were a barrier to economic growth both at national and international levels (Stolper and Walter, 2017). Thus, the wealth of a country is influenced, also by the financial literacy of its citizens. Among the factors that contributed to the 2008 financial crisis were a combination of risky and behaviour and inappropriate financial actions by individuals and businesses, as well as the lack of understanding of households on financial issues relating to credit and investments in particular. Consequently, individuals opted, sometimes unknowingly, to take more financial risks than what they could afford.

Following the economic, political and social changes that took place in Albania after the 1990s, the Albanian consumer was left unprepared to deal with a number of new and sophisticated products offered by the financial services firms. The Albanian consumer had to make important decisions about their personal finances, the effects of which did not only affect their purchasing ability, but at the same time had an extended impact on Albania's financial services industry and macroeconomic stability.

Studies have shown that consumer financial disability leads to personal financial mismanagement which in turn causes inefficiency in financial markets (Brown, 1993; Garman, 1998; Hira and Loibl, 2005). Also, scholars report that making a bad financial decision has a negative impact on the workplace, as therefore, financial education increases labour productivity (Garman et al., 1996, 1999; Joo and Grable,

2000). Financial literacy within a community has a positive impact on community development, and leads to a lower level of poverty (Chibba, 2009). When adults and children are taught good financial management skills, then the quality of these families and the community as a whole is strengthened, enabling them to pursue their desires and provide a successful financial future.

A growing number of countries have paid attention to the level of financial literacy of consumers and the public as a whole (Lusardi and Mitchell, 2011; Mitchell and Lusardi, 2011). The importance of good financial literacy has also been recognized by the European Union since 2007, this can be seen through the European Commission's adoption of a financial literacy issue that underlined its role in the domestic market policy and the benefits it brings to individuals, society and the economy in general. In 2008, the OECD created the International Financial Education Network with the objective of improving international co-operation on financial literacy issues around the world. In Albania, financial education has been in focus since 2006 by the Bank of Albania in cooperation with other governmental institutions, through the organization of activities aimed at raising public awareness of behaviours, attitudes and financial ability. Also, the Ministry of Education and Science and the Bank of Albania signed a memorandum of cooperation aimed at enhancing financial literacy. During this period, financial education activities were divided into five main categories: elementary school students, high school students, students, teachers and journalists.

The importance of financial education has increased in recent years as a result of financial market developments and demographic, economic and policy changes. Financial literacy can play an important role in the development of the Albanian financial system. In 2005, an OECD report showed that financial education can benefit consumers of all ages and income levels and that financially educated consumers can also benefit the economy, by demanding products more responsive to their needs, and encouraging providers to develop new products and services, thereby increasing competition in financial markets (OECD, 2005). According to the Financial System Stability Assessment 2, conducted by the IMF in 2005, the Albanian financial system is still in its early stages of development, as transactions in cash are still very common. Since Albania aspires to be a member of the European Union, the improvement in levels of financial literacy among its citizens should be as close as possible to European standards. As indicated by the report of the European Commission, progress has been made in improving financial education in Albania, but the quality of this education must be at the highest levels (EC, 2016). Financial education positively affects the financial system as a whole and the behaviours, attitudes and capabilities of consumers also. It can help develop the skills of future financiers. As a result, financial education is put in the spotlight during 2006 (Chionsini, 2012).

Based on the above discussions and the study of Potrich et al. (2016), the aim of this study is to analyse the financial literacy among young people living in Tirana and to investigate any difference between males and females in terms of the three main dimensions: financial behaviour, financial knowledge and financial attitudes.

2. Literature review

Many definitions have been offered for financial literacy as evident in several business and academic reports (Lusardi and Tufano, 2015; Mandell and Klein, 2007;

Moore, 2003). For the purpose of this study, financial literacy is defined as the ability to understand finances. More specifically, financial literacy refers to acquiring financial skills and knowledge that allow us to be better informed and to take effective decisions through our knowledge of finance. It also has to do with the individual basic level of financial affairs, the knowledge on how to manage budget and personal or family assets. According to Noctor et al. (1992: 29), “financial literacy is the ability to make informed financial predictions and make effective decisions regarding the use and management of money.” Financial literacy as a construct was modelled for the first time by the Jump\$tart Coalition for Personal Financial Literacy in 1997, which defined financial literacy as “the ability to use the knowledge and the ability to manage one another’s financial resources in the most effective way.” A more detailed definition is given by Tomášková et al. (2011). According to them, financial literacy is a concept that is used to refer to the body of knowledge, skills and attitudes of the citizens needed to financially secure themselves and their family. Individuals with good financial literacy have knowledge about money and pricing, they are prepared to effectively manage their personal or family budget by being able to manage their money and financial assets. Financial literacy is also related to mathematical knowledge, and the use of mathematical skills to solve numerical problems, knowledge in computing such as the ability to search, evaluate and use the information found and legal knowledge such as orientation with legal systems, rights and responsibilities of individuals (Tomášková et al., 2011). Financial literacy as part of personal or family financial management includes three components: monetary literacy, knowledge of prices and knowledge of the budget. Hung et al. (2009) reviewed the literature of this field and they defined: financial literacy as a specific form of knowledge, the ability to use that knowledge, good financial behaviour, and good financial attitudes and even financial experiences (for a review on measuring knowledge refer to Matošková (2016)). Moreover, Nguyen et al. (2017) found that financial knowledge had a positive relationship with regular personal saving.

Gender is a social phenomenon that refers to behavioural, social, and psychological characteristics of men and women. A review of current literature indicates that gender has been claimed to be a significant variable that affects the level of individual financial literacy (Hira and Mugenda, 2000). Even after controlling the impact of other factors, Chen and Volpe (2002) find that the gender factor is still statistically significant. Studies have shown that women are less knowledgeable about finance than men (Chen and Volpe, 1998; Lusardi and Mitchell, 2008; Mitchell and Lusardi, 2011). Not only older men are generally more financially knowledgeable than older women, but similar patterns also are shown up among younger respondents as well (Lusardi and Mitchell, 2014). In addition, according to a study report of the OECD in 2012, a larger proportion of male than female respondents gained high scores in knowledge in Albania. It appears that in almost all countries covered in that pilot study, where the average level of knowledge was relatively high, female respondents were less knowledgeable than male respondents (Atkinson and Messy, 2012). Belás et al. (2016) did a study comparing financial literacy among secondary school students in the Czech Republic and Slovakia based on their gender. The result of the study showed that, male and female subjects covered in the study were equally sound in making the right decisions regarding bank loan options available to them in both countries. Surprisingly, Cupák et al. (2018) found that the highest differences in gender referring

to financial literacy are in more developed countries. Therefore, they concluded that personal characteristics can explain some of these differences.

Furthermore, findings have suggested that women are more risk-averse than men; less confident when making financial decisions, and less knowledgeable in terms of financial literacy (Chen and Volpe, 2002). Lusardi and Mitchell (2007) studied whether people tried to figure out how much they need to save for retirement, whether they devised a plan, and whether they succeeded in the plan. They found that retirement calculations are not an easy task for respondents in general and for women in particular. The risk-averse behaviour of women in their retirement planning will likely result in significantly lower pension wealth than men (Chen and Volpe, 2002).

Analysis of the relationship between behaviour and knowledge suggests a positive relationship when knowledge increases so does the behaviour (Atkinson and Messy, 2012). Women are more likely than men to be satisfied with their level of savings. On the other hand, women are less likely than men to feel that their financial situation is better than that of others at the same socio-economic level (Hira and Mugenda, 2000). There is also a positive relationship between attitudes and behaviour (Lusardi, 2008). Atkinson and Messy (2012) reported that women were more likely than men to have high attitude scores showing that they typically had a more positive attitude in long-term. However, Hira and Mugenda (2000) found that women are less likely than men to be satisfied with their ability to meet long-term goals and women are far more likely than men to purchase unplanned items, so to buy without any need. Danes and Hira (1987) found that males know more about insurance and personal loans, but know less about overall financial management than females. In this context, Kozubíková et al. (2017) found evidence of gender on the perception of financial risk in small and medium-sized enterprises in the Czech Republic.

Despite the broad literature focusing on financial literacy, there is a lack of evidence of financial literacy for Albanian consumers. A research that has been conducted in Albania to measure the financial literacy was carried out at the national level in 2011. In addition, the OECD undertook a study in 2011 to measure the financial literacy of 14 countries in 4 continents, including Albania. Despite the great contribution to identifying the needs and shortcomings of the Albanian population in terms of financial literacy, this study addresses the problem of a “one size fits all” perspective as it is not focused in a particular segment of the population. It concluded that the level of financial knowledge, even when compared to other countries, was at the average level and that there is still a lot of work to be done. Appropriate good financial behaviour is mainly demonstrated by males, households, people within the 30-59 years old bracket, with a high level of education when compared to those with unsustainable incomes. Most respondents exhibited deficiencies in financial literacy and, as expected, knowledge, financial attitudes and behaviour positively affect the financial literacy (Ceca et al., 2014). Another study regarding financial literacy was carried out in 2014 by Nano and Cani (2013). They studied the financial literacy of students at public and private universities in Albania where the results revealed a low level of student financial ability. Despite positive attitudes towards personal finance, it was concluded that students did not possess the necessary financial knowledge and did not have good financial behaviour (Nano and Cani, 2013).

3. Aim, data, methods and procedures

The research unit in this study are the young people that live in Tirana, the capital city of Albania. The aim of the study is to investigate the differences between young females and males in their levels of financial literacy. Relevant literature suggests three main dimensions of the financial literacy: financial knowledge, financial behaviour and financial attitudes. We want to see whether these dimensions are the same for both young males and females in Tirana.

A questionnaire was designed using the OECD's (2005), Atkinson and Messy's (2012) and Ceca et al.'s (2014) suggestions and approaches as a reference, and it was distributed electronically. 23 questions related to the financial literacy dimensions were designed as Likert scale 1 to 5 ([1] Strongly disagree; [2] Disagree; [3] Neither disagree, nor agree; [4] Agree; [5] Strongly agree).

Tab. 1: Selected items to proceed with the analysis

Dimension	Item	Description (Statement)
Financial attitude	f_att1	I want to know more about money management
	f_att2	I find it more satisfying to spend money than to save it for long-term
	f_att3	I understand money management
	f_att4	I'm prepared to risk some of my own money in saving or doing an investment
	f_att5	I am keen on reading and learning more about financial literacy
	f_att6	I think money is there to be spent
	f_att7	I think I control my financial situation
	f_att8	I read to improve my knowledge in finance
Financial behaviour	f_beh1	Before I buy something I carefully consider whether I can afford it
	f_beh2	I keep a close personal look at my financial affairs
	f_beh4	I think creating a saving plan is important
	f_beh5	We pay our bills on time
	f_beh6	We make a plan to manage our revenues
	f_beh7	We plan our spending
	f_beh8	We control if the revenue and spending fits the budget
	Financial knowledge	f_knw10
f_knw11		If someone offers you the chance to make a lot of money it is likely that there is also a chance that you will lose a lot of money
f_knw12		High inflation means that the cost of living is increasing rapidly
f_knw13		It is usually possible to reduce the risk of investing in stock market by buying a wide range of stocks and shares
f_knw14		It is less likely that you will lose all of your money if you save them in more than one place
f_knw15		A credit card is safe and risk-free
f_knw16	If prices go up rapidly, the money people have in savings accounts could lose much of its value	

Source: Own processing.

Due to the fact that this study was focused on young people, a definition of young people was needed. Only respondents 18-35 years old were considered as young people. Only 148 responds had satisfied the age criteria, so the other respondents were removed from the dataset. In addition, the respondents' gender was imbalanced (70.9% females, 29.1% males). During the analysis process, the theoretical weighted approach was applied to weight the database by gender based on Tirana's population (51% females, 49% males). This type of procedure was applied to gender because the aim of this study is to see the differences between young males and females in

financial literacy. Because of this weighted database was used, the results are expected to be generalized for this city based on gender.

Exploratory factor analysis (EFA) was used to identify factors of financial literacy for both of the sub-samples. EFA is a statistical method used to describe variability among observed and correlated variables (items) in a way to reduce the number of unobserved variables also called factors or components. EFA aim is to find those factors known as independent unobserved variables also labelled as latent variables. The principal component analysis (PCA) was selected as the extraction method. The varimax rotation was applied, which is an orthogonal rotation. The eigenvalue criteria ($\lambda > 1$) was used to define the latent variables number for each sub-sample. During the iterative process, items with communality value smaller than 0.3, and items with cross-loadings above absolute value of 0.4 were removed. In addition, attention was paid to the absence of multicollinearity, the nonzero correlations between items and sampling adequacy, which they were controlled by the correlation matrix determinant that should be greater than 0.00001, the KMO statistic and Bartlett's test, respectively. Construct reliability of the items loading into a factor was estimated by Cronbach's alpha (CA). These rules on how to find the best solution are given by Tabachnick and Fidell (2013) and Field (2009). Analyses were computed using SPSS, version 23.

Having considered all the above principles and rules, it was found that 22 observed variables could be used to proceed with the analysis. The hypothesized financial literacy dimensions had 8, 7 and 7 items, respectively, as they are shown in Tab. 1.

4. Results

Basic socio-demographic variables were collected through the questionnaire, these included gender and age, and such information is available also for the Tirana's population and thereby comparisons were possible. The survey respondents' gender was imbalanced, which was surprisingly quite similar to the survey of Nano and Cani (2013). This issue was sorted out after the theoretical weighted procedure was applied. The age distribution of the respondents was: 35.9% of them were 18-21 years old, 44.5% of them were 22-24 years old, and the rest of them were 25-35 years old.

Tab. 2 summarises the main findings regarding the male sample. 17 observed variables (items) loaded on six components, factors or unobserved variables. Since the correlation matrix's determinant resulted bigger than 0.00001 (3.224E-5), then the absence of multicollinearity was considered as a fact. Also, the sampling adequacy was tested by Kaiser-Meyer-Olkin (KMO) statistic and its result (0.702) indicated that were sufficient items for each factor. Bartlett's test was significant (p-value less than 0.01), indicating that the correlation matrix is significantly different from an identity matrix, in which correlations between variables are all zero. The minimum communality value was 0.620 and its average among all items was 0.772, so the item variances accounted for by the factors were above 0.620. Variables are ordered and grouped by size of loading to facilitate interpretation.

For the male sample, six factors were extracted. The total variance explained by those factors after the rotation procedure was 77.24%, which is a considerable percentage. The first factor explained 18.54% of the variance and it was composed by five items related to the dimension of financial knowledge, in particular with those that were focused in the financial risk knowledge, thereby it was labelled 'dealing with

risk'. The average loading items' value was 0.740. Its internal consistency was high (CA = 0.829), indicating that the construct reliability was very good. The dimension of financial knowledge is consistent with the expatiations since its items were not allocated to other dimensions (all its items loaded under *Dealing with risk*).

The other two financial literacy dimensions were divided into five factors. The financial behaviour dimension was divided into two new factors that were labelled 'budgeting' and 'buying plans'. The label 'budgeting' was selected because the four items (f_beh7, f_beh8, f_beh6, f_beh5) that loaded on it were related to the budgeting process. The average loading items' value resulted in 0.808. This factor explained 17.33% of the variance, which is quite near to the first factor's percentage. For this reason, this factor was ranked as the second one. Its construct reliability (CA = 0.847) showed that the internal consistency was very good. The 'buying plans' factor was constructed by two items and it was ranked as the fourth factor since its variance's percentage was 9.78%. That label was selected for this factor because its two items statement were "Before I buy something I carefully consider whether I can afford it" and "I think creating a saving plan is important". Its CA resulted in 0.716, indicating that the internal consistency was acceptable.

Tab. 2: Results for the male sample

Factor	Item	Factor loading						Communality	Reliability
		1	2	3	4	5	6		
Financial Knowledge: <i>Dealing with risk</i>	f_knw10	.817						.795	.829
	f_knw11	.800						.735	
	f_knw13	.779						.650	
	f_knw15	.683						.647	
	f_knw16	.619						.620	
Financial Behaviour: <i>Budgeting</i>	f_beh7		.913					.906	.847
	f_beh8		.893					.901	
	f_beh6		.831					.860	
	f_beh5		.596					.822	
Financial Attitude: <i>Willingness to act</i>	f_att4			.813				.701	.756
	f_att1			.803				.760	
	f_att5			.728				.761	
Financial Behaviour: <i>Buying plans</i>	f_beh4				.888			.857	.716
	f_beh1				.645			.740	
Financial Attitude: <i>Money management</i>	f_att3					.830		.723	.699
	f_att7					.736		.790	
Financial Attitude: <i>Reading</i>	f_att8						.895	.862	–
Variance (%)		18.54	17.33	13.59	9.78	9.51	8.49	total variance = 77.24%	

Source: Own processing. Note: Correlation Matrix's Determinant = 3.224E-5; KMO Sampling Adequacy = 0.702; Bartlett's Test of Sphericity (Sig.) = 0.000; Coefficient loading displayed above |.42|; Extraction: PCA; Rotation: Varimax with Kaiser Normalization. Only Male cases are used.

The financial attitude dimension was divided into three new factors which were named 'willingness to act', 'money management' and 'reading'. 'Willingness to act' is labelled the factor that was loaded with three items (f_att4, f_att1, f_att5). Based on the percentage of the variance explained (13.59%), this factor was ranked as the third, with a clear difference between the second (3.74% = 17.33% – 13.59%) and fourth (3.81% = 13.59% – 9.78%) factors. The average loading items' value was 0.781 and the items internal consistency was acceptable because CA was 0.756. The 'money

management' factor, loaded with two items focusing on how to manage money, was ranked as the fifth by explaining 9.51% of the variance. The difference between it and the fourth factor was so narrow (0.13%) and a slightly bigger difference between it and the sixth factor (1.02% = 9.51% – 8.49%). The CA value was almost 0.7 (0.699). The last factor was 'reading', which was loaded with a single item with a value of 0.895 and its statement was "I read to improve my knowledge in finance". This factor explained 8.49% of the variance (refer to Tab. 2).

Tab. 3 shows the results of the female sample. The PCA with a varimax rotation was performed on 17 items. Findings were not affected by the multicollinearity, since the correlation matrix's determinant was 0.001. Our correlation matrix was significantly different from an identity matrix because Bartlett's test was significant (p-value < 0.01). The KMO statistic resulted in 0.735, showing that were sufficient items for each factor, so the sample was adequate. Although the average communality value of all items was 0.656, indeed the minimum item variance accounted for by the factors was 0.419 but this is considered enough to proceed further with the analysis.

Tab. 3: Results for the female sample

Factor	Item	Factor loading					Communality	Reliability
		1	2	3	4	5		
Financial Attitude: <i>Money management</i>	f_att7	.817					.697	.807
	f_att3	.771					.701	
	f_att5	.721					.629	
	f_att4	.695					.583	
	f_att8	.569					.419	
	f_att1	.533					.479	
Financial Behaviour: <i>Budgeting</i>	f_beh7		.889				.843	.879
	f_beh6		.853				.786	
	f_beh8		.797				.786	
Financial Knowledge: <i>Dealing with risk</i>	f_knw14			.782			.616	.648
	f_knw13			.702			.579	
	f_knw15			.644			.563	
	f_knw12			.575			.502	
Financial Behaviour: <i>Buying plans</i>	f_beh1				.847		.791	.838
	f_beh2				.782		.718	
Financial Attitude: <i>Spending money</i>	f_att2					.847	.767	.642
	f_att6					.782	.693	
Variance (%)		18.58	14.92	11.53	11.40	9.16	total variance = 65.59%	

Source: Own processing. Note: Correlation Matrix's Determinant = 0.001; KMO Sampling Adequacy = 0.735; Bartlett's Test of Sphericity (Sig.) = 0.000; Coefficient displayed above |.40|; Extraction: PCA; Rotation: Varimax with Kaiser Normalization. Only Female cases are used.

Five factors were extracted. Financial attitude dimension was divided into two new factors: 'money management' and 'spending money'. The first one was composed by six items and its variance was the highest among five factors (18.58%), whereas the 'spending money' factor was loaded with two items and it reflected the lowest percent of the variance (9.16%), ranking as the last factor. 14.92% of the variance was explained by the factor labelled 'budgeting', ranking it as the second factor. Three items part of the financial behaviour dimension loaded on it, whilst the two other items of this dimension constructed the 'buying plans' factor, which was ranked as the fourth factor (11.40%). Just with a very small difference, the 'dealing with risk' factor was

ranked as the third factor by explaining 0.13% more of the variance than ‘buying plans’ factor. Two out of five factors reflected a questionable internal reliability, whereas the other three had a good internal reliabilities (see Tab. 3).

5. Discussions

The differences among males and females have been noticed by many scholars, but only in terms of the financial literacy level (Chen and Volpe, 2002; Hira and Mugenda, 2000; Lusardi and Mitchell, 2014; Mitchell and Lusardi, 2011). In contrast to them, this research was focused on identifying the financial literacy factors of males and females separately, performing factor analysis on both genders.

In the light of the work conducted by Potrich et al. (2016), this paper went far in depth by identifying or exploring sub-factors within three dimensions of financial literacy: financial behaviour, financial knowledge and financial attitudes. In summary, it is important to emphasise that the observed variables loaded into the same hypothesised financial literacy dimensions, indicating consistency with the theory. All items constructed the ‘willingness to act’, ‘money management’, ‘reading’, and ‘spending money’ factors, originated from the hypothesised financial attitude dimension. On the other hand, the ‘budgeting’ and ‘buying plans’ factors were constructed by items that were assumed part of the financial behaviour dimension.

The improvement of financial education may prevent people from making wrong financial decisions. Hence, they will have a better understanding of issues regarding credit and investments, thereby reducing their appetite to a manageable level. The research of Huang et al. (2016) drew on Sherraden’s (2013) model, found empirical evidence that emphasize the importance of financial access for financial functioning, especially for populations that are vulnerable and with low income. The improvement of financial education suggestion is in line with the views of Stolper and Walter (2017), which is that associating peoples’ financial literacy with their everyday life financial decisions, is an accurate approach that might lead to an improvement of the quality of studies conducted in the financial literacy field.

Results of this research may lead to the modification of the models that are currently in use, in particular, those suggested by Sherraden (2013) and Potrich et al. (2016), and partially, the one developed by Fiksenbaum et al. (2017). For instance, financial behaviour can be analysed by two sub-dimensions, which this research suggest ‘budgeting’ and ‘buying plans’, and financial attitude can be breakdown into ‘willingness to act’, ‘money management’ and ‘reading on finance issues’.

6. Conclusions and policy implications

Evidence of the differences among young males and females was found in Tirana regarding financial literacy. The differences had been seen especially in terms of the number of composed factors and of their order by gender. Thus, six factors were found within the male sample, whilst the female sample had five factors. Even though four factors were extracted in both samples (dealing with risk, budgeting, buying plans, and money management), two of them had a different order. Hence, ‘dealing with risk’ was ranked as the first factor in case of the male sample, but it was the third one in female sample. Moreover, ‘money management’ was the first factor for females, but for male cases, it was the fifth factor. But in contrast to them, the ‘budgeting’ and

'buying plans' factors reflected the same order on both samples. The male sample had two other extra factors compared to female sample, which were 'willingness to act' and 'reading'. In this context, even female cases had an extra factor named 'spending money', which cannot be found in the male cases. This is consistency with the Hira and Mugenda (2000) findings.

It was noticed that the financial knowledge dimension was the main factor for males, identified by the 'dealing with risk' factor. The same factor was identified even for females but was not the main one for them. Also, the two factors that originated from the financial behaviour dimension were identified both in the male and female cases. It seems that young males appeared to be more apprehensive than young females about risk, and on the other hand, young females concerned more about the money management rather than males. In addition, young males compared to females had two extra factors originated from financial behaviour dimension, showing the willingness to act and to read about finance. Instead of these, young females paid special attention to spending money.

Modification of the actual conceptual framework of the financial literacy is the main remark of this study. Thus, financial behaviour can be analysed considering two constructs 'budgeting' and 'buying plans', and financial attitude can be decomposed into 'willingness to act', 'money management' and 'reading on finance issues'.

The results of this study are useful for designing policies with the main purpose of enhancing the knowledge and skills of young people living in Tirana, on the management of personal finances and to recommend a mechanism which should be used to ensure a satisfactory level of financial literacy. Study results are useful to policymakers since differences in financial literacy in term of gender among young people were identified. Therefore, policymakers should pay attention to differences in gender when they design the financial education policy.

Although the study has reached its aims, there were some limitations. First, even though it was applied the theoretical weighted procedure on gender according to Tirana's gender distribution, it would be preferred a larger sample size. Second, the study uses a sample of young people in Tirana, and this could raise the issue of external validity. Despite these limitations, the study makes a unique contribution to the literature by suggesting financial literacy's constructs depending on gender.

Acknowledgement

This paper was supported by Internal Grant Agency of FaME TBU No. IGA/FaME/2017/010: Financial Constraints on Economic Activities.

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Received: 04. 01. 2018, reviewed: 22. 06. 2018

Approved for publication: 24. 10. 2018

ACHIEVING A GREAT REPUTATION FOR CORPORATE SOCIAL RESPONSIBILITY: STUDY FROM THE CZECH HOSPITALITY INDUSTRY

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Abstract: *Corporate Social Responsibility (CSR) can be understood as an investment that will bring stability and prosperity to a company in the long-term. We investigate the notion that social initiatives will help companies to expand business through an excellent reputation in CSR and, thus, gain the conditions for profitable and sustainable growth. We employed questionnaire survey data and used statistical analysis of the results to identify possible links between social activities and other hotel characteristics, namely, a set code of ethics, hotel independence, hotel class, hotel size and managerial position of the respondent. According to the results, respondents considered socially responsible business practices as the most important. The Cause Promotion initiative was considered as less important than corporate philanthropy and volunteer work by hotel employees. The lowest importance was attributed to Cause-Related Marketing. A set ethical code has an impact on assessing the significance of all social initiatives. We have determined that managers of independent hotels pay less attention to social activities than managers of hotel chains. The hotel class did not affect responses in the categories of Cause Promotion and Social Marketing. Furthermore, hotel size did not affect assessed the significance of socially responsible business practices.*

Keywords: *Corporate Social Responsibility, Hospitality Industry, Hospitality Management, Statistical Analysis, Sustainable Growth, Prosperity.*

JEL Classification: *M14.*

Introduction

With the world continuing to steadily recover from the losses of the financial crisis sustained a decade ago, the European hospitality industry has started to benefit from increased levels of economic sentiment (European Commission, 2018). Most tellingly, EU year-over-year revenue per available room (RevPAR) surpassed US levels in 2015, at 6.9%. Overall, in the Czech Republic (CR) GDP grew by 4.7 in 2016 and the unemployment rate is the lowest in the EU (2.9 per cent in August 2017), because about 40 per cent of the Czech labour force is working in manufacturing (which is a record percentage of any EU member). According to STR (n.d.) Prague experienced the third highest RevPAR growth rate of any city in 2015 – 14.6% – behind Dublin (23.3%) and Milan (30.3%). Occupancy rates in the Czech capital have also progressively increased to 78% in 2017, up from 68% in 2012 (Statista, 2018). This growth can be directly linked to the overall rise in tourism with a yearly increase of 7.1% more visitors booking overnight stays in 2016 (Thompson, 2016). This upturn is occurring in conjunction with the exponential growth of the industry's greatest perceived external threat, Airbnb. The industry is keenly aware that even its traditional bastion is under threat – 10% of Airbnb bookings are now business travellers (Jennings et al., 2016). In response, it is likely Europe will follow the example of the

US hospitality industry by encouraging initiatives to increase regulation of these disruptive new sharing platforms (Benner, 2017). CSR can be seen as an investment which will bring stability and prosperity to the company in the long-term. This does not, though, necessarily mean prosperity in the financial sense (Pavlík et al., 2010).

According to Philip and Milton Kotler (2013) there are eight ways leading to sustainable corporate growth. One of these is expansion through achieving an excellent reputation in social responsibility. Referencing a publication (Kotler, Hessekiel, Lee, 2012), they enlist six categories of social initiatives (CSI): Cause Promotion – providing resources or material help to raise public awareness of a specific social issue; Cause-Related Marketing – depending on sales, adequate financial or material support is given to a chosen charity; Social Marketing – supporting a campaign aimed at a specific change of behaviour to improve the health or safety of society or to help the environment; Corporate philanthropy – direct donation of financial resources, grants or material services to a charity or a cause; Employee voluntary work – encouraging employees to work as volunteers for organisations supporting the local community or a specific cause; Socially responsible business practices – decisions about the financial support of the local community through reduced use of energy or other measures with a positive environmental impact.

The first theoretical concept of CSR emerged in the second half of the 20th century in the USA. The European Union also expressed its first concern in the 1990s. The evolution of Corporate Social Responsibility covers three phases (Jones, 2012). The first phase, called the “age of image”, spans approx. from 1990 to 2000. There was growing interest in how corporate subjects act, in their practices and what they stand behind, especially on environmental issues. Companies used this concept to form new communication strategies changing their corporate image in the eyes of their consumers rather than pursuing real change in company processes and behaviour. Subsequently, the voice of unsatisfied consumers with access to increasingly improved technologies grew louder. Then came the “age of advantage” (2000-2010). Some companies started behaving more responsibly towards society and tried to differentiate themselves from their competition. Today, social networks represent a new effective instrument supporting social responsibility and positive changes. Today’s consumers prefer companies which do not just care about profit. The only way to understand social media is to take an active part in them: to publish statements, blogs, to share, to listen. A company should use social media in all areas it is active on – to listen through them to their customers, to employees and competitors, to communicate with all important subjects and groups, to share information and to sell products or services. Forward looking companies include corporate social responsibility in their business strategy which, in turn, aids their growth. If a company is more socially responsible, it implements changes at all levels – employment policy, attention to the local and global environment, communication and sharing of information with its local and global public. CSR is, therefore, being perceived as an investment, which can bring corporate stability and prosperity in the long term, without any insistence that this prosperity must necessarily have a financial effect (Pavlík et al., 2010).

The specialised section of Social Responsibility and Sustainable Development of the National Quality Council of the CR set its goal to align Czech and international standards. In 2015, this specialised section produced a strategic document entitled

“National Action Plan of Corporate Social Responsibility in the CR”. This was later passed as Government Resolution no. 199 on the 2nd of April 2014 (Vláda ČR, 2014). The goal was to introduce the concept of socially responsible behaviour to all companies and organisations in the CR and, thus, lead them to socially conscious entrepreneurship and responsible provision of services.

The engagement of another Czech organisation – the Association of Social Responsibility was also important (2015). Their common goal was to establish a national network Global Compact Czech Republic, which came into existence in 2015. This network supports local companies as well as branches of international companies engaged in the UN Global Compact through implementation of its basic principles and encourages sharing experiences, opportunities for learning, collective action and partnership. It enables its members to actively influence CSR policy in the CR through dialogue (including political). The host organisation of the Czech National Network is the Association of Social Responsibility. Alongside professional interests, hotels and hotel chains under The Czech Association of Hotels and Restaurants intend to undertake entrepreneurial activity in accordance with commonly recognised ethical principles of commercial action and interpersonal relationships in a democratic society. These principles are clearly stated in the Ethical Code (2006). The protection of the health of customers is a priority. Because of this, hygiene norms and regulations are strictly adhered to in both catering and hospitality services.

Managers of hotels and hotel chains must understand that, in the current intensely competitive environment, it is not enough to just compete with rival companies on quality, price or innovation of services. The reputation of any company, regardless of where it operates, is also important and is composed of quality services and products and its brand. By improving the reputation of a company, it is possible to be distinguished from the competition, to gain customers who dislike wasting resources, and to approach customers who care about the environment and harmony in society. Another opportunity is to co-operate with more socially conscious suppliers or with human resources recruiters which can lead to increased interest in work positions by potential young, talented employees for whom the company’s values are important.

As to international experience, in recent history, various aspects of CSR have called for researchers to present both conceptual and empirical papers on CSR. Amongst others, Caulfield (2013) concentrated on the development of strategic corporate social responsibility centred on community involvement. Sponsorship in customer related marketing and CSR as a leveraging strategy was investigated by Polonsky and Speed (2001). This was further discussed by Sheikh and Beise-Zee (2011), focusing on the impact on customer attitudes; and Pursuit (2017) discussing the potential for community partners. Employee volunteers and employee satisfaction was analysed by do Paco and Nave (2013) and Nave and do Paço (2013), who concluded that the most motivational category for people to be engaged in volunteering is motivation through the success of their company. Further influence of CSR on employees was discussed by Park and Levy (2014) in the US market and Li (2014) who also researched the links between corporate politics, philanthropy and governance in China, Singapore and Hong Kong. The authors have found that corporate governance affects a firm’s performance and foreign direct investment decisions.

Corporate philanthropy and CSR in CEE region countries was researched by Elms (2006), who claims that corporate responsibility would not develop in the CEE without stakeholder responsibility. Corporate strategy and impact on corporate profit in the retail segment was investigated by Baddache and Nicolai (2013) and by Schramm-Klein, Morschett and Swoboda (2015). The authors revealed that while CSR generally has positive effects on retailer performance – despite the cost associated with CSR implementation, diverse dimensions have different effects. Also, both downstream (customer-oriented) as well as upstream (supplier-oriented) activities count. Also, CSR communications, thus talking about what good a retailer does, is of high relevance.

The challenges and conflicts of CSR in SMEs were researched by Fenwick (2010) who focused on practicing social responsibility (SR) in small businesses. Cause-related marketing was the topic of a paper dealing with the leading role of dominant companies in their industry (Baddache and Nicolai, 2013). The authors conclude that corporations need to keep up with these changes through initiatives that are driven by themselves, or through indirect input from stakeholders or through a contractual process defining relationships between stakeholders, driving a decision-making process which sets commitments between business and society.

1 Statement of a problem

The research on CSR in tourism and hospitality gains increased attention abroad, however, few studies in this area have focused on CSR in the Czech Republic. CSR could be seen from many perspectives, for instance, Wells (2016) in her research explores the consolidative model of CSR, mainly via employees. Ettinger (2018) examines how certified hotels communicate CSR on their websites and concentrates in this work on small hotels. Hyelin (2017) describes links between CSR and its internal consequences using the hotel employees' CSR perception, quality of working life, affective commitment, organizational citizenship behaviour, and job performance. The authors concentrated on Kotler's theory (2013) to prove if and how CSI enable to achieve an excellent reputation in social responsibility, in the Czech hotel industry.

A company can gain an excellent reputation in CSR through the realization of one, or a combination of social initiatives, and it can sustain that reputation for a long period. Today's customer expects and attributes great value to the fact that the company is socially engaged and that it cares about the environment and reflects the values of its customers and stakeholders and wants to be perceived as such, in the future. Therefore, top managers in all sectors, including the hotel industry, should consider how to improve the social standing of the company for which they work to secure more respect and support from both the public and stakeholders. The authors emphasize that the social initiatives will help companies to expand business through an excellent reputation in CSR and, thus, gain the conditions for profitable and sustainable growth.

The major novelty of the paper is the focus on this research-analysis-of CSR in the hotel industry in the CR, one of the transformational economies of the CEE. The remainder of this paper has been organized as follows. In the next section we provide the research methods together with the process of data collection and related descriptive statistics. Then, in part three, the authors describe and clarify their

outcomes with regards to problem solving. The main findings are discussed in part four. The conclusions and future research directions are drawn in the final section.

2 Methods

This article aims to analyse the opinions of top and middle managers of hotels and hotel chains in the hotel industry that are members of the Association of Hotels and Restaurants in the CR, on CSR. Data was acquired through manually distributed questionnaires. In our analysis we have used non-parametric methods. The following research question was set: “Do managers assign any impact to individual CSI on hotel reputation? If yes, how much importance do they assign?” The auth CSI are formulated and tested relevant hypotheses concerning the impact of several features: (1) the existence of an ethical code, (2) the independent status of the hotel or it being part of a hotel chain, (3) the hotel size, (4) hotel class (number of stars) and (5) the managerial position of the respondent to evaluate the importance of the six CSI. The following hypotheses have been set:

1. The respondents evaluated the individual CSI as being of the same importance.
2. Specific features and social initiatives: the existence of an ethical code (the independence of the hotel or its belonging to a hotel chain, hotel size, hotel class (number of stars) and the managerial position of the respondent) were tested for their importance for contribution to hotel reputation.

Cluster sampling was used to choose the respondents and, subsequently, the data for testing the hypotheses were assembled through a questionnaire survey. The managers who were personally handed the questionnaire were selected randomly using the following criteria: Our method of sample selection was like stratified random sampling, but it was not so narrowly specified. The authors have formed a natural group of respondents (cluster), from which representatives were randomly selected for research. The cluster was composed of managers on top or mid-level positions of independent hotels and hotel chains. All the hotels were members of the Association of Hotels and Restaurants of the CR.

The questionnaire was composed predominantly of closed questions, which were either multiple-choice or yes/no in nature. Scale and comparative questions were also used where respondents assigned a score to the answer from a scale of 1 to 10. The questionnaire survey took place in November 2016. The field staff used for the ground work was previously trained by the research coordinators. They personally handed the questionnaires to the respondents and collected them upon completion. The questionnaires were collected by the coordinators in several stages, and a running check of adherence to the selected characteristics was performed. The work of the field staff and the contents of the answers were further checked for logical consistency. Of the total number of 650 distributed questionnaires, 319 were filled out and handed in by the respondents. The response rate was therefore 49.1 %.

Descriptive characteristics were determined for the analysed data and the data results, and the data features were graphically depicted. Correlation coefficients were used to test significance. For data analysis, a non-parametric approach was used due to the character of the data (scale 1-10). When evaluating the influence of hotel class

(number of stars), hotels with one and two stars were considered one category. To test the hypotheses, the following research methodology was used:

1. The correlation between answers on a scale of 1-10 (social initiative), was evaluated using the Spearman rank correlation coefficient. Its statistical significance was tested at the level of 0.05 throughout the whole contribution.

2. The first hypothesis – that respondents evaluate all the CSI as being the same – was tested by a Friedman test with a follow-up post-hoc multiple comparison analysis aimed at finding out which items were evaluated differently.

3. Correlation between the answers to individual categories of social activity and other characteristics (ethical code, the independence of the hotel or its belonging to a hotel chain, hotel size, hotel class and the managerial position of the respondent) was analysed according to the type of sorting variable either through a Wilcoxon or with use of a Kruskal-Wallis test.

3 Problem solving

Tab. 1 contains the average and median respondent evaluation of individual initiatives in the question “*How important are these CSI for your hotel/hotel chain – Cause Promotion, Cause-Related Marketing, Social Marketing, Company philanthropy, Voluntary work, Socially responsible business practices?*” Respondents indicated the chosen value on the scale of 1 – the least important to 10 – the most important. Tab. 1 further contains the median value and the ranking based on the average and the median. In the case that the median value is identical to the ranking set on average (the median value is 5 for categories 3-5, the average ranking of all 5 values is 3).

Tab. 1: Evaluation of the importance of individual categories of social initiatives

Category of social initiative	Average	Median	Ranking by average	Ranking by median
Cause Promotion	4.318	4	5	5.5
Cause-Related Marketing	4.203	4	6	5.5
Social Marketing	4.770	5	4	3.0
Company philanthropy	5.307	5	2	3.0
Employee volunteering	5.072	5	3	3.0
Socially responsible business practices	7.588	8	1	1.0

Source: (own research)

From the data presented in Tab. 1 it is clear that the highest importance was assigned to socially responsible business practices and the least importance was assigned to Cause-Related Marketing, which means the provision of financial or material support to a specific charitable organisation depending on the amount of a specific product sold in a given time frame. This corresponds to the specifics of the hospitality industry, which offers mainly accommodation and gastronomic services.

The dependence between individual answers to the question “*How important are these CSI for your hotel/hotel chain?*” was assessed using a correlation coefficient. Given the nature of the answers (answers on a scale); the most suitable method is to use the Spearman rank correlation coefficient.

Tab. 2: Spearman rank correlation coefficient values

	A	B	C	D	E	F
A	1.000	0.583	0.571	0.295	0.343	0.053
B	0.583	1.000	0.470	0.381	0.349	0.056
C	0.571	0.470	1.000	0.368	0.408	0.155
D	0.295	0.381	0.368	1.000	0.469	0.292
E	0.343	0.349	0.408	0.469	1.000	0.300
F	0.053	0.056	0.155	0.292	0.300	1.000

Notes for Tables 2-6: (A) Cause Promotion, (B) Cause-Related Marketing, (C) Social marketing, (D) Company philanthropy, (E) Voluntary work, (F) Socially Responsible Business Practices. Statistically significant correlations (significance level of 0.05) are in bold.

Source: (own research)

All correlation coefficients in Tab. 2 are statistically significantly different from 0 except for the correlations between social initiatives A-F and B-F. Correlation measured by the Spearman correlation coefficient cannot be found between evaluations A-F and B-F. The highest correlation of 0.583 was found between the initiatives A-B, which can be understood in the sense that respondents who perceive the initiative Cause Promotion as significant see also the initiative Cause Related Marketing as significant, and vice versa. Most of the correlation coefficients are statistically significant at a level of 0.05 – due to high number of valid responses, but their values are not very high. Due to the correlation between the answers, a Friedman test (Hollander, Wolfe, 1973) was used for testing the hypothesis that all CSI are evaluated as of the same importance. The resulting test statistic has the value of 338.16, p-value < $2.2 \cdot 10^{-16}$. It is therefore possible to conclude from the test results that the difference in evaluation is statistically significant. This means that individual categories were not evaluated as the same. A further post-hoc analysis was conducted based on the Friedman test, which finds the groups of data differing from each other based on multiple comparison analysis (Demsar, 2006). The calculated p-values are shown in Tab. 3, including the correction using the Bonferroni method.

Tab. 3: p-values of the post-hoc test using the Bonferroni method

	A	B	C	D	E
B	1.00000	–	–	–	–
C	1.00000	1.00000	–	–	–
D	0.00005	0.00002	1	–	–
E	0.00027	0.00011	1	1	–
F	0.00000	0.00000	0	0	0

Source: (Own research)

It is clear from Tab. 3 that the answers to the sub-question (F) Socially responsible business practices differ significantly from all the others. A further distinction can be seen in the couplings A-D, A-E, B-D and B-E. It is clear, and confirmed by the tests, that initiative F is seen as most important (it differs statistically significantly from all other social initiatives). Based on the test results it is possible to say that initiatives (A) Cause Promotion and (B) Cause-Related Marketing are understood as less important than (D) Company philanthropy and (E) Voluntary work of employees. These results correlate with the ranking according to the average and median in Tab. 1.

Data from previous tables, showing the arithmetic average and median of the individual answers of the respondents were used when testing hypotheses concerning the influence of the existence of an ethical code, the independence of the hotel or its belonging to a hotel chain, hotel size, hotel class (number of stars) and the managerial position on the answers. A hypothesis that the evaluation of individual CSI is not influenced by the chosen sorting variables was tested by the Wilcoxon or Kruskal-Wallis test. The results of these tests (p-values) are shown in Tab. 4. The p-values smaller than the significance level of 0.05 are highlighted in bold. It indicates that the sorting variable (a factor) has a statistically significant impact on the analysed category of social initiative. It is clear, from the table, that the managerial position of the respondent has no influence on the answers.

Tab. 4: p-values of Wilcoxon or Kruskal-Wallis tests

Category of social initiative	Existence of an ethical code	Hotel/hotel chain	Hotel class	Hotel size	Managerial position
A	0,00002	0,00392	0,23362	0,00006	0,24617
B	0,00022	0,00389	0,02701	0,00038	0,88077
C	0,00001	0,10239	0,34544	0,00358	0,13944
D	0,00002	0,00918	0,00104	0,004	0,23428
E	0,00006	0,04487	0,00402	0,00301	0,83047
F	0,02744	0,04038	0	0,23413	0,05628

Source: (Own research)

The fact that a hotel has an ethical code has an influence on all CSI. By the comparison of hotels with and without an ethical code, we can conclude that hotels with an ethical code see all CSI as more important. The influence of the independence of hotels was evident only in the use of Social Marketing, to which the managers of independent hotels paid less attention than managers of hotel chains. The influence of hotel class was not significant for the category Cause Promotion and for Social Marketing. The rank of managers (whether the managers work on a top or mid-level position) had no influence on the evaluation of the importance of any of the initiatives (Tab. 5).

Tab. 5: Averages (\bar{x}) and medians (\tilde{x}) according to categories – existence of an ethical code, hotel type, managerial position

Category of social initiative	Existence of an ethical code				Hotel/hotel chain				Managerial position			
	\bar{x}_1	\tilde{x}_1	\bar{x}_2	\tilde{x}_2	\bar{x}_1	\tilde{x}_1	\bar{x}_2	\tilde{x}_2	\bar{x}_1	\tilde{x}_1	\bar{x}_2	\tilde{x}_2
A	4,73	5	3,41	3	4,05	4	4,92	5	4,17	4	4,42	4
B	4,57	4	3,47	3	3,89	4	4,88	5	4,18	4	4,2	4
C	5,21	5	3,69	3	4,6	4	5,19	5	5,1	5	4,56	4,5
D	5,76	6	4,33	4	5,02	5	5,89	6	5,54	5	5,16	5
E	5,49	6	4,02	4	4,85	5	5,57	6	5,03	5	5,09	5
F	7,72	9	7,27	8	7,39	8	7,95	9	7,8	9	7,43	8

Notes: The existence of an ethical code (1 – yes, 2 – no), hotel type (1 – hotel, 2 – hotel chain), managerial position of respondent (1 – top manager, 2 – mid-level manager).

Source: (own research)

Based on the results summarized in Tab. 6, we can conclude that, with an increase in the star rating, the evaluation of the importance of the researched indicators of social initiative has increased. Hotel class did not influence the answers in the category (A) Cause Promotion and (C) Social Marketing. The size of the hotel in which respondents were working did not have any impact on their opinion regarding socially responsible business practices. A certain tendency can be tracked when looking at the remaining initiatives, in which the evaluation of the importance of social initiatives increases with increasing hotel size.

Tab. 6: Averages (\bar{x}) and medians (\tilde{x}) according to categories –hotel class and size

Category of social initiative	Hotel class										Hotel size					
	\bar{x}_1	\tilde{x}_1	\bar{x}_2	\tilde{x}_2	\bar{x}_3	\tilde{x}_3	\bar{x}_4	\tilde{x}_4	\bar{x}_5	\tilde{x}_5	\bar{x}_1	\tilde{x}_1	\bar{x}_2	\tilde{x}_2	\bar{x}_3	\tilde{x}_3
A	4	4	3,77	4	3,89	4	4,43	4	4,93	5	3,57	3,5	4,86	5	4,74	5
B	3	3	4,69	4	3,66	3	4,27	4	5,16	6	3,51	3	4,69	4,5	4,65	4
C	4	3	4,08	3	4,35	4	4,93	5	5,3	5	4,13	4	5,1	5	5,56	5
D	3,6	3	4,46	3	4,63	5	5,56	5,5	6,42	7	4,71	5	5,81	6	5,39	5
E	1,8	2	5,62	6	4,36	4	5,33	5	5,77	6	4,39	4	5,45	5	5,78	6
F	3,4	3	5,08	5	7,16	8	7,97	9	8,47	10	7,44	8	7,73	9	7,59	9

Notes: Hotel class (index corresponds to number of stars), hotel size (1 – small, 2 – mid-size, 3 – large)

Source: (Own research)

4 Discussion

With the change of the global economic situation, globalization trends, and the corresponding change in the economic situation in the CR, most hotels and hotel chains are initiating some sort of development strategy. Achieving an excellent reputation in CSR is one way of securing growth. While it is true that managers usually focus, mostly, on the bottom line, many of them increasingly realise that in the

global entrepreneurial environment an excellent reputation can be a factor helping to differentiate their hotel from the competition.

This research has shown that managers of hotels and hotel chains perceive socially responsible activities connected to the financial support of local communities, reduced use of energy and other measures aimed at environmental protection as the most important. To the other hand, the least importance was attributed to Cause-Related Marketing. This implies that the provision of financial or material support to a specific charitable organisation (depending on the amount of a specific product sold in the given period) was not perceived as an efficient and valid initiative to increase reputation.

The assumption that if a hotel has an ethical code, its managers see all CSI as more important has been proven as correct. The influence of the independence of a hotel was proven only for the use of Social Marketing and it can be said that managers of independent hotels see all CSI as less important than managers of hotel chains. The managerial position of the respondent on the evaluation of the importance of the individual categories had no influence. Hotel class had some impact only on the evaluation of the importance of the categories of Cause Promotion and Social Marketing. Hotel size did not have any influence on the opinions of the managers regarding socially responsible business practices. However, it can be concluded that, with a higher hotel class (higher number of stars) and a growing hotel size, the evaluation of observed categories increases.

Conclusion

Achieving an excellent reputation in CSR is used as a way of achieving higher growth mainly by large hotels with a high number of stars. In the CR, these are mostly owned by large multinational companies. If the potential of CSR is to be fully achieved and if it is to become common practice for the industry, it needs to be embraced by the entirety of the hospitality business, including small and mid-sized hotels with a lower number of stars. The Czech Association of Hotels and Restaurants should also take in consideration this finding by adjusting its ethical code (2006), in which the protection of health of customers seems to be the main priority. This, however, is only a small component of CSR. Recommendations for further research are broad. Nevertheless, the authors would like to examine how industry managers use standards related to CSR issues. We also recommend focussing on how hotels and hotel chains use social networks and public media to report their achievements in CSR.

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Received: 06. 05. 2018, reviewed: 03. 07. 2018

Approved for publication: 24. 10. 2018

IMPACT OF SELECTED FACTORS ON THE PERCEPTION OF THE MACROECONOMIC AND FINANCIAL ENVIRONMENT OF SMES (EMPIRICAL STUDY FROM CZECH REPUBLIC AND SLOVAK REPUBLIC)

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***Abstract:** The business environment is the one of the most important cause of successful business. The important role plays macroeconomic and financial environment and entrepreneur's perceptions of them. The aim of the article is to evaluate and compare the perception of business environment and its impact on entrepreneurship in the Czech Republic and in the Slovak Republic. The article deals with the results of the empirical questionnaire survey, which was completed in 2018 in the Czech Republic. The research works with 641 valid answers. Research focused on small and medium-sized enterprises, as they are a major catalyst for the economic growth of individual economies. Two main research questions were set to compare the perception of macroeconomic environment and financial environment and its impact on business in selected countries. Another 4 research questions were formulated in relation to compare two main research questions in relation to selected factors (length of the business and entrepreneur's education). In process of solving the formulated research questions tables, descriptive characteristics and Person coefficient of contingency were used. Despite the fact that the macroeconomic environment in the Czech Republic and Slovakia is comparable, perceptions of the business environment differ in several aspects.*

***Keywords:** Business Environment, SMEs, Perception, Bank's Interest Rates, Czech Republic, Slovak Republic.*

***JEL classification:** B22, G21, L26*

Introduction

The business environment changes worldwide and affects all type of businesses and their activities. Especially effects of macroeconomic variables and access to financial sources are very important for doing a successful business. Small and medium enterprises are more sensitive for these changes than large companies. They are very often more dependent on the bank's help. Moreover all macroeconomic changes which have negative impact can cause serious problem within company. Nevertheless, SMEs are very important part of the market economy. (Karpak and Topcu, 2010). Bhaird (2010) states, that 99% of all European and American enterprises are from the SME segment. SMEs are a key factor in maintaining and creating the functioning market economy, particularly as a means of stimulating competition, creating jobs and promoting economic boost (Kessler, 2007).

Business activities are significantly determined by the environment of the company. In this context, important roles are played by the social environment and the political and legal environments that are created by the state authorities. Presumably, a positive perception of these companies by their environment could stimulate their financial performance and accelerate the positive influences of these companies on society. (Belás et al., 2015).

Article focuses its attention on SMEs as a very important part of the economy. The perception of entrepreneurs from small and medium-sized enterprises may have an impact on the desire to do business in these countries in the future.

The structure of the article is as follows. In the theoretical part, we present the importance of business environment, compare Czech and Slovak economics and identify the critical areas for SMEs. Based on the empirical research of the quality of business environment in the Czech Republic and Slovakia we quantify P-value and Z-score and we compare differences in perception by Czech and Slovak entrepreneurship in relation to their education and the length of their business. At the end of this paper, we present the main results of our research and their benefits.

1. Theoretical background

Small and medium-sized enterprises (SMEs) are an important driver for the development and renewal of national economies (West et al., 2007; Barbero et al., 2011; Wolf et al., 2012). The economic importance of SMEs was detected by many authors around the world. The vitality of SMEs has been a major factor in the creation of new jobs and the economic renewal of certain regions in Europe (Henderson and Weiler, 2010; Ivanova and Koiso, 2014, Smekalova et al., 2014).

Enterprises are affected by business environment. It can help them, but at the same time it can mean the greatest threat. For small and medium enterprises, business orientation is a key element of their success (Brockman, Jones, and Becherer, 2012). Soininen et al. (2012) consider innovation, risk acceptance and active attitude as the basic characteristics of business orientation. According to Kuzmišin (2009) permanent challenges for all players in the business environment are the improvement of business conditions, support of entrepreneurial spirit, flexible labor markets, company and worker adaptability, investments into education and science, research and innovations, market access and secure supply of energy.

SMEs also face an increased liability of foreignness simply because of their size (Lu and Beamish, 2001). This lack of resources can have a profound impact on operations as the firm expands abroad (Autio et al., 2011). According to resource dependency theory, a company's lack of certain critical resources and entry into new (foreign) environmental settings pushes it to seek additional resources from other market participants (Hillman et al., 2009).

Beck et al. (2006), through a World Business Survey (WBES), found that the lack of long-term bank financing is the second most important funding challenge facing SMEs, while high interest rates and reinsurance are at first and third place. Despite the significant contribution to the economy, the survival rate of SMEs is significantly lower than for large corporate firms for various reasons, including limited access to bank financing, high interest rates, lack of skilled labor, the existence of technological and financial risks, strong competition from large companies etc.

In this article, we focused on analyzing the business environment from the point of view of macroeconomic variables (as GDP, employment rate, inflation rate) as well as the perception of financial environment (defined by current bank's interest rates). We choose two areas for comparison – Czech Republic and Slovak Republic. These countries

have the same history and also the macroeconomic environment was similar in the past (it can be seen on the following Tab. 1).

Tab. 1: Macroeconomic indicators

Year	GDP		Employment rate		Inflation (CPI)		Household spending		Long-term interest rates	
	CZ	SK	CZ	SK	CZ	SK	CZ	SK	CZ	SK
2013	-0.48	1.00	67.72	59.85	1.43	1.4	0.51	-0.79	3.18	2.11
2014	2.71	1.49	68.97	60.97	0.34	-0.07	1.79	1.36	2.07	1.57
2015	5.38	3.83	70.22	62.72	0.3	-0.32	3.69	2.22	0.88	0.57
2016	2.49	3.28	71.95	64.85	0.68	-0.52	3.6	2.68	0.54	0.42
2017	4.27	3.26	73.63	66.17	2.45	1.31	3.99	3.57	0.91	0.98

Note: GDP - Annual growth rate (%); Employment rate - % of working age population; Inflation (CPI) - Annual growth rate (%); Household spending - Annual growth rate (%); Long-term interest rates - % per annum.

Source: (OECD, 2018)

The quality of business environment is determined by possibility of SMEs to access to financial resources. The limited possibility for company financing causes to the huge risk. In this context were made other researches. Belás et al. (2014), Májková (2012) state that the restricted access to the financial resources is caused by high risk level of these firms and they can be limited to pay their commitments. The similar view is also presented by other authors, for instance Ključnikov et al., (2017), Kozubíková et al., (2017). Ozturk and Mrkaic (2014), Kundid and Ercegovac (2011).

With limited financial resources is connected also their price. In case of many SMEs was found out that banks are charging a higher risk premium (Ayadi 2005). Especially after crisis increasing bank funding costs were detected. Higher interest rates were detected for the SMEs not for the large firms. The results of research made by Altman et al. (2010) confirmed, that firms aged within 3-9 years are more vulnerable to failure.

Bank loans are a key source of finance for SMEs (Howorth and Moro 2012) and non-transparent information often build barrier to obtain such loans (Ortiz-Molina and Penas, 2008; Van Caneghem and Van Campenhout, 2012). The barrier can be caused by misunderstanding of the conditions for loans obtaining. One of the reasons for this misunderstanding may be the insufficient education of entrepreneurs. This paper analyses also an entrepreneur's perception of bank's interest rates and its impact on their business from the entrepreneurs' education view.

Due to the unclear credit rating models and information asymmetry between banks and the SMEs, banks can impose not only higher prices of the loans, but also non-price related restrictions in SME lending, for example, collateral, shorter maturity, and smaller loan size (Hernández-Cánovas and Martínez-Solano, 2008; Hanedar et al., 2014; Godlewski and Weill, 2011; Farinha and Felix, 2015; Kirschmann, 2016). In contrast, large firms can produce better financial statements, which can help them to get easy access to bank finance (Knyazeva and Knyazeva, 2012; Leon, 2015; Cenni et al., 2015)

Also the long-term interest rates are similar in both countries. There is no significant reason why the perception of business environment should be different in this context. This theoretical background was used as a base for research questions which are formulated in the next chapter.

2. Research objective and methodology

The aim of the article is to evaluate and compare the perception of business environment and its impact on entrepreneurship in the Czech Republic and in the Slovak Republic. The results are the partial results of extensive research, which was conducted at Tomas Bata University in Zlin in 2018. Entrepreneurs were selected from the database "Albertina" (CR) and "Cribis" (S) randomized numbers using mathematical functions "RANDBETWEEN". The statistical unit of research was one enterprise. Individual companies were directly addressed by email or by phone or by a personal meeting. 641 responses from enterprises (312 enterprises CR and 329 enterprises S) were collected.

Two socio-demographic factors were selected for evaluation of impact on perception of business environment: education and length of action on the market.

The structure of the sample according to the size of the business was as follows: 82.7 % were Micro Enterprises (<10 employees), 13.8 % were Small Enterprises (10-50 employees) a 3.5 % were Medium-sized enterprises (50-250 employees). The structure of respondents in the Slovak Republic was as follows: 71.1 % Micro Enterprises (<10 employees), 21.6 % Small Enterprises (10-50 employees) and 7.3 % Medium-sized enterprises (50-250 employees). This structure corresponds to the distribution of companies in both monitored economies.

Within the Czech Republic, 66.6% of respondents are active on the market more than 10 years, 15.4% are active between 5 to 10 years and 18% do a business less than 5 years. The distribution of respondents from the Slovak Republic is similar. 44.7.% of respondents do a business more than 10 years, 23.7% of them are active from 5 to 10 years, and 31.6% of respondents have entrepreneurship less than 5 years.

The structure from the view of education was different in both countries. The largest share of the owners surveyed in the Czech Republic was secondary education (59.3%) and the rest of entrepreneurs (40.7 %) has finished the education at university. In the Slovak Republic were 68.1% of entrepreneurs with university education and other 31.9% has finished their studies at high school.

Following research questions were evaluated to fulfil the main objective of the article:

Perception of current level of basic macroeconomic variables (GDP, employment rate, inflation rate) and their business environment support:

RQ₁: The basic macroeconomic variables perception of entrepreneurs of SMEs from the Czech Republic and Slovak Republic is the same, without significant differences.

RQ_{1a}: The perception of the current level of the basic macroeconomic variables is dependent on the length of business.

RQ_{1b}: The perception of the current level of basic macroeconomic variables is dependent on the education of SME entrepreneurs.

Perception of positive impact of bank's interest rates on the business environment.

RQ₂: Entrepreneurs of SMEs in the Czech Republic and the Slovak Republic perceive the current level of interest rates in banks without significant differences.

RQ_{2a}: The perception of the current level of interest rates in banks depends on the length of business.

RQ_{2b}: The perception of the current level of interest rates in banks depends on the education of SME entrepreneurs.

The following statistical tools of descriptive statistics were used: contingency and association tables, descriptive characteristics - cumulative frequency. These methods were used to apply Z-test method for evaluation the formulated research questions. Subsequently, we applied statistical methods as absolute abundance and simple sorting of the statistical character. In the simple sorting method, attention was drawn to the expression of the relative number of entrepreneurs according to the selected statistical features (the length of business in the business environment and the highest completed education of the entrepreneur). The contingency intensity was measured by the Pearson coefficient of contingency based on the square contingency. By comparing the selected groups of enterprises according to the selected statistical features, the significance of the statistical feature was determined, i.e. the research questions were verified using the above-mentioned tests using the good match test and the Z-test. The individual questions were verified at a 5% level of statistical significance, with a p-value of less than 0.05 leading to the rejection of the statement on the independence of the variables.

3. Results

The first research question (RQ₁) focuses on analyzing whether addressed companies from the Czech and Slovak Republics perceive the current level of basic macroeconomic variables (GDP, employment, inflation) as suitable for business support and creating interesting business opportunities. This question is further analyzed in relation to the duration of the business and the education of the addressed entrepreneurs.

Tab. 2: Do macroeconomic indicators (GDP, unemployment, inflation rate) support entrepreneurships?

	Czech Republic	Slovak Republic	Z – score (CZE/SK)	P-value (CZE/SK)
Agree	31.7 %	38 %	-1.662	0.097
Not identified	35.3 %	26.1 %	2.504	0.012
Do not agree	33 %	35.9 %	-0.760	0.447

Note: TOTAL: CZ(n)= 312; SK(n)=329. Chi-square (χ^2) = 6.529; P- value (π) = 0.038226

The result is significant at $\pi < 0.05$.

Source: Authors' results

It can be seen (Tab. 2) that the current level of basic macroeconomic variables in relation to their business is positively perceived primarily by entrepreneurs in Slovakia (38%). Data also show that Czech entrepreneurs have a predominantly neutral attitude to the macroeconomic indicators (35.3%), compared to Slovak entrepreneurs (26.1%).

The results in Tab. 2 indicate that the difference in answers to the RQ₁ is statistically significant (p-value is 0.038226 at 5% significance level). The following research questions will determine whether the identified heterogeneity in responses is due to the number of years of business and the education of SME entrepreneurs.

The RQ_{1a} analyses if the perception of the current level of basic macroeconomic variables is dependent on the length of the business.

Tab. 3: Do macroeconomic indicators support entrepreneurs? (Attitude according to the length of the business)

attitude	The number of years of business in Czech Republic				The number of years of business in Slovak Republic				Z-score (CZE/SK) P-value (CZE/SK)		
	1-5 years	5-10 years	> 10 years	TOTAL (n) %	1-5 years	5-10 years	> 10 years	TOTAL (n) %	1-5 years	5-10 years	> 10 years
Agree	35.7%	37.5%	29.3%	(99) 31.7%	36.5%	44.8%	35.4%	(125) 38.0%	-0.103 0.920	-0.814 0.418	-1.205 0.230
Not identified	44.6%	35.4%	32.7%	(110) 35.3%	27.0%	27.0%	25.1%	(86) 26.1%	2.271 0.023	1.009 0.313	1.530 0.126
Do not agree	19.6%	27.1%	38%	(103) 33%	36.5%	28.2%	39.5%	(118) 35.9%	-2.212 0.027	-0.137 0.889	-0.281 0.780
TOTAL (n)	56	48	208	312	104	78	147	329			

Note for Czech Republic: Chi-square (χ^2) = 8.0485; P- value (π) = 0.089819

Note for Slovak Republic: Chi-square (χ^2) = 3.2079; P- value (π) = 0.523657

The results are not significant at $p < 0.05$.

Source: Authors' results

In research question RQ_{1a} are only minimal differences between Czech and Slovak respondents. These differences can be seen especially among start-ups (1 to 5 years of entrepreneurship), where Czech entrepreneurs mostly see the impact of macroeconomic indicators on their businesses less negatively (19.6%) than Slovak entrepreneurs (36.5%). This difference was proved as statistically significant (Z-Score is -2.212, the p-value is 0.027). The result is significant at $p < 0.05$. On the contrary, Tab. 2 shows that the 5% level of significance was not statistically significant in relation to all obtained answers, in the Czech Republic (the chi-square statistic is 8.0485 and the p-value is 0.089819), in the Slovak Republic (chi-square statistic is 3.2079 and the p-value is 0.523657).

The RQ_{1b} addresses whether perception of the current level of basic macroeconomic variables is dependent on the education of SME entrepreneurs. There is only one significant difference between Czech and Slovak respondents in this question.

Tab. 4: Do macroeconomic indicators support entrepreneurs? (Attitude according to education reached by entrepreneurs)

Attitude	Level of education of entrepreneurs in Czech Republic			Level of education of entrepreneurs in Slovak Republic			Z-score (CZE/SK) P-value (CZE/SK)	
	High school graduates	University diploma	TOTAL (n) %	High school graduates	University diploma	TOTAL (n) %	High school graduates	University diploma
Agree	33.0%	30.0%	(99) 31.7%	35.2%	39.3%	(125) 38.0%	-0.392 0.697	-1.758 0.078
Not identified	31.9%	40.1%	(110) 35.3%	26.7%	25.9%	(86) 26.1%	0.933 0.352	2.775 0.005
Do not agree	35.1%	29.9%	(103) 33.0%	38.1%	34.8%	(118) 35.9%	-0.504 0.617	-0.938 0.347
TOTAL (n)	185	127	312	105	224	329		

Note for Czech Republic: Chi-square (χ^2) = 2.3004; P- value (π) = 0.316579

Note for Slovak Republic: Chi-square (χ^2) = 0.5383; P- value (π) = 0.764039

The results are not significant at $p < 0.05$.

Source: Authors' results

The results show that Czech entrepreneurs with higher education (40.1%) have a neutral attitude towards perceptions of macroeconomic indicators compared to Slovak respondents in the same category (25.9%). This difference was proved as statistically significant (Z-Score is 2.775, the p-value is 0.005). The result is significant at $p < 0.05$. Tab. 4 shows that the 5% of the significance level was not statistically significant in relation to all obtained answers, in the Czech Republic (the chi-square statistic is 2.3004 and the p-value is 0.316579), and in the Slovak Republic chi-square statistic is 0.5383 and the p-value is 0.764039).

The second research question (RQ₂) focuses on analyzing whether addressed companies from the Czech and Slovak Republics perceive interest rates in banks as a positive factor in the business environment. This question is further analyzed in relation to the duration of the business and the education reached.

Tab. 5: Do interest rates in commercial banks support entrepreneurs?

	Czech Republic	Slovak Republic	Z – score (CZE/SK)	P-value (CZE/SK)
Agree	34.4%	40.7%	-1.681	0.093
Not identified	35.6%	24.6%	3.027	0.002
Do not agree	30.1%	34.7%	-1.222	0.222

Note: TOTAL: CZ(n)= 312; SK(n)=329. Chi-square (χ^2) = 9.1911; P- value (π) = 0.010097

The result is significant at $\pi < 0.05$

Source: Authors' results

Tab. 5 shows that interest rates in banks as a positive factor affecting the business environment are perceived primarily by entrepreneurs in Slovakia (40.7%). Czech entrepreneurs also perceive this factor rather positively (34.3%). Data also show that Czech entrepreneurs have predominantly neutral attitudes to the interest rates in banks (35.6%) compared to Slovak entrepreneurs (24.6%). The results refer to the fact that the difference in answers to the question (RQ1) between Czech Republic and Slovak Republic is statistically significant (the p-value is 0.010097 at 5% significance level). The following research questions will determine whether the identified heterogeneity in responses is due to the number of years of business and the education of SME entrepreneurs.

The RQ_{2a} analyses whether the perception of the current level of interest rates in banks is dependent on the length of the business.

Tab. 6: Do interest rates (in commercial banks) support entrepreneurs? (Attitude according to the length of the business)

attitude	The number of years of business in Czech Republic				The number of years of business in Slovak Republic				Z-score (CZE/SK) P-value (CZE/SK)		
	1-5 years	5-10 years	> 10 years	TOTAL (n) %	1-5 years	5-10 years	> 10 years	TOTAL (n) %	1-5 years	5-10 years	> 10 years
Agree	30.4%	39.6%	34.1%	(107) 34.3%	31.7%	39.7%	47.6%	(134) 40.7%	-0.179	-0.018	-2.558
Not identified	37.5%	33.3%	35.6%	(111) 35.6%	28.9%	18.0%	25.2%	(81) 24.6%	1.120	1.969	2.083
Do not agree	32.1%	27.1%	30.3%	(94) 30.1%	39.4%	42.3%	27.7%	(114) 34.7%	-0.910	-1.724	0.629
TOTAL (n)	56	48	208	312	104	78	147	329			

Note for Czech Republic: Chi-square (χ^2) = 0.9972; P- value (π) = 0.910213

Note for Slovak Republic: Chi-square (χ^2) = 10.3335; P- value (π) = 0.035169

Source: Authors' results

There are several differences between Czech and Slovak respondents in this question. These differences are evident especially among long-term entrepreneurs (with length of the business more than 10 years). In this category Slovak businessmen perceive the impact of interest rates on banks on their business more positively (47.6%) than Czech entrepreneurs (34.1%). This difference was proved as statistically significant (Z-Score is -2.558, the p-value is 0.011). The result is significant at $p < 0.05$. Other significant differences in the responses were found in the neutral attitude to the surveyed issue for entrepreneurs operating for more than 5 years.

There wasn't proved any other significant dependence in answers of entrepreneurs from the Czech Republic (the chi-square statistic is 0.9972 and the p-value is 0.910213). The dependence between the duration of the business and the perception of interest rates banks (the chi-square statistic is 10.3335 and the p-value is 0.035169) was proved in answers of entrepreneurs from the Slovak Republic.

The RQ_{2b} addresses if the perception of the current level of interest rates in banks is dependent on the education of SME entrepreneurs.

Tab. 7: Do interest rates (in commercial banks) support entrepreneurs? (Attitude according to education level of entrepreneurs)

Attitude	Level of education of entrepreneurs in Slovak Republic			Level of education of entrepreneurs in Czech Republic			Z-score (CZE/SK) P-value (CZE/SK)	
	High school graduates	University diploma	TOTAL (n) %	High school graduates	University diploma	TOTAL (n) %	High school graduates	University diploma
Agree	34.6%	33.8%	(107) 34.3%	36.2%	42.8%	(134) 40.7%	-0.274 0.787	-1.657 0.097
Not identified	35.1%	36.2%	(111) 35.6%	26.7%	23.7%	(81) 24.6%	1.485 0.139	2.513 0.012
Do not agree	30.3%	30.0%	(94) 30.1%	37.1%	33.5%	(114) 34.7%	-1.199 0.230	-0.686 0.490
TOTAL (n)	185	127	312	105	224	329		

Note for Czech Republic: Chi-square (χ^2) = 0.0399; P- value (π) = 0. 980256

Note for Slovak Republic: Chi-square (χ^2) = 1.319 ; P- value (π) = 0. 517122

The results are not significant at $p < 0.05$.

Source: Authors' results

There is only one statistical difference between Czech and Slovak respondents. The results show that Czech entrepreneurs with a university education (36.2%) have a more neutral attitude in the perception of interest rates in banks compared to the Slovak respondents in the same category (23.7%). This difference was proved as statistically significant (Z-Score is 2.513, the p-value is 0.012). The result is significant at $p < 0.05$.

The statistical significance on the 5% level was not proved in relation to all obtained answers, in the Czech Republic (the chi-square statistic is 0.0399 and the p-value is 0.980256), in the Slovak Republic (the chi-square statistic is 1.319 and the p-value is 0.517122).

Discussion and Conclusion

In this paper we analysed the impact of selected factors (education of entrepreneurs and length of the business) on the perception of macroeconomic and financial

environment of SMEs in the Czech Republic and in the Slovak Republic. The research was conducted at Tomas Bata University in Zlín. For this partial results were 2 main research questions set (and another 4 research questions were formulated in relation to three selected factors - length of the business and entrepreneur's education).

The results provide some interesting facts. The findings have potentially important implications for governments in both countries for understanding how the factors affected business environment are perceived by entrepreneurs from SMEs. The government can anticipate better a reaction of the SMEs and target each encouragement to achieve a real support of SMEs.

Despite the fact that the macroeconomic environment in the Czech Republic and Slovakia is comparable, perceptions of the business environment are different in several aspects. As can be seen from results of first research question, entrepreneurs in the Slovak Republic perceive the current macroeconomic variables more positively than entrepreneurs in the Czech Republic. On the contrary, Czech entrepreneurs with short business experiences (1-5 years) perceive macroeconomic variables (GDP, employment rate, inflation rate) more positively than the Slovak entrepreneurs in the same category. Our result are in the contradiction to the statement of Altman et al. (2010), who states that SMEs which are on the market 3-9 years are more sensitive and vulnerable to failure. This result was partially proved by Cepel et al. (2018). They assumed that Slovak entrepreneurs gave the economic factors a higher rating than Czech entrepreneurs. We analysed also the impact of entrepreneurs' education on the perception of business environment. No statistical significant impact and no differences between Czech Republic and Slovak Republic were proved.

The second research question was focused on perception of financial environment. The financial environment was defined as perception of current bank's interest rates and their positive impact within business environment. Czech and Slovak entrepreneurs perceive this impact differently. While this impact is perceived positively in the Slovak Republic, entrepreneurs in the Czech Republic don't hold any position. It can be caused by Czech Nation Bank's intervention which were finished in April 2017. Slovak entrepreneurs with more than 10 years of business experiences perceive current interest rates much more positively than Czech entrepreneurs in the same category. Entrepreneurs' education does not have impact on the perceiving of current interest rates. There were found out no significant differences between Czech and Slovak answers in this field. It can be seen that the general perception of current bank's interest rates is more positive by Slovak companies than Czech companies. Czech entrepreneurs are more negative. This results are not in line with results Kalusova and Badura (2017) who claim that financial condition of Czech enterprises appeared to be more consolidated than the financial condition of Slovak enterprises. In this case Czech enterprises should not be negative in the perception of bank's interest rates. Civelek et al. (2016) state that Czech entrepreneurs evaluate also government's approach and its attempts to develop suitable condition for doing business.

This paper has some limitations. Firstly, only Czech and Slovak SMEs were analysed. Secondly, the questions placed among entrepreneurs could be understood differently (due to different experiences, knowledge, or just because of current mood). The results can be affected also due the sample size which responded our questions. Lastly, the respondents

could provide untruthful answers. Therefore, the results cannot be generalized. The study does not attempt to examine the causation of differences in perception.

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Received: 06. 05. 2018, reviewed: 09. 05. 2018

Approved for publication: 24. 10. 2018

FINANCIAL STATEMENTS RISK: CASE STUDY OF A SMALL ACCOUNTING UNIT

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Abstract: *Accounting records constitute the basic information sources for various groups of users. The quality of information acquired may considerably affect their decision-making based on accounting data and information reported. The focus of this contribution is laid on the CFEBT method of risk detection of accounting records from the view of a risk of accounting errors and frauds, with a result in the reduction in the information asymmetry between their authors and users. The main article objective is to analyze the risk of accounting errors and frauds through CFEBT risk triangle and a case study of selected small entities which operate predominantly in processing industry. The CFEBT risk triangle was designed as a tool for detection, evaluation and management of the risk of accounting errors and frauds in circumstances of the Czech accounting standards and International Financial Reporting Standards (IFRS). The case study results that it was ascertained that the most significant discrepancy between the economic substance of the business activity of the accounting unit and the generation of cash flow is a consequence of reported financial revenues.*

Keywords: *Creative Accounting, CFEBT, Financial Statements, Risk of Financial Statements, Fair and True View, Frauds, Accounting Errors.*

JEL Classification: *G32, M41.*

Introduction

Financial statements have been a major concern for the regulators due their importance for financial fraud detection tools and capabilities that may provide stakeholders and other involved people's red flags. However history shows that financial fraud can never be confirmed without a full investigation (Bay, Kumaraswamy, Anderle, Kumar & Steier (2006). According to Abbasi (2012) over the past decades several frauds have been uncovered, for example Enron, WorldCom, Lehman Brothers, General Motors (USA), Harris Scarfe and HIH (Australia), Vivendi (France), Royal Ahold (the Netherlands), SKGlobal (Korea), YGX (China), Liverdoor Co. (Japan) etc. In this connection, Henselmann and Hofmann (2010) list the worst ten financial scandals in the last years. The Association of Certified Fraud Examiners estimates that worldwide financial losses exceed a trillion dollars. Needless to say, traditional methods of uncovering frauds and risks thereof have increasingly failed. This is also proven by the fact that frauds are uncovered in only a half of all cases (42%) outside the internal control systems of companies. Whereas only a small percentage of loss from frauds is attributable to organizations, a higher percentage is achieved in this sense by senior officers and managerial staff. Organizations may accordingly lose as many as 7% of their total turnover per year as a consequence of frauds (Chartered Institute of Management Accountants 2009). After the global financial crisis banks and politics around the world promoted new rules and regulations to enhance the transparency of financial system. The question is to what extents reduce these institutions the risk of fraud. Companies are also confronted with the task of implementing information technologies in forensic activities, improvement of internal information systems by

introducing effective internal controls based on mutual links in the financial and managerial accounting.

The paper focused on the issue of manipulation of accounting records, which is the main area of creative accounting. The CFEBT triangle method analysis will show a case study of small accounting units where it is possible to reduce information asymmetry between authors and users of the financial statements.

1 Statement of a problem

Accounting report fraud is also a very problematic kind of fraud which affects many organizations around the world (Cantoni & Xiang, 2013). The first fraudulent misstatement comes about as a result of fraudulent financial reporting and this involves the intentional misstatements or omissions to disclosure facts in the financial statements in order to deceive and mislead those using the financial statement. The next kind of misstatements comes about as a result of misappropriating assets, and these can include theft or even defalcation (Clarke, 2007). Both these misstatements generally result in financial reporting fraud that is very detrimental to any organization (Adner & Helfat, 2003). All kinds of financial fraud are said that be a very significant problem for many business organizations all around the world (Adner & Helfat, 2003). There are many examples of large multinational companies which have been found to either practice fraud or have become the victim of fraud, and suffering very bad consequences as a result (Masdoor, 2011). Financial fraud is a species of fraud that is very destructive to an organization and it is capable of bringing the organization to its knees (Adner & Helfat, 2003). Without proper defence mechanisms, a banking and finance organization would not be able to guard against financial fraud and suffer the consequences of it (Clarke, 2007). Many large international companies around the world are greatly dependent on the ability to control their financial performance measures (Eccles & Youmans, 2015). Companies that are unable to do so would eventually fall victim to financial reporting (Gallagher & Blank, 2012).

Reduced information asymmetry for users of accounting records may have significant impacts on their decision-making. The publication recommends a preventive detection of accounting errors, including uncovering the causes thereof (Wuerger and Borba, 2014). Specific recommendations for the management to introduce internal auditing and set up different organizational internal controls for preventing frauds of financial statements were published as a result of a case study conducted in a construction company and construction industry (Horvat & Lipicnik, 2016). A proposal for a method for determining the probability of veracity of financial statements as a tool for distinguishing between fraudulent and truthful reports was published by authors Purda and Skillicorn (Purda and Skillicorn, 2015). Moreover, manipulation of accounting is rooted in attempts at tax evasion or money laundering. Results of frauds in the area of export are presented within the “Deep Learning” model, which classifies Brazilian producers as regards the options of committing frauds during export activities. According to the publication, this model was able to uncover certain anomalies, such as money laundering (Paula et al., 2016). The problem of financial statements risk is associated with the terms “creative accounting” and “fraud”. The term of “creative accounting” is defined in theory as a process during which economic transactions are realized directly in order to achieve favourable accounting results or, more often, this term concerns a purpose-directed manipulation of

data. Users of financial statements are unable to obtain absolute certainty about faithful presentation (true and fair view) of financial statements in the relation of economy reality. This means they need reasonable certainty. At the same time creators and users of financial statements want to get the best quality and quantity of information. They could use a wide range of ratios, bankruptcy and credibility models. But these models often provide users with conflicting results and this complicates decisions about the financial health of a company and so on.

2 Material and Methods

The objective of the paper is analysis of manipulation of accounting records using the CFEBT triangle method on the case study of small accounting units. The method of CFEBT represents a solution to the issue of reducing the information asymmetry between authors and users of financial statements.

2.1 Data

The analysis was engaged in certain tested periods for selected accounting units in the range of available data of seven accounting periods, i.e. accounting periods of the years 2005–2016. The selected sample is made up of accounting units of small entities, depending on the average number of their employees, which is greater than 10 and does not exceed 50. The accounting units operate predominantly in processing industry. In total, as many as 6,299 accounting units were included in the analysis. All selected companies are seated in the Czech Republic. The analysis works with reported data of financial statements of companies from Albertina database. Where it tests risks of causes (motivation) of occurrence of accounting errors and frauds, the analysis operates with as many as 26,884 under test (data rows) or 6,299 accounting units for the analysed accounting periods of selected accounting units in order to calculate seven selected financial indicators, median value, frequency of occurrence in the set, and consequently, the calculation of a deviation from the median value and the standard deviation and the proportion of a deviation to the standard deviation.

The table below reflects in detail the representation of individual groups of industries for the selected sample of accounting units under comparison, included in the test. Where the representation of certain groups of NACE industries is insignificant, these groups were combined into suitable joint groups.

Tab. 1: Characteristics of data sample according to CZ NACE

CZ NACE number	Description of CZ NACE groups branches of processing industry	Number of accounting units		Number of enterprises	
		%	Number	%	Number
10-12	Production of food, beverages and tobacco	9.64	2591	10.10	636
13-15	Textile, clothing, leather and shoe production	5.88	1580	5.81	366
16-17, 31	Wood processing and paper production, furniture production	11.19	3009	11.27	710
19-20, 22-23	Manufacture of chemicals and coke, plastics and rubber production and other non-metallic products	12.78	3436	12.78	805
24-25	Metals and metal products, fabricated metal product manufacturing etc.	26.48	7118	26.18	1649
26-27	Electrical machinery and optical equipment production including computer and electrical equipment	8.14	2188	7.99	503
28-30	Manufacture of machinery and equipment and transport equipment production	12.09	3251	12.05	759
8,18,21,32,33	Other manufacturing	13.81	3711	13.83	871

Source: (Albertina Gold Edition)

2.2 CFEBT risk triangle method

The methodology of CFEBT risk triangle is based on the Beneish model that uses financial statement data in assessing the fraud potential of enterprises. To compute a probability of manipulation (M-score), Beneish (1999) estimated a probit regression. The calculations of CFEBT score is divided into three levels of analysis. The M-score is designed at the first level as an analytical test which is followed by a detailed analysis of non-monetary expenses and revenues in a modified calculation of the second level of the M-score. The third level of the M-score is included to pursuance of a complex overview of all interconnections of generated outputs of cash flow and CFEBT. These levels could be calculated as follows:

$$CFEBT = \frac{\sum_{t=1}^n CF_t - \sum_{t=1}^n EBT_t}{\sum_{t=1}^n EBT_t} \cdot 100 \quad (1)$$

Where:

CF ... Total increase or decrease in cash flow before tax during the observed period *t*

EBT ... Earnings before tax, generated during the observed period

If $CFEBT \geq \text{materiality}$, a detailed test of links of impacts has to follow in the second and third levels of M-score (Drabkova, 2013; 2015).

$$CFEBT_m = \frac{\sum_{t=1}^n CFm_t - \sum_{t=1}^n EBTm_t}{\sum_{t=1}^n EBTm_t} \cdot 100 \quad (2)$$

Where:

CF_m ... Increase in cash flow before tax in the observed period, modified by reported future cash in- and out-flows

EBT_m ... Earnings before tax generated during the observed period, modified by non-monetary expenses

$$CFEBT_{om} = \frac{\sum_{t=1}^n CFom_t - \sum_{t=1}^n EBTmm_t}{\sum_{t=1}^n EBTm_t} \cdot 100 \quad (3)$$

Where

CF_{om} : increase in operative cash flow before taxes in the analysed period

EBT_m : earnings before taxes gained for the analysed period modified by non-monetary expenses

For a statistical analysis of causes of accounting errors and frauds, seven financial indicators are designed for the individual accounting periods. These indicators allow a comparison between cash flow and earnings in terms of accounting, i.e. net of income taxes: return of assets (ROA), cash flow return on assets (CFA), and return of equity (ROE), cash flow return of equity (CFE), expense personnel productivity (EPP), financial personnel productivity (FPP) and total accruals to total assets (TATA).

3 Problem solving

CFEBT risk triangle is based on 3 risk factors in mutual relationships causes and impacts of accounting errors and frauds based on a detailed analysis in combination with assessment of internal control system of accounting unit. The triangle aims to reduce an information asymmetry between creators and users of accounts. It is also able to help to manage risks of accounting errors and frauds for managers and corporate governance.

3.1 CFEBT Risk Triangle – risk of cause for the whole sample of small entities

The analysis of the risk of occurrence (cause) of accounting errors and frauds focused on the frequencies of seven individual indicators which were: ROA, CFA, ROE, CFE, EPP, FPP and TATA. Results are obtained on the whole sample of small entities. On the basis of the determined risk items for the parameter set up for the calculation of 7 financial indicators, (i.e. tolerance = 0, and certainty = 3.5, narrowing = 1 %, and calculation of the median value using the modus, the number of risk items for 7 financial indicators was calculated in the proportion 1%). The next phase of the analysis tested modality in form of calculation of vertices in order to evaluate suitability of using the modus for calculating the median value of the given set. As regards the course of frequencies, the function development was observed, and the issue whether it is possible to identify one significant vertex on the Gaussian curve was examined. The use of modus in order to gain the most accurate calculation of the median value was confirmed.

The following table shows resultant values of frequencies accomplished for individual indicators of the risk of occurrence (cause) of accounting errors and frauds. The above-specified calculations are performed using a statistical method which reveals median values, deviations of data from a median value and the standard deviation. The subsequent

calculation of a ratio (deviation of an accounting value from a calculated median value of a set) and the standard deviation generates information about a risk factor in the sense that values of the analysed data entity deviate from median values of the set of taxable entities. A median value is determined in the framework of the analysis for each item contained in the database of the entities observed for every accounting period included.

Tab. 2: Overview of detected risk items of financial indicators – risk of cause of accounting errors and frauds occurrence in the years 2005–2016

Indicator	ROA	CFA	ROE	CFE	EPP	FPP	TATA
Modus	0	4	0	10	296	6	0
Frequency	2270	1283	1118	1666	3078	1316	1118
Standard deviation	14.48	15.29	48.6	61.04	531.21	66.59	48.6
Number of risk items in set	727	646	998	1033	757	812	631
Proportion of risk items %	3	2	4	4	3	3	2

Source: (own processing)

Tab. 2 above shows the total number of evaluated risk indicators of the financial analysis for individual analysed accounting periods of 2005–2016, in total 26,884 of analysed items (calculations) for as many as 6,299 accounting units. The calculation of 7 selected indicators is also based on the evaluation of cash flow and profit. These are part of the risk analysis of the cause of accounting errors and frauds occurrence in CFEFT risk triangle.

The result of detected risk areas of the financial analysis may be presented as a reflection of the information capacity of the calculated financial health of the accounting unit observed in relation to comparable accounting units. In addition, it is possible to determine whether the given accounting unit deviates from financial indicators and, as the case may be, to determine the areas of financial indicators that are deviated from. The evaluated risk items in the given accounting periods of the selected accounting unit are used in comparison with results of a risk analysis of the impact of accounting errors and frauds. In this part of the anti-fraud CFEFT approach, the three-level calculation of the M-score proceeds from the interconnection of cash flow change (CF) and earnings (EBT), all after the tax aspect has been excluded. We selected one accounting unit from the tested sample for the analysis of the risk of impacts in this paper because selected accounting unit had 1st level of CFEFT score highly above considered materiality. Considered materiality was between 5% - 10%.

3.2 Case study: CFEFT Risk Triangle for the selected small entity

The detection of risk items for individual entities may be followed by a detailed analysis, which examines the impact of these items in a long-term context of relations between financial statements. The selected accounting unit is based in the Czech Republic, and, according to the classification of CZ NACE, the industry in which the accounting unit operates is that with the prevailing activity of NACE 30990: Manufacture of other means of transport and equipment unspecified elsewhere. The turnover of the accounting unit for the last accounting period observed amounted to CZK 29 million and this accounting units has approximately 25 employees. For the period observed, the financial statements of the accounting unit were not verified by auditors.

3.2.1 Three levels of M-score

In the analysis of an impact risk of accounting errors and frauds, the selected unit generated following results of the M-score. Results of M-score were calculated for a selected unit for the accounting period 2011-2015 and Tab. 3 provides cumulative results for individual accounting periods analysed. Tab. 3 implies that the first level of CFEBT M-score is calculated at 547%. The first level of M-Score is calculated according to the equation 1 (see chapter 2.2 methodology). This value, which is highly above the materiality level, expresses a significant inconsistency between the generation of cash flow and earnings before tax for the analysed first to twelfth years in the selected accounting unit. This positive value clarifies that the accounting unit has reached earnings at a significantly lower level in comparison with the generated cash flow.

Tab. 3: CFEBT for the selected accounting unit – three levels of M-score

Analysis into risk of impact of accounting errors ad frauds – 1st - 3rd levels of CFEBT*	First level of M-score	Second level of M-score	Third level of M-score
Taxable entity	Basic	Modified	M-operative
M-score	547	88	-66
Δ CF**	2,787	5,087	909
Σ EBT	431	2,704	2,704

* indicator (1), (2) and (3) in methodology of CFEBT risk triangle

**an increase in cash flow of reviewed accounting periods in thousands

Source: (own processing)

In the detailed testing of the second level of modified M-score, the first level of M-score was reduced to 88% from 547%, see Tab. 3. The second level of M-Score is calculated according to the equation 2 (see chapter 2.2 methodology). However, M-score still shows a value that is higher than the materiality under consideration. In modifying the creation of cash flow and the profit (loss) as to the economic substance of the results reported for the accounting periods observed, cash flow increased by TCZK 2.300, and EBT increased by TCZK 2.273. However, there still remains a considerable discrepancy between cash flow and EBT at 88%.

The third phase of M-score as shown in Tab. 3 presents the calculation of the ratio of generated operating cash flow and EBT after modification by costs not converted to expenses. The third level of M-Score is calculated according to the equation 3 (see chapter 2.2 methodology). The operative M-score equals 66%, with a minus values, where the value of the modified EBT in the amount of TCZK 2,704 exceeded the value of the operating cash flow in the amount of TCZK 909. This means that the decrease in cash flow below the value of the profit earned in total originated in the operational area in 34%, and in 66% outside the operational area, i.e. by financial and investment activities of the accounting unit.

On the basis of results of the first, second and third levels of M-score, interconnections between impacts of EBT and cash flow may be interpreted as inconsistent, with an impact outside of the operations area of the selected company, or, as the case may be, the inconsistency has been caused predominantly in the financial or investment area.

Tab. 4: Modification items of the second level of CFEBT M-score

Item no.**	Description of item (modification, informative, operative)*	Change of item "n" in TCZK	n / EBT in %
4	Receivables -4, trade receivables	-1,355	-314
5	Receivables -5, from institutions	-135	-31
9	Inventory	-221	-51
10	Tangible fixed assets	-1,236	-287
13	Payables to members	-138	-32
16	Trade payables	-350	-81
18	Payables to employees (institutions)	-153	-35
23	Depreciation	2,273	527
33	Equity capital	250	58
34	Total revenues from assets and material	4,905	1,138
35	Total costs of assets and material sold	3,110	722

* EBT and CF non-cash and informative items: changes in values over the reviewed period

** items nos. 1–22 – items for modification of CF_m , nos. 23–25 – items for modification of EBT_m , nos. 26–33 – informative items, nos. 34–35 operative items for calculation of $CFEBT_{mo}$

Source: (own processing)

Tab. 4 shows detailed individual modification and informative items, including their percentage proportion to EBT. This information is important for the final evaluation of the risk of accounting manipulation on the basis of the overall results of the analysis into the risk of causes and impacts of accounting errors and frauds.

The difference between the modified cash flow and EBT on the second level of CFEBT score stands at TCZK 2.383 for the period observed, see Tab. 3. Based on the analysis of modified items presented, Tab. 4 indicates that the positive difference between the creation of cash flow and EBT, when corrected as to their economic substance, was caused in the values reported especially by the decrease in trade receivables by 314%, decrease in stock by 51% and tangible fixed assets by 287%. At the same time, the value of the equity capital increased by TCZK 250, or 58%.

3.2.2 Statistical analysis of the risk of cause within CFEBT risk triangle

To evaluate the **risk of cause** of occurrence within the CFEBT risk triangle, the risk rate of the selected accounting unit (small entity) was assessed in the individual accounting periods. The risk of cause of occurrence was analysed for the selected accounting unit on the basis of the above results of the case study for a sample of small accounting units operating predominantly in building production. A statistical analysis and comparison with the median value of the set were performed for the seven proposed financial indicators and the selected accounting items, with these parameters: tolerance 5%, narrowing 0.5% and certainty 3.5.

In accordance with Tab. 5 and results of the evaluation of the risk of accounting items, risk was detected that exceeds the permitted tolerance of 5% for the change of change in reserves and adjustments and complex deferred expenses. Tab. 5 presents the detected risk of cause of accounting errors and frauds for the position "Net book value of material sold" and the observed accounting periods of the years 2011, 2013, 2014 and 2015. Tab. 5 shows results of the comparison between the accounting unit and the whole

set of small companies. The columns provide data as to the frequency of the occurrence of values at 5% tolerance as well as deviations from this tolerance. Results of risk areas for the evaluation of risks of occurrence and impacts of accounting errors and frauds of the selected accounting entity will direct the user into the evaluated risk areas, with information that the user will be able to use on his/her level of decisions made based on financial statements.

Tab. 5: Overview of detected risk items of financial indicators – risk of cause of accounting errors and frauds occurrence in the years 2005–2016

Financial statements date	Accounting item	Change of accounting item TZCK*	Comparison between accounting unit and the whole set		
			Frequency	Deviation	Dev./Stand. dev.
31.12.2011	Reserves, adjustments and complex deferred expenses	-4		-4	-11.43
31.12.2011	Net book value of material sold in TCZK	4	327	4	3.67
31.12.2013		327	4	3.67	327
31.12.2014		218	5	4.59	218
31.12.2015		327	4	3.67	327

* risk items that were excluded upon narrowing at 3% and tolerance at 5%

Source: (own processing)

In statistical evaluation of the risk in the reported accounting unit “change of accruals”, which includes reserves and adjustments, the vertex of risk of occurrence cause uncovered a significant deviation from the median value of the whole sample of accounting units for the year 2011, where the proportion of the deviation and standard deviation of the analysed set amounted to 11.43% – see Tab. 5.

4 Discussion

We elaborate the results of causes and impacts of accounting errors and frauds in small entity which had 1st level of CFEBT score highly above considered materiality. Only reported data of the selected accounting unit in the given collection of documents are at disposal for the evaluation of internal risks present in accounting units, or rather the 30 red-flag questions. Users of accounting statements have in fact no information about the substance of the generated cash flow from these activities. Needless to say, this is an important value of financial assets reported in financial statements by the accounting unit. Previous research carried out by comparison of the CFEBT approach with results of evaluation of selected bankruptcy models (Drábková, 2015; 2016) and models of detection of risks of manipulation of accounting records (Drábková, 2017) confirmed the efficiency of the complex CFEBT approach, which is based on interconnections between reported accounting information in the context of their economic substance. Despite the efficiency of individual detection models, it may be assumed that the focus of these models is placed on selected techniques of creative accounting and lack in complexity of the development of information reported in time and interconnections.

In the evaluation of the risk of impacts of accounting errors and frauds, the generated cash flow exceeded 6.47-fold the generated EBT, which represents a discrepancy of TCZK 2,356 for the observed period 2011–2015. The second level of M-score evaluated the impacts of discrepancies between EBT and the generation of cash flow on the level of individual items, taking into consideration their significance on EBT – see Tab. no. 2. After modification of non-monetary items, the second level of M-score detected a noteworthy discrepancy between the generated cash flow and EBT on the level of 88%. Accordingly, for the observed period, the second level of modified M-score exposed a significant impact of discrepancies on reducing trade receivables by 314% proportion to EBT – i.e. the value of TCZK 1,355, and reduction of stock by 51% proportion to EBT – i.e. TCZK 221,000, for the observed period of 5 years. In addition, payables were reduced by 81% proportion to EBT – i.e. the value of TCZK 350, for the observed period of 5 years – see Tab. 4.

This discrepancy, exceeding the generated cash flow on three levels of the CFEBT score for the area of risk detection of impacts of accounting errors and frauds, and interfering in the operating cash flow to a considerable extent, was not explained by the reported accounting statements in a satisfactory manner, or, as the case may be, the equity capital was not increased by surcharges of owners or the external capital was not increased by credits and loans provided to the company. The third level of CFEBT M-score of 66% revealed that this discrepancy between the earnings before tax and the generated cash flow occurred in the operating cash flow, specifically in the area of reported valued for the sale of material (i.e. in addition to the revenues from sales of goods) and in the area of financial revenues. The financial revenues reported in the observed period of 2011-2015 represented the proportion to EBT in the amount of 1,184%, whereas the expended financial costs reduced these reported revenues only by 191% proportion to EBT. The accounting unit has no short-term or long-term financial investments in its corporate assets. However, the proportion of the reported revenues for the observed period of 6 years (2011 to 2015) to the value of the short-term financial assets on bank accounts and petty-cash funds amounts to 97% at the date of the financial statements for 2015.

The comparison of the interconnection between causes and impacts of the risk of accounting errors and frauds may lead to the evaluation of the discrepancy between the generation of cash flow and EBT for the observed period of 2011 through 2015 in particular in the operating area of sales of materials and reserves including adjustments, where the links between the reported accounting units were not explained satisfactorily. The accounting unit generated the reported cash flow that significantly deviates from the economic substance of the activity about which the entity provides information to users of financial statements.

Conclusion

The analysis of the risk of accounting errors and frauds examined the operating and financial activities of the accounting unit. In these areas, it was ascertained that the most significant discrepancy between the economic substance of the business activity of the accounting unit and the generation of cash flow is a consequence of reported financial revenues. The operating income reported by the accounting unit reached a significant loss during the individual accounting periods 2011 to 2015. It was exactly for the reason of the

reported profit from sales of material and reported financial revenues that the accounting unit reported the positive earnings before tax in 2014 to 2015 (accounting profit).

Recommendations for individual users of accounting statements can vary subject to the decisions these users intend to make. Auditors, internal or external, and Corporate Governance management may be recommended to direct audit procedures in detailed tests of the generation of reserves and adjustments for the year 2011, and financial revenues, including the related values of bank accounts in the individual years, and last but not least, the area of reporting of revenues and expenses from the sales of materials for 2011, 2013 to 2015. A significant risk of accounting errors and frauds was detected in these accounting areas for the observed period. Potential investors may be recommended to assess their priorities as to the investment into this company with respect to the detected risk of earnings management and off-balance financing, the consequence of which might be the reported values of cash flow and EBT for the observed period of 2011 to 2015. In general, potential investors cannot be recommended to invest into this company despite the fact that bankruptcy or solvency models may yield different information.

Acknowledgement

This contribution was supported by the Faculty of Economics, University of South Bohemia in Ceske Budejovice under Grant No. IGS05C1, “Methods of Risk Management of Accounting Errors and Frauds to Increase the Efficiency of the Internal Control System of Small and Medium Enterprises”.

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Received: 21. 03. 2018, reviewed: 30. 08. 2018

Approved for publication: 08. 04. 2019

LEVERAGE CERTIFICATES' DESIGN WITHIN THE PORTFOLIO MANAGEMENT

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Abstract: *The paper examines an analysis of leverage certificates (namely turbo certificates), where their value is derived from an underlying asset and barrier options. Turbo certificates are riskier financial instruments that provide much more gains or losses due to leverage effect. There are introduced long turbo (for increasing markets) and short turbo certificates (for markets drop). The replicating portfolios profit is identical to a profit from the combination of an underlying asset and barrier options as it is proved in the paper. Based on theoretical approach, replicating portfolios for long and short turbo certificates on Google and Facebook companies are engineered with various parameters and calculated the certificates prices and financial leverages. Their profitability is disproportionately high what it is proved due to low capital investment and the leverage. The main objective is to demonstrate the nature of the given certificates creation using barrier options in an analytical form. The use of proposed turbo certificates can be one of the alternatives for creating a diversified portfolio for investors to reduce risk in case of unforeseen stock price developments. The results of our analysis help the increasing of the intellectualization of all potential investors. After that they will be able to make the best investment decisions in future according to the expectations of UA's price development.*

Keywords: *Long Turbo Certificate, Short Turbo Certificate, Barrier Options, Financial Leverage, Profitability.*

JEL Classification: *G11, G13.*

Introduction

In today's market economy, a large variety of structured products is an expression of a well-functioning market and strong competition between issuers (banks and financial institutions). The large number of structured products is caused due to different variety of characteristics and features of these products. These include a wide range of underlying assets (to be referred as UA henceforth) as stocks, indices, commodities, currencies etc., amount of risk involved, market orientation and maturities. Many studies (Bluemke, 2009; Choudhry, 2004) introduce these modern structured products. According to Brechmann (2008), structured products are derivative financial securities issued by individual issuers. They are linked to the issuer's creditworthiness, but their value is derived from the other financial instruments' development. There is included for example stocks, indices, commodities, currencies, exchange rates and interest rates. Paik (2013) have stated that structured products are a generalization of standard options or derivatives, and specifically turbo certificates are a generalization of classical barrier options.

The main paper's purpose is to introduce and analyse long turbo and short turbo certificates which belong to the leverage certificates. These certificates are highly speculative tools that offer an investor to disproportionately higher investments through leverage. The advantage of short certificates is their ability to participate in

decreasing trends, so they are an interesting option for creating a portfolio of different securities. The research problem is to show the possibility of these products' creation based on barrier options in an analytical form, which belong to the significant part of the financial engineering. Also the background of these products is presented using literature review so that we could continue in our research. The paper's research is applied in Google and Facebook companies. Our findings should help to increase the investors' ability to understand these certificates' creations. Based on the results of the approach, the investors are able to make the best investment decisions in the future according to the expectations of the UA's price development.

1 Statement of a problem

Turbo certificates (or leverage certificates) are a subgroup of structured products. It is a new group of financial instruments that connect the basic features of classical investment instruments together with derivative instruments (Bluemke, 2009). They are highly speculative tools that allow an investor to disproportionately higher investments through leverage. Investor participates in UA's price development without the need for direct investment. Either investing in turbo certificates provides an opportunity to speculate on UA's price increases or price decreases. Long turbo certificates (to be referred as LT henceforth) enable the investor to profit from increasing markets by tracking the UA. On the other hand, short turbo certificates (to be referred as ST henceforth) enable the investor to profit from markets drop by tracking the UA in an inverse manner. The barrier level is set below (LT) or above (ST) actual UA's spot price. Obviously, in the event that markets move the wrong way, investor would multiply any loss too. However, the maximum loss is limited by the capital-invested amount, i.e. investor cannot lose more than he invests. These products are the object of our research.

On the basis of existing studies (introduced below) we can explore the financial engineering principles to the long turbo and short turbo certificates creation using the analytical expression of the barrier options. Also, the pricing formulas to our designed certificates are determined. Consequently, several certificates on Google and Facebook companies using different factors are created, compared and analysed with the aim to investigate the investor's profitability based on the expected shares development scenarios in the maturity date. Using the relation (1) our research is based on real European vanilla options. The demonstration of the creation of these certificates on our selected UA may contribute to the creation of diversified portfolio based on investor's risk-return profile. Our findings should help to increase the investors' ability to understand these certificates' creations. Based on the results of the approach, the investors are able to make the best investment decisions in the future according to the expectations of the UA's price development. On the other hand, the application can be realized on various financial asset classes (indices, commodities...), the use of which may be widened in the scientific and the commercial area.

1.1 Literature review

Over the last years, investment in turbo certificates has attracted the attention of a large body of financial studies, which have investigated both the theory and the practice of these products use and their design. For example, Mahayni and Suchanecki

(2006) have dealt with the design of Turbo certificates belonging to the special forms of barrier options. They have showed that the relation between the barrier level and the strike price is especially important with a certain choice of these parameters. Wilkens and Stoimenov (2007) have provided the empirical analysis of the leverage products pricing in the German retail market. Entrop et al. (2009) have analysed open-end leverage certificates on the German market. Rossetto and Bommel (2009) have dealt with the endless leverage certificates, which are partly financed with a loan from an issuing bank. Šoltés (2010a) have characterized modern investment tools (namely Turbo Certificates) for trading crude oil, which have used the leverage effect significantly. Marasović and Šego (2011) have developed more than 60 models for options pricing used for pricing warrants and turbo certificates with the application in the Croatian capital market. Paik (2013) wrote an extensive thesis about valuation, empirical analysis and optimal exercise of open-end turbo certificates on the German market. Meyer et al. (2014) have studied the trading behavior of retail investors in the market of leveraged bank-issued retail derivatives. They have investigated whether retail investors have private information or whether they gamble without private information. These authors have widen their research, where later Schroff et al. (2016) have studied the impact of retail investor information demand on trading in leverage structured products. Baller et al. (2016) have presented the theoretical model of the profit maximizing price-setting policy for the issuers of exchange-traded retail certificates used data from the German market for leverage certificates. Other new modified types of the bonus or guarantee certificates using vanilla and barrier options is proposed by Harčariková (2016) and Gordiaková and Younis (2013).

Following the existing literature, we will study turbo certificates' creation and their application in Google and Facebook companies. To our knowledge, turbo certificates designs have not yet been widely investigated using analytical expression of barrier options.

2 Research methods

The methodology of the paper is based on options and option strategies, which introduce the basic part of every investment certificates. According to Hull (2012), option is a financial contract with the right for holder (the owner) to buy (call) or sell (put) UA at a certain date (either at the expiration date of option - European style or at any time up to the option expiration period – American style) for a certain price (the strike or the expiration price). The seller (the writer) of the call/put option receives the option premium for buyer's right. Exotic options are a higher generation of options with a widely used class of barrier options. They are developed for a number of reasons, such as hedging need in the market (Šoltés and Rusnáková, 2013) or products' design to reflect a view on a potential future movements (Šoltés, 2010b; Younis and Rusnáková, 2014). Barrier options contain the second barrier level (known as the second strike price, to be referred as B henceforth). According to Zhang (1998) there are 16 types of barrier options that depend on the activation/deactivation of options (in/out option) and the barrier level's placement (up/down option), i.e. UI/UO/DI/DO call (c)/put (\bar{p}) options. In the case of barrier options' valuation Rubinstein and Reiner (1991) applied Black-Sholes-Merton formula (Merton, 1973) on 8 basic types of barrier options and Haug (1997) on all 16 types of standard

European barrier options. Finally, a mathematical structure of barrier options value was derived by Rich (1997). It is valid the relation

$$c_{DI} (\bar{p}_{DI}) + c_{DO} (\bar{p}_{DO}) = c (\bar{p}) \quad (1)$$

The analytical expression of profit functions for selected barrier options is used within the turbo certificates' creation. The payout profile's analytical expression for **LT certificate**, where $strike = B$ (or $strike < B$ but $B < S_0$), is shown as:

$$P(S_t)_{LT} = \begin{cases} np(S_{STRIKE} - S_0) & \text{if } S_t \leq B, \\ np(S_t - S_0) & \text{if } S_t > B, \end{cases} \quad (2)$$

with time $0 \leq t \leq T$ period and actual UA's spot price (S_0), the subscription ratio (p) and number of certificates (n). If the UA's price does not reach B , the investor's profit will be the same as the profit from the linear certificate (to be referred as LC henceforth, where LC is the simplest certificate which follows the underlying asset's price development with some subscription ratio). However, the initial investment of LT is significantly lower, the investor will achieve a disproportional appreciation of the amount invested by the leverage (to be referred as L henceforth). The payout profile's analytical expression for **ST certificate** is derived as (3), where $strike = B$ (or $strike > B$ but $B > S_0$):

$$P(S_t)_{ST} = \begin{cases} np(S_0 - S_t) & \text{if } S_t < B, \\ np(S_0 - S_{STRIKE}) & \text{if } S_t \geq B. \end{cases} \quad (3)$$

Products themselves are based on the principle of credit trading. The issuer finances a certain part of UA's price value (the strike price) and the investor (product price) finances the rest of the price. LT certificate's price is calculated as

$$k_{LT} = p(S_t - S_{STRIKE}) + FC, \quad (4)$$

where the UA's price (S_t) is reduced by the strike value (S_{STRIKE}). There is concluded that the exercise price is higher than the strike value and the investor funds the difference. This difference is multiply by the subscription ratio (p) and issuer's financial costs (FC) are added. ST certificates are expressed by following relationship:

$$k_{ST} = p(S_{STRIKE} - S_t) + FC. \quad (5)$$

Above mentioned it is derived that the factors such as S_{STRIKE} , p and FC has the most influence on the certificate's price. Scholz et al. (2005) have examined whether the certificate's prices were consistent with the published price formula. They found that price estimates are distorted in favor of the issuer, i.e. the higher issuer's costs are charged than they actually are. Another factor is volatility, but its impact is only low. The size of the financial leverage (P) changes during the LT (ST) certificate existence and can be calculated based on the relationship:

$$P = \frac{S_t \cdot p}{k_{LT}(ST)}, \quad (6)$$

It is valid, P increases with the increasing of the strike price at ceteris paribus. The next factor is the certificate's price (k_{LT}). If k_{LT} drops, P increases because the investor needs fewer resources to invest in the UA and vice versa.

3 Problem solving

3.1 Analysis of the creation

Suppose, certificate's issuer buys n DO call options. If the multiplier p should be secured, then n/p certificates are necessary to sell. It means, the issuer sells x certificates and specifies the multiplier p, then he has to buy xp call barrier options. Also, the certificate's expiration date should be the same as option's expiration date or both of tools should be issued in open-end form. Comparison of the relation (2), the LT certificate can be created based on the following operations:

- Selling n/p LT certificates and gaining $n \cdot k_{LT}$ amount of money,
- Buying n DO call options with option premium c_{1N} . Mentioned above, k_{LT} is increased by the issuer's cost, including DO call option's premium. Issuer does not need any money due to gaining resources from investor.
- Free resources in amount of $NV = n \cdot (k_{LT} - c_{1N})$ remains issuer after cost reduction. These resources can be deposited at interest rate r_1 to the time of certificate's expiration, where the issuer gains the amount of money, i.e. $NV \cdot r_1 \cdot T/360$ at the time of expiration as the compensation for providing "a loan" to investor in amount of the strike price.

At the time of expiration 2 scenarios can be: The UA is under the barrier ($S_t \leq B$) during time to maturity, investor suffers a total loss or certificate's residual value is paid to him. Issuer gains deposit together with interests and suffers a loss in amount of option premium, which investor finally pays as part of the certificate's price. The UA is above the barrier ($S_t > B$) during time to maturity, issuer realizes the option contract and buys the UA at the strike price X and then sells the UA at the actual spot price S_t in the financial market. The results ($S_t - X$) of these operations can be positive (gain) or negative (loss). The gain or loss will be divided among the investors based on the multiplier p.

Paik (2013) states that the **ST certificates** are a modification of UO put option with B equals the strike value. In the case of UO options, B is above the strike price X and the given option is active until B is reached. At the time T_0 the issuer realizes the following operations:

- Sells n/p ST certificates and gaining $NV = n \cdot (k_{ST} - p_{1N})$ amount of money,
- Buys n UO put options with option premium p_{1N} , which he finances based on the resources received from investors.
- After cost reduction, free resources in amount of $NV = n \cdot (k_{ST} - p_{1N})$ remains issuer. He can invest these resources in the financial market, where we can calculate deposited amount of money with the interest.

At the time of expiration 2 scenarios can be, i.e. B is reached ($S_t \geq B$) during time to maturity, then investor suffers a total loss or certificate's residual value is paid to him. On the other hand, B is not reached ($S_t < B$) during time to maturity, the issuer realizes the option contract (i.e. sells the UA at the strike price X and then buys the UA at the actual spot price S_t). From the mentioned above we can conclude that given certificates are created using barrier options' modifications. Certificate's creation is not connected with additional issuer costs due to the fact that option premium is a part of certificate's price and he gains interest r_1 for borrowing money in the amount of the strike price.

Alternative investment of **LT certificate** can be created using following operations: Issuer (bank or financial institution) buys n LC with p for which he pays $np \cdot S_0$. Suppose issuer has money in amount of K, i.e. he buys $n = K/(p \cdot S_0)$ certificates. Profit function from the long position is illustrated as

$$P_1(S_t) = np \cdot (S_t - S_0). \quad (7)$$

Issuer buys np DI put options (due to security of UA's price drop) on the same UA with the strike price equals the barrier level of the certificate B_{LT} , barrier level B_1 , where ($B_1 < B_{LT}$), option premium p_{1B} and identical expiration period of the options as the expiration period of the certificates $0 \leq t \leq T$.

$$P_2(S_t) = \begin{cases} -np \cdot \overline{p_{1B}} & \text{if } \min(S_t) \geq B_1 \wedge S_t > B_{LT}, \\ -np \cdot \overline{p_{1B}} & \text{if } \min(S_t) \geq B_1 \wedge S_t \leq B_{LT}, \\ -np \cdot (S_t - B_{LT} + \overline{p_{1B}}) & \text{if } \min(S_t) < B_1. \end{cases} \quad (8)$$

Issuer buys np DO put options on the same UA, with the same barrier level B_1 , the barrier level of the certificate B_{LT} represents the strike price, option premium p_{2B} and with the same expiration period $0 \leq t \leq T$.

$$P_3(S_t) = \begin{cases} -np \cdot \overline{p_{2B}} & \text{if } \min(S_t) \geq B_1 \wedge S_t > B_{LT}, \\ -np \cdot (S_t - B_{LT} + \overline{p_{2B}}) & \text{if } \min(S_t) \geq B_1 \wedge S_t \leq B_{LT}, \\ -np \cdot \overline{p_{2B}} & \text{if } \min(S_t) < B_1. \end{cases} \quad (9)$$

The issuer generates costs in the amount of the option premiums (issuer's costs FC). FC are the part of k_{LT} and for that reason, the issuer does not need its own resources to create an alternative investment. Created certificates are sold to investors with a certain multiplier p. The option premiums are divided according to p and k_{LT} is increased at least $n \cdot (\overline{p_{1B}} + \overline{p_{2B}})$. Finally, the option premium does not reduce the issuer's profit, but only increases k_{LT} . After modification of combinations (7), (8) and (9), we have derived following relation

$$P(S_t)_{LT} = \begin{cases} np \cdot (S_t - S_0 - \overline{p_{1B}} - \overline{p_{2B}}) & \text{if } \min S_t > B_{LT}, \\ np \cdot (B_{LT} - S_0 - \overline{p_{1B}} - \overline{p_{2B}}) & \text{if } \min S_t \leq B_{LT}, \end{cases} \quad (10)$$

which is identical with payout profile's analytical expression for LT certificate (2).

ST certificates are created by similar way, i.e. issuer sells n LC, buys np UI call options and buys np UO call options on the same UA. Derived relation (11) is identical the payout profile's analytical expression for ST certificate (3).

$$P(S_t)_{ST} = \begin{cases} np \cdot (S_0 - S_t - c_{1B} - c_{2B}) & \text{if } \min S_t < B_{ST}, \\ np \cdot (S_0 - B_{ST} - c_{1B} - c_{2B}) & \text{if } \min S_t \geq B_{ST}. \end{cases} \quad (11)$$

The main advantage of investing in turbo certificates is disproportionately higher profits from deposits due to P . There is important to monitor the profitability on turbo certificates. The profitability LT and ST certificates is calculated as

$$\%Profitability(S)_{LT} = \frac{np \cdot (S_t - S_0)}{n \cdot k_{LT0}}, \quad (12)$$

$$\%Profitability(S)_{ST} = \frac{np \cdot (S_0 - S_t)}{n \cdot k_{ST0}}, \quad (13)$$

where used parameters are numbers of the certificates n , the multiplier p , the actual UA's spot price at the issue time S_0 , the UA's spot price at the maturity date S_t and the purchase price of given certificates k_0 . Once B is reached, the loss becomes permanent and thus the profitability will be at constant level.

3.2 Analysis and using in portfolio management

Let's design LT and ST certificates on Google (GOOG) and Facebook (FB) where k_{LT} (ST) and P_{LT} (ST) are calculated and the payout profiles of the given certificates are derived. GOOG and FB shares are chosen according to the correlation coefficient between them, i.e. 0.44036, where there is a weak interdependence. An annual return for GOOG is 15.43% and for FB is 4.59%. The volatility of the UA is the annualized standard deviation of daily returns computed over up to 1.3 years' worth of historical data, where 22.30% is for GOOG and 31.22% is for FB. Based on the examination of the selected assets, we consider the certificates' design based on these underlying assets to be appropriate. All key information is in Tab. 1. We will use European style options in the turbo certificates' creation. All data are obtained from Yahoo Finance (2018a; 2018b).

Tab. 1: Initial UA's description

Underlying	Issue price	Issue time	Maturity date	Multiplier	Dividends
Google	1087.97	18.10.2018	17.01.2020	0.1	-
Facebook	154.92	18.10.2018	17.01.2020	0.1	-

Source: (Yahoo Finance, 2018a; 2018b)

The strike prices selected according to the strike prices of classical put/call options are in the range of 520-1880 USD for Google shares and 5-320 USD for Facebook shares on 18th October 2018. In total there are created 53 LT(GOOG) certificates, 64 ST(GOOG) certificates, 51 LT(FB) certificates and 55 ST(FB) certificates. For showing we choose only selected strike prices (Strike), which are in Tab. 2 and Tab. 3. Also, following assumptions, i.e. B of the created certificate equals Strike of the put (call) option and Strike is the same or lower (higher) as B for LT (for ST), have to be met. Issuer costs are in amount of put (call) option premiums based on the relation (1). Due to simplification, other transaction costs are not considered.

Tab. 2: The results of the analysis for LT certificates

Google					Facebook				
B _{LT}	Strike _{LT}	FC _{LT}	k _{LT}	P _{LT}	B _{LT}	Strike _{LT}	FC _{LT}	k _{LT}	P _{LT}
1000	1000	73.92	16.19	6.72	140	140	12.31	2.72	5.69
1000	900	73.92	26.19	4.15	140	130	12.31	3.72	4.16
1000	800	73.92	36.19	3.01	140	120	12.31	4.72	3.28
900	900	43.98	23.20	4.69	130	130	9.05	3.40	4.56
900	800	43.98	33.20	3.28	130	120	9.05	4.40	3.52
900	700	43.98	43.20	2.52	130	110	9.05	5.40	2.87
800	800	20.15	30.81	3.53	120	120	6.35	4.13	3.75
800	700	20.15	40.81	2.67	120	110	6.35	5.13	3.02
700	600	11.80	49.98	2.18	110	100	4.22	5.91	2.62

Source: (Author)

Notes: LT long turbo, B barrier level, FC issuer costs, k certificate's price, P financial leverage.

Tab. 3: The results of the analysis for ST certificates

Google					Facebook				
B _{ST}	Strike _{ST}	FC _{ST}	k _{ST}	P _{ST}	B _{ST}	Strike _{ST}	FC _{ST}	k _{ST}	P _{ST}
1100	1100	140.00	15.20	7.16	160	160	22.47	2.76	5.62
1100	1200	140.00	25.20	4.32	160	170	22.47	3.76	4.13
1100	1300	140.00	35.20	3.09	160	180	22.47	4.76	3.26
1200	1200	92.00	20.40	5.33	170	170	18.28	3.34	4.64
1200	1300	92.00	30.40	3.58	170	180	18.28	4.34	3.57
1200	1400	92.00	40.40	2.69	170	190	18.28	5.34	2.90
1300	1300	62.00	27.40	3.97	180	180	15.00	4.01	3.87
1300	1400	62.00	37.40	2.91	180	190	15.00	5.01	3.09
1400	1600	46.10	55.81	1.95	190	200	11.45	5.65	2.74

Notes: ST short turbo, B barrier level, FC issuer costs, k certificate's price, P financial leverage.

Source: (Author)

Based on the initial key UA's information, for showing LT(GOOG) certificate can be designed by buying n LC at 108.97 USD/certificate and by buying np DI put and DO put options for GOOG with the same inputs (B 900 USD, Strike 800 USD, expiration time 17th January 2020) as the LT certificate, where issuer pays barrier option premiums. In our case we will use classic put option premiums (sum of barrier options (1)) from real market in amount of 43.98 USD/option. The using of relations (4) and (6), it is possible to calculate k_{LT} and P_{LT} for all selected variants of B and Strike (Tab. 2). All parameters are modified on the basis of the multiplier p. Once all the parameters have been determined, we can deduce the profit function when buying one LT certificate according to relation (10). Profit function of LT(GOOG) certificate for given parameters is shown in Tab. 4. At the time of expiration, 2 scenarios can occur, either B (900 USD) is reached, then investor suffers a loss in amount of 23.20 USD/certificate or B is not reached, the investor's profit is increasing with the UA's price increasing.

Tab. 4: Profit functions of selected LT and ST certificates on GOOG and FB

LT(GOOG)		LT(FB)		ST(GOOG)		ST(FB)	
B>900	0.1S _T -113.20	B>130	0.1S _T -16.40	B<1200	-0.1S _T + 99.60	B<170	-0.1S _T + 13.66
B<900	-23.20	B<130	-3.40	B>1200	-20.40	B>170	-3.34

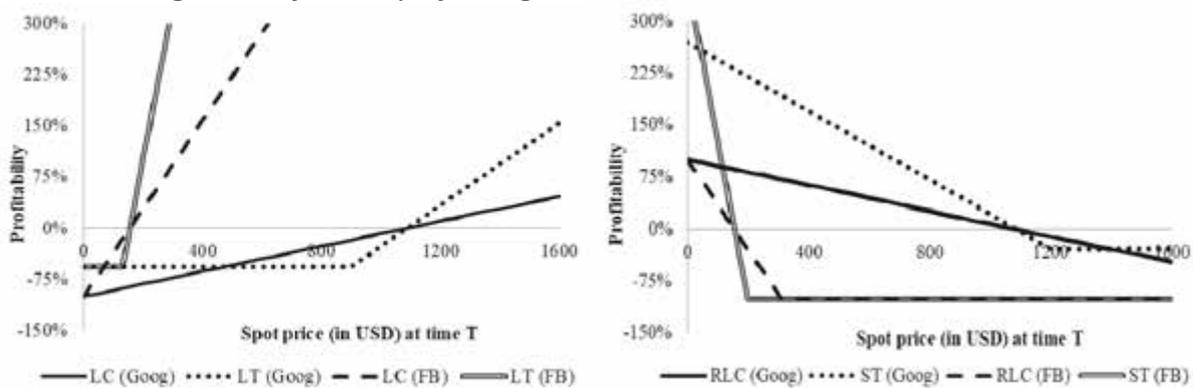
Source: (Author)

ST(GOOG) certificate is possible to create as selling n LC at 108.97 USD/certificate and by buying np UI call and UO call options for GOOG with the

parameters (B 1200 USD, Strike 1400 USD, expiration time 17th January 2020). The use of the relations (5) and (6), there are calculated k_{ST} and P_{ST} (Tab. 3). The ST profit function is derived by the relation (11) with showing in Tab. 4. Also, at the time of expiration, 2 scenarios can occur, either B (1200 USD) is reached, then investor suffers a loss in amount of 20.40 USD/certificate or B is not reached, the investor's profit is increasing with the UA's price drop. In the same way, we can derive profit functions for other certificates, also for FB shares (Tab. 4) with different defined parameters (see Tab. 2 and Tab. 3).

Due to the existence of the financial leverage, there is important to monitor the profitability of turbo certificates in comparison to linear (reverse linear) certificates as it is graphical expressed in Fig. 1 (calculations are according to relations (12) and (13)). This comparison is based on our designed certificates derived in Tab. 4.

Fig. 1: Profitability of designed certificates on 17th January 2020



Notes: LC linear certificate, RLC reverse linear certificate, LT long turbo, ST short turbo

Source: (Author)

Fig. 1 shows the higher turbo certificates' profitability than LC's profitability for LT (if UA's price is increasing above actual UA's spot price S_0) and ST (if UA's price is decreasing below S_0) due to financial leverage. The leverage effect for LT(GOOG) is 3.28, LT(FB) 3.52, ST(GOOG) 2.69 and ST(FB) 3.57. On the other side, the opposite direction (as it was predicted) causes disproportional higher losses than LC's losses. However, LT and ST certificate's loss is limited by invested capital amount. In the same way we can design different turbo certificates for different level of given parameters, ultimately it depends on the investor who chooses the right certificate to his portfolio. Therefore, these certificates are risky, but they can make a higher profit. Due to this fact, they are suitable as one tools in portfolio management.

4 Discussion

From the above mentioned results (Tab. 2, Tab. 3 and Fig. 1) of our analysis we can deduce following facts about creation, the payout profiles and the profitability of turbo certificates.

Turbo certificates have to be created using barrier options. Depends on the multiplier p , the issuer can create a different number of turbo certificates, i.e. if the multiplier is 1:10, it is possible to issue 10 certificates from one barrier option. Down barrier options are used for LT certificates' creation (B is identical or above the strike price but both parameters are lower than actual spot price, i.e. $S_{STRIKE} \leq B < S_t$). Up

barrier options are used for ST certificates' creation (B is identical or below the strike price but both parameters are higher than actual spot price, i.e. $S_t < B \leq S_{STRIKE}$). Following parameters influence turbo certificates' creation, i.e. numbers of the certificates (the number does not impact on the certificate's profitability), the barrier level B (the exercise price of the options), the strike price, the multiplier p (the higher multiplier is, the higher investor's profit is), financial leverage P (the bigger leverage is caused by lower certificate's price – higher strike price) and issuer costs FC (increase the certificate's price). It is valid, the higher (lower) the exercise price of the put (call) option is, the lower barrier distance from UA and the higher probability of reaching the barrier level is. The lower the strike price is, the higher long turbo certificate's price is. However, the higher risk of reaching the barrier level is. The higher strike price is, the higher ST certificate's price is and vice versa. On the other side the optimal distance between strike prices and UA does not exist.

Our approach based on the proposed turbo certificates can be provided as an inspiration for further types of these financial certificates creation. Turbo certificates are designed for speculative investors with an active trading strategy with a leverage effect and having a strong view on the future direction of the underlying market. On the other hand, short certificates are one of the few instruments on the equity market that gives you the chance to benefit from falling markets. Our findings could be useful to investment certificates' issuers who are willing to increase the level of their products' transparency. The findings should help to increase the investors' ability to understand these innovative tools creation. Investors are able to make the best investment decisions in future according to the expectations of UA's price development. This approach is robust for various financial asset classes, such as a commodity, indices or foreign currency, the use of which may be widened in the scientific and the commercial area. Throughout the entire portfolio construction process, it is vital that you remember to maintain your diversification above all else. It is not enough simply to own securities from each asset class; you must also diversify within each class. The paper offers a significant contribution in both an academic and practical sense due to analysis of new financial tools which may be used in practice.

Conclusion

The paper has introduced high-risk investment products (long and short turbo certificates, also referred to as leverage products), which are only suitable for experienced and active investors with a high risk tolerance. There are certificates available both for rising (Long turbo LT) and for falling (Short turbo ST) prices. Turbo certificates are traded by barrier level, in condition that UA reaches this level, they became worthless. Design of these products is expressed through the analytical expression of barrier options. For understanding of turbo certificates' design, it was introduced the review of the literature dealing with these products. Based on the existing empirical studies, the paper's scientific problem is to design and demonstrate the nature of LT and ST certificates creation through financial engineering. It was proved the design using barrier options. LT certificates are a modification of down and out call options. However, the alternative investment is possible to create as buying linear certificates, down and in put options and down and out put options. On the other hand ST is a modification of up and out put options and the alternative investment is

created as selling linear certificates, buying up and in call options and up and out call options. Our empirical approach is applied to Google and Facebook companies, where in total 223 certificates with various parameters are designed, compared and analysed followed by investigation of their profitability. Alternative investments using real market call/put option prices from 18th October 2018 are presented. The main aim of the paper was to prove the nature of these products creations through the barrier options with showing the main parameters influencing of their price and profitability. These products can be used for financing of issuers, not only for banks, but also for governments. Also, certificates have a useful role to play in modern portfolio management. Our approach can provide as an inspiration for creation of the further types of the investment certificates with the increasing of intellectualization of all potential investors in Europe.

Acknowledgement

The work was supported by the Ministry of Education of the Slovak Republic under grant VEGA No. 1/0967/15, “Approaches for fiscal imbalance solution in terms of the EU and in the context of the systemic crisis”.

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Received: 15. 11. 2017, reviewed: 10. 09. 2018

Approved for publication: 08. 04. 2019

AN ANALYSIS OF TWO NEW PROCESS APPROACH-RELATED TERMS IN ISO 9001:2015: RISK-BASED THINKING AND CONTEXT OF THE ORGANIZATION

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Abstract: *This paper is focused on understanding “risk-based thinking” and “context of the organization” in the process approach according to the requirements of the updated norm, ISO 9001: 2015 Quality Management Systems – Requirements. These new trends should increase the effectivity of the quality management system, should improve company results, and should prevent negative effects of processes. This article explains how to understand the context of the organization in order to make correct strategic decisions. The author describes the integration procedure of risk-based thinking into several organizations in the Czech Republic. This article can support organizations in the implementation of the best practice of new requirements of ISO 9001: 2015. This paper is focused on several production organisations from the different industrial area in the Czech Republic. This research is based on the up to date research data of world’s databases. The author used the qualitative method in the form a structured interview.*

Keywords: *Risk-based Thinking, Context of the Organization, ISO 9001: 2015, Quality Management System, Actions to Address Risks and Opportunities*

JEL Classification: *G32, L15, O31*

Introduction

One of the external factors influencing the continuous improvement of business processes are the new trends published by the International Organization for Standardization (hereinafter referred to as ISO), based in Geneva. In September 2015, ISO published an update EN ISO 9001: 2015 Quality Management System – Requirements. ISO Secretary Kevin McKinley justifies updating the ISO 9001 standard as an opportunity to organizations to adapt to the changing world (ISO 2015). The survey of IRCA QMS registered Auditors of all industry and services sectors worldwide claims that ISO 9001: 2015 is in line with modern business and quality management concepts and will be a useful tool for the companies (Fonseca et al., 2016).

The Principal Auditor of the International Register of Certificated Auditors (Trčka, 2015) states that two significant changes regarding the updating of standards EN 9001: 2015 are the implementation of the context of the organization, and risk-based thinking. According to the type of the organization, the different industries in which it operates, legal requirements, the context and objectives of the organization face various risks (EN 31010: 2011). Standard EN 31000: 2010 defines the context of determining a definition of external and internal parameters to be taken into consideration in risk management and setting the scope and risk criteria for risk management policy.

ISO 9001: 2015 argues that the organization is responsible for the introduction of risk-based thinking and identification of actions to address risks, including documenting the actions as an evidence of addressing the risks. (ISO 9001: 2015). Ionaşcu et al. (2016) suggest that the financial performance of Romanian companies implementing and certifying multiple management systems (ISO 9001, ISO 14001 and OHSAS 18001) is higher and directly proportional to the complexity of the management systems implemented and certified. Řeháček (2017) states that the effectiveness of a QMS is to a great degree related to whether quality costs are introduced into the frameworks of the company's strategies and supported by proper resources. While assessing the quality the economic aspect is related to the costs borne for quality, effects of a lack of quality and the achieved effects (Řeháček, 2017). This lack of the quality could be filled with risk-based thinking.

The risk management process (Šefčík, 2009) is a general term of some spontaneous and systematic actions to control risk. Christensen et al. (2003) state that risk is an element of danger, which individually or in combination with other elements, has the ability to be a source of consequence. Zhou et al. (2012) validated risk management process by a stochastic simulation model. According to the international OHSAS 18001: 1999 (Tichý, 2006) this consequence in the form of damages can be expressed in monetary or other units. Three elements relate to risk: time frame, the likelihood of events, and the level of seriousness of the consequence (Procházková, 2012).

According to ISO 31010: 2011, risk assessment may take place at the organizational level, the departmental level, within projects, and during individual activities. Aven (2011) highlights the need to focus on the selection of appropriate methods for identification and risk assessment. For the risk assessment of the human factor, HRA - Human Reliability Analysis, is used, which assesses the human-machine interface and tries to predict the behavior of the operator and its interaction in the production process (Bedford, 2003). The main trends and emerging themes of management practices and also in the risk management in the current business world and their synergy effects were identified, reviewed and classified eg. in articles Blahova et.al (2017). Risk management it is only one parameter, that we can also include into EFQM Excellence Model (Chodůr et al, 2011).

1. Statement of a problem

In February 2016, there was an update of the CSN EN ISO 9001: 2016, Quality Management Systems – Requirements in the Czech Republic. Every organization implementing the quality management system based on this international standard should deal with the new elements, risk-based thinking and context of the organization, in the process approach, and should have the goal of achieving improved results and preventing negative effects (ISO 9001: 2015). Each organization can itself select the form of integration of the risk-based thinking (ISO 9001: 2015). Particularly, in an economic downturn in a country an organisation needs to understand their organization and its strategic direction in order to be prepared for this situation. It means to determine and address its associated risks (Medic et al., 2016).

The last update, ISO 9001: 2008, included risk-based thinking in carrying out preventive actions (ISO 9001: 2015). Organizations certificated in ISO 9001: 2008 had

to solve internal and external nonconformities and other procedural and systematic problems. The solution of nonconforming outputs was ensured after their creation. However, the new requirement from ISO 9001: 2015 – Action to address risks and opportunities – must be included in process planning to prevent or decrease negative events and to estimate opportunities. Tuček (2016) mentions in his research that the process of Strategic management and planning of resources belongs to the second most significant managing process. This requirement should “establish a basis for increasing the effectiveness of the quality management system, achieving improved results and preventing negative effects” (page 9, ISO 9001: 2015).

The deadline for the implementation of the new version of the norm is September 2018. Also, a time period of approximately 1 year was introduced for the members of the International Organization for Standardization for the transition to the new requirements. Most of the organisations do not clearly understand how to fulfil the vague requirements of this new ISO norm. Based on the vagueness in business area a following research question is dealt with in this article: What kind of integration of two new terms – Risk-based thinking and context of the organisation – do production organisations select?

2. Methods

This article is focused on 5 middle and big sized production organisations from the different industrial area in the Czech Republic, which have already started the implementation of risk management according to the new requirements of ISO 9001: 2015. Two of these organization got a certificate during the update ISO 9001: 2015, also their management system has proven the ability to fulfil the new requirements of this norm. The other three organizations are currently implementing the new requirements to their processes and quality management system.

Tab. 1: List of interviewed production organizations

Sign of organization	Size of organization	Implementation of norm ISO 9001: 2015	Interviewed person
A	Big company	Implemented	Senior quality manager
B	Big company	Implemented	Quality manager
C	Big company	Implementing	CEO
D	Middle company	Implementing	Industrial engineer
E	Middle company	Implementing	Quality manager

Source: (the authors)

The author used the qualitative method in the form a structured interview. Interviews are a qualitative technique for collecting data from individuals; data are often descriptive and going deep (Pickard, 2013). The interviews in the framework of research were managed and structured. The interview questions are described in chapter Research results in a form best practice.

The structured interview was selected to find out more details and direct information about risk management and the context of the organization. The author describes the best practices in the integration of risk-based thinking into a quality management system and

in understanding the context, both based on the experiences of the selected organizations.

3. Research results in a form best practice

The introduction of the results presents progressive steps for the integration of the context and the risk-based thinking in their organization. The certification companies in the Czech Republic see the difference between the new 9001: 2015 and the old norm 9001: 2008 Quality management systems – Requirements in two terms – the context of the organization and the risk-based thinking (Bureau Veritas Czech Republic, 2015). Sitnikov et al. (2017) describe that new version of the norm ISO 9001: 2015 represents a major opportunity to forge an integrated system of performance management, through the creation of significant ties between quality management and continuous improvement, on the one hand, and corporate risk management on the other hand.

In this research all five of the selected organizations implemented the requirements in similar, which is described in this part of article.

3.1 Context of the organization

In connection with strategic planning an organization needs to define its context. Context of the organization consists of external and internal issues, understanding the needs and expectations of interested parties and determining the scope of the quality management system (ISO 9001: 2015). All managers of an organization shall know this new term. Islam et al. (2017) illustrate the effect of organizational context (e.g., structure and climate) on knowledge conversion in the service industry. It is essential to understand the effect of organizational contexts on knowledge conversion using socialization as a mediator and IT as a moderator (Islam et al., 2017). In this research we can claim that understanding the context of the organization and making the strategic and operational decision in organization can be done according to the requirements of ISO 9001:2015 and process owners.

The managed interviews found out the following:

- Q1: Which job positions define the organization context
- Q2: How do organizations proceed in defining the organization context?

The results from the managed interviews point to the fact that in two production companies (large B and middle D organizations) the quality manager himself defined the context of the organization (external and internal issues) and submitted it to the company's director, who edited it and presented it to comment at the management's meeting. One middle organization (middle E organization) set the context of the organization by cooperation of all top management members at the management meeting using the SWOT analysis (the Strengths, Weaknesses, Opportunities, and Threats Matrix). The remaining two organizations (big organizations A, C) created the context based on brainstorming of the team formed by the members of quality management, strategy and industrial engineering departments. The final form of organization context for all companies was put into effect as a controlled document. All employees of the organizations were acquainted with it.

3.1.1 External and internal issues of the organization

The norm ISO 9001: 2015 highlights that the organization shall determine external and internal issues, which are relevant to its purpose and its strategic direction (ISO 9001: 2015). Managers need to know the external and internal issues of their organization to make correct decisions. Each of the interviewed organizations introduced a different register of external and internal issues. This difference is understandable due to the diverse strategies of the organizations.

The author would like to explain this statement on the Tab. 2. If the personal managers can understand the internal and external issues of the organization, then they should plan and decide with the information – Skilled and hardworking people, our work is handicraft – in the personal process. It means that in the production process the human resources cannot be substituted by automation. The main source of the production process are the employees and the organization has to work on a correct benefit's system to keep their employees inside the organization and other actions which can ensure new skilled employees. To understand this internal issue, the long-terms objectives should be defined. For example, this organization should work on building cooperation with a vocational school or should establish its own school for the incoming production employees. This decision is depending on the personal manager.

Tab. 2: Example of the internal issue in the organization

Issue	Kind
Skilled and hardworking people, our work is handicraft	Internal

Source: (the authors)

3.1.2 External and internal interested parties

Due to another requirement on the context of the organization managers have to understand the needs and expectations of interested parties (stakeholders). Organizations shall detect all interested parties and their requirements, which might be relevant to their quality management system (ISO 9001: 2015). All the interviewed companies have a similar list of stakeholders. The expectations of the stakeholders are very similar. In Tab. 3 we can see the example of the internal interested party - employees and its needs and expectations.

Tab. 3: Internal interested party – its needs and expectations

Interested party	Needs and expectations
Employees	Reasonable salary and motivation bonuses for work Acceptable working conditions for occupational safety and health Professional growth - up skilling

Source: (the authors)

Defined needs and expectations must be monitored and reviewed in order to respect all relevant parties. Competitive employees have to cope with this information to be able to perform planning, management, decision-making and controlling. The organization has to ensure exact communication channels to both, external as well

as internal parties. It is important to ask questions such as: who, how, when and with whom - will communicate within the organization.

3.1.3 Scope of the quality management system

Within the context of the organization, the scope of the quality management system must be defined. When defining this scope, the organization shall consider following issues: internal and external relations, requirements of relevant interested parties and the products and services of the organization (based on the ISO standardization 9001: 2015). The managed interview revealed that all the interviewed companies have a defined scope of the quality management system. This is understandable because it is a requirement of the procedural approach.

3.2 Risk-based thinking

Firstly, the managers of the processes shall define a context of their organization and then they shall fulfil other requirements related to the actions to address risks and opportunities. Top management shall demonstrate a commitment with respect to the risk-based thinking. Another commitment to the customer is to determine and solve the risks and opportunities that can affect conformity of products and services. (ISO 9001: 2015)

Chiarini (2016) detects a lack of risk-based assessment in research of European manufacturing small- and medium-sized enterprises, which could be caused by not enough experience in dealing with risk-based thinking according the norm ISO 9001: 2015. The norm ISO 31 000 Risk management – Principles and guidelines defines the risk management process. This norm defines to establish the context of the organization and progressive steps of risk assessment and risk treatment. The top management shall also monitor and review the risks. (ISO 31000: 2010). ISO 9001: 2015 standard does not require an implementation of the risk management process. It is up to the organization, if they implement the risk management process to their quality management system or not.

Questions from managed interviews to determine the integration of risk-based thinking into quality management system of organizations were as follows:

- Q3: What job positions define process risks?
- Q4: How do you define the risks in your processes?
- Q5: Based on which criteria is the level of risk determined?
- Q6: What scale of risk level do you use in risk evaluation?
- Q7: What other information (apart from Evaluation of risk, Description of problem, Action to risk, Responsibility and Date) do you find out when defining risk?

Tables 4 and 5 show individual approaches in integration of risk-based thinking into their processes within the interviewed production organisations. Tab. 4 describes who defines risks in business processes and how organizations define the risks in their processes. Process risks are mostly defined by the process owner alone, the process owner and their colleagues or by internal interested parties (top management, managers

and employees). Also the quality manager with the process owner, customers or external consultants are involved into risk definition. The form of risk definition - brainstorming - was used in all five cases. Organization mostly applied the knowledge of experts and in one case SWOT analysis and fishbone diagram were used for risk definition.

Tab.4: Defining risks

Q3: What job positions define process risks?						
What job positions/	Organization	A	B	C	D	E
Process owner (manager) alone		√	√	√		
Process owner with their colleagues (subordinates)		√		√		
Quality manager with process owners			√			
Top management		√				
Customers				√		
External consultants				√		
Internal interested parties (top management, managers, employees)					√	√
Q4: How do you define the risks in your processes?						
How/	Organization	A	B	C	D	E
Knowledge of experts		√		√	√	√
Brainstorming		√	√	√	√	√
SWOT analyze						√
Fishbone diagram				√		

Source: (the authors)

Tab. 5 shows which criteria are chosen by organizations for risk evaluation. All organizations established the level of risk based on the consequence for customer and organization. Likelihood of events are mostly determined through a gross estimation. One organization is interested into the cause and the consequence of risk by risk identification.

Tab.5: Level of risks and other information

Q5: Based on which criteria is the level of risk determined?						
Which criteria of level of risks/	Organization	A	B	C	D	E
Likelihood of events		√		√	√	√
Consequence (for customer)		√	√	√	√	√
Consequence (for organization)		√	√	√	√	√
Time frame			√			
Q6: Which scale of level of risk in risk evaluation you are using?						
What kind of scale/	Organization	A	B	C	D	E
3 scale of risk evaluation (low, medium and high risk)		√	√	√	√	√
Q7: What other information (without Evaluation of risk, Description of problem, Action to risk, Responsibility and Date) do you find out about the defined risk?						
What other information/	Organization	A	B	C	D	E
Cause of risk (what happens if..)						√
Consequence of risk (outcome of an event in detail)						√
Nothing		√	√	√	√	

Source: (the authors)

Based on the structured interviews, the author of this article has set the procedure, how to implement the risk-based thinking into the processes of the organization. The scope of the organization determines all processes. Each manager of its process has to plan actions to address risks and opportunities, has to integrate and implement these actions and evaluate the effectivity of these actions. All risks and opportunities can be defined in a list of risk and opportunities as a form of documented information.

In Fig. 1 a personal manager with the responsible team defined risks of the personal process. Process risks was defined by process owner, managers of top management, other employees, external consultants and customers in the realized interviews. This definition and assessment of processes risks based on the experience of managers and other internal or external interested parties could appear very simple. These interested employees should be experts in this area. Pačaiova et al. (2017) find out according to the performed research that qualitative approach in multi-criteria decision making brings a high level of uncertainty in risk assessments.

Fig. 1: Risks and opportunities of personal process

Risks / Opportunities	Evaluation of the risk/opportunities			Description of the problem	Risk treatment - Action	Responsibility	Date
	Consequence	Likelihood	Level of risk				
Risk: Shortage of qualified staff	3	2	6	1. The age composition of current employees - average age 38 years 2. A high proportion of manual work - specialized activities 3. Demographic structure in the location of this organization	1. Setting cooperation with universities, colleges, secondary and vocational schools.	Name of employee, Department	January 2017
					2. Extending the benefit program for employees	Name of employee, Department	December 2016
					3. Awakening interest among employees of small businesses in the area	Name of employee, Department	December 2012
Risk: The unsubstitutability of the key managers	2	1	2	Not each managers has its successor	To create a substitutability plan	Name of employee, Department	May 2017

Source: (the authors)

Defined risks in this process are shortage of staff and the unsubstitutability of the key managers. The personal manager should explain the problem of this risk or opportunity. In relationship to risk management process the personal manager identified the risks and now he should do the analysis and evaluation these risks or opportunities. This phase is dependent on the method which the organization will decide to use. The organization can use the method from the norm EN 31010 Risk management – Risk assessment techniques (EN 31010). The research showed that most organizations used the Winterling Crisis Matrix, which can be seen in Fig.2. This solution of risk matrix was used when using FMEA (Failure Mode and Effects Analysis) method to view critical drawback (Čížek, 2017). Fonseca et al. (2016) describe that risk matrix could be used for operational risk assessment.

Fig. 2 Risk evaluation

Consequence of risk	Happens regularly	3	medium risk 3	high risk 6	high risk 9	<div style="background-color: red; width: 15px; height: 15px; margin-bottom: 5px;"></div> Immediate solution	
	May happen	2	low risk 2	medium risk 4	high risk 6		<div style="background-color: yellow; width: 15px; height: 15px; margin-bottom: 5px;"></div> Setting actions
	May not happen	1	low risk 1	low risk 2	medium risk 3		
			1 Low	2 Medium	3 High		
			Likelihood of risk (for the organization, for customers)				

Source: (the authors)

After risk assessment the manager has to set an action, define responsibility and plan a date of the action. The manager of process has to monitor the tasks and their fulfilment. The organization has to determine the frequency of monitoring and review of the risks and opportunities. The research showed that most organizations reviewed risks and opportunities within management review of the quality management system at the end of the year. Risks and opportunities should be updated at the beginning of each year together with the goals of the quality management system of the organization.

4. Conclusion

Context of the organization should be determined using the facts about the organization. Top management and managers of processes have to manage and make decisions through information derived from the context of the organization. Aspects of the organization are main determinants of ensuring the success of the organization. They may take the form of opportunities as well as threats. Needs and expectations of all interested parties must be monitored and reviewed for the purpose of increasing the prosperity and reputation of the organization. Expectations and needs of internal stakeholders are the basis for organizational culture. External stakeholders with their needs and expectations are fundamental to the correct settings of the social responsibility of the organization. The interviewed organizations defined the context of the organization with either one employee or a team of executives and employees in the form of brainstorming or SWOT analysis. We cannot confirm whether the difference in these approaches influences the final effect due to the short period of the defined context. This document should be based on the organization' strategies and should be an interactive means for making the strategic and operational decisions in organizations.

The process approach is not a new term for the organization. From the point of view of the process approach, each process should include the necessary elements. The new element resulting from the requirements of the ISO norm is to manage risks and opportunities. The research has shown that organizations use a simple solution – the table or the list of process risks defined by one job position or a team to fulfil the requirement of ISO norm 9001: 2015 - Actions to address risks and opportunities.

This register of risks involves the evaluation of risks, the description of problems, the actions to address risks, the responsibility and the dates. The level of risk is established based on the consequences for customers and the organization and the likelihood of events. The interviewed organizations use three levels of risk evaluation – low, medium and high risks. Managers of business processes have to assess and deal with the main risks and opportunities of these processes. Until the update ISO 9001: 2015, improving the process depended on the abilities of each manager or top management. If the manager or top management has no interest in continual improvement, then this should be recognized and the internal or external auditor should highlight the absence of these requirements. The new requirement – an action to address risks and opportunities – is to define problem areas in the processes and possible potential opportunities for improvement. Managers of the processes are responsible for these activities. The level of evaluation of risks and opportunities depends on the choice of appropriate methods. The treatment of the major risks should be provided in the form of action to eliminate or minimize the risk. Top management shall review the context of the organization and the list of risks and opportunities at the end of each year.

Acknowledgement

The authors are thankful for the financial support received from the internal grant project IGA/FaME/2017/016 „Environmental and energy risk management in relation to the triple bottom line concept within selected industrial sector in the Czech Republic”.

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Received: 22. 12. 2017, reviewed: 15. 03. 2018

Approved for publication: 08. 04. 2019

DETERMINATION THE EFFICIENCY OF SECONDARY SCHOOLS IN THE PARDUBICE REGION

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Abstract: Efficiency belongs among frequently discussed topics of public policy. This paper deals with the measurement of the efficiency of secondary schools established by the Pardubice region. We used the data envelopment analysis (DEA) to measure efficiency. One input - the expenditure on teacher salaries, and three outputs - % of pupils success in Czech language, math, and English language exams were selected. The results of this analysis show that 12 secondary schools from the 36 examined secondary schools are effective. Conducted DEA model also determines the way how inefficient school reaches efficiency (how to reduce input and increase outputs). Furthermore, the optimal utilization of capacities calculated as quotient of actual number of pupils and optimal number of pupils expresses the fact that the examined grammar schools use their capacities on average at 80 %, and examined vocational secondary schools only at 60 %. This situation is mainly caused by a long-term decline in birth rates when the number of secondary school pupils is decreasing.

Keywords: Data Envelopment Analysis, Secondary Schools, Efficiency, Capacity, Pupils Results.

JEL Classification: I210, H750.

Introduction

An educated population is a foundation for the economic and social development of each country. Elementary and secondary schools prepare students for further education and to full social life. Therefore, providing a quality education is one of the most important public services. Public expenditure is crucial to assure the access to quality education for all citizens. However, it is also necessary to spend public resources efficiently from economic point of view.

In recent times, the Czech Republic faces the problem of the lack of pupils of secondary schools in terms of school capacity. There is an excess supply (capacity of schools) over demand (number of pupils). This situation is mainly caused by a long-term decline in birth rates when the number of secondary school pupils is decreasing, but the current inappropriate funding system also plays an important role. All these effects reduce the efficient use of public resources.

This paper is organized as follows: Section 1 presents current issues on the Czech Republic secondary schools and approaches towards the evaluation of efficiency of secondary schools. Section 2 describes data and method used. Section 3 presents our findings, Section 4 discussion. Lastly, a brief conclusion about the research is presented.

1 Statement of a problem

In the context of the Czech Republic, the issue of regional education concerns especially financing. The current system of funding according to the number of pupils does not lead to the optimal structure of secondary schools. This system puts pressure on schools to accept the maximum number of pupils and within the framework of the

legislation, the regional authorities can increase the amount of funds for secondary schools with low capacity utilization in order to maintain their established schools through their regional norms. This strategy of the regional authorities together with the unfavourable demographic development causes excess supply (capacity of schools) over demand (number of pupils) (EDUin, 2018; MEYS CR, 2018a).

In the Czech Republic, there has been a significant decline in birth rates since the 1990s. This development is reflected in primary and secondary education. Secondary schools with very low capacity utilization have been optimized in the past in the whole Czech Republic. Moreover, after 1989 there were many new educational facilities. The creation of new entities has not been regulated and their number has increased significantly. The first efforts of the government to optimize the network of secondary schools occurred in 1995-2000, when several secondary schools were merged. Optimization efforts continued until the year 2003. The largest wave of merging came in 2011, when utilization of capacities of secondary schools was less than 60 %. This wave of merging covered almost all regions (MEYS CR, 2013).

But merging schools has met with disagreement among citizens. Berka (2015) adds that this is a political issue, and politicians are not interested in merging schools because of the outflow of voter's favour. Despite public protests, the Pardubice Region (but also other regions in the Czech Republic) previously managed to merge some of the little-used secondary schools, mainly vocational secondary schools. Recently, the Council of the Hradec Králové Region has approved the merger of 21 secondary schools in the region. The number of schools should be reduced to 10 schools. Most of them are vocational schools (Lechmann, 2017). The merging is also considered in the Vysočina Region, or in Prague Region. Functioning of secondary schools with very low capacity utilization is not effective.

A huge literature about the educational productivity and efficiency exists (Lassibille and Gómez, 2000; Duru-Bellat and Suchaut, 2005; Davutyan, Demir and Polat, 2010). The main issue in school evaluation of efficiency is the definition of the factors that reflect the performance of the school. A current approach to school evaluation considers schools as production units that use multiple inputs (recourses) and produce multiple outputs. A commonly accepted measure is based on the records of students in the national matriculation examinations. School efficiency is often assessed through measuring student achievement.

Due to the unknown nature of the educational production function, there are two main approaches usually applied in school evaluation: the stochastic frontiers methods and data envelopment analysis (DEA). Efficiency of schools is possible to determine by using stochastic production frontier or least squares method (Perelman and Santin, 2011). But these methods have the drawback that they can only deal with single outputs but schools do not produce just one output and the multiplicity of outputs produced by a school cannot be aggregated into a single measure in any meaningful way.

Some studies have relied on traditional regression with students serving as the unit of analysis. A weakness of this approach is that it ignores between-schools variation at the school level (Deutsch et al., 2013). This issue could be addressed with a multilevel regression analysis used Fekjær and Birkelund (2007) which is a multi-stage methodology that could use both schools and students as units of analysis,

acknowledging that students are nested within schools. However, multi-level analysis makes parametric assumptions about the distribution of schools and students on variables studied.

For the evaluation of the efficiency of secondary schools we can also use comparative methods, norms and standards but the most commonly used are modelling methods distinguished by the mathematical-statistical apparatus, namely non-parametric DEA. DEA has many advantages. This method has the ability to process multiple inputs and outputs simultaneously without requiring aggregation, to specify production relationships non-parametrically without limiting a particular functional standard, to analyse potential cost savings and production gains resulting from changes in inputs and outputs. It does not work with financial categories such as profit, it is not necessary to calculate inputs and outputs valued in monetary units. Therefore, this method is suitable for measuring the efficiency of public services. In addition to schools, DEA is often used for public or non-public institutions such as hospitals, agricultural companies, banks, research organizations, or transport organizations (Kohl et. al, 2018; Lee and Worthington, 2016).

The aim of this paper is to evaluate efficiency of secondary schools in the Pardubice region using DEA analysis for the school year of 2016/2017. Then, based on the results, formulate recommendations for improving chosen indicators. The research question is formulated: whether pupils at schools with smaller class size achieve better results in matriculation exams.

2 Methods

This study covers 36 secondary schools established by the Pardubice region. Vocational secondary schools that are part of higher vocational schools were excluded. Also all schools in the sample were divided into vocational and grammar schools for analysis due to different characteristics between these types of schools. Vocational secondary schools have significantly higher costs than grammar schools due to the need for more expensive equipment for practical training, or a higher number of teachers divided into practical and theoretical learning. Due to the nature of the analysis (it expresses the unit's efficiency within the group of units under investigation; DEA compares unit with respect to the best units) non-distribution of these types of schools would then distort the results. The data about schools was obtained from the internal materials of the Statutory City of Pardubice and data on the achievements of pupils was obtained from the website of CERMAT (2018).

DEA was used to estimate efficiency scores of secondary schools. The DEA method is one of the methods of linear programming that considers each school as a decision-making unit (DMU) using inputs to produce outputs with the aim to compute efficiency scores. DEA is used to develop an efficiency frontier for the DMUs which operate with optimal performance patterns. These optimally performing DMUs, which are considered as efficient, lie on the efficiency frontier and have an efficiency score of 1. In a DEA model, efficiency is defined as the relative ability of each DMU in producing outputs, and the term relative means that each organization is compared with any other homogeneous unit (Moreno and Lozano, 2018).

In this method, outputs are by their nature maximization, i.e. that their higher value leads to higher performance of the monitored units. For creating effects production unit consumes inputs, which are by their nature minimization, i.e. that the lower the value of these inputs leads to higher performance of the monitored units (Hudec and Prochádzková, 2013). Inputs and outputs in the DEA analysis must be chosen to have for the functioning of institution the greatest importance. Outputs of the education system typically include some measure of examination success, but also in some specifications include other measures such as pupils subsequent labour market performance. Inputs characteristically include measures of pupil composition such as ability on entry and socio-economic characteristics. In addition, measures of resourcing are often included, such as pupil–teacher ratio, educational expenditure, and the quality of the teaching staff. Tab. 1 provides a review of frequently used inputs and outputs that used previous studies to measure secondary school efficiency.

Tab. 1: Summary of previous studies

Authors	Sample	Inputs	Outputs
Ruggiero and Vitaliano (1999)	New York school districts	Operating expenditures per student	Scores on standardized tests, Dropout rate, Graduation rate
Davutyan, Demir and Polat (2010)	Turkish secondary schools	Students skills at admission to secondary school, Classrooms per student ratio,	Scores on the nationwide university entrance exam, Admission rate to university
Alexander et al. (2010)	New Zealand secondary schools	Number of fulltime equivalent teachers, Number of teacher aides, Administration expenses, Expenditure on learning resources, Depreciation expenses, Expenditure for raising local funds, Property management expenses	Number of students passing bursary with minimum 4C or better grade, Sum of marks of students passing school certificate examination, Number of students leaving school with a certificate
Portela and Camanho (2016)	Portuguese secondary schools	Average scores on entry, Average number of years in school for the parents, % secondary students not subsidized by state	Average scores on exit on national exams, % students entering public higher education % students completing secondary education in 3 years % students not abandoning secondary education
Nauzeer, Jaunky and Ramesh (2018)	Mauritian secondary schools	Number of classrooms in school, Equipment, Number of academic staffs, Number of administrative staffs, Total number of students in school	% pass at school certificate examination

Source: Author's analysis based on the literature listed in the table

DEA models can be oriented to inputs or outputs. In the input-oriented model, DMUs minimize inputs while maintaining the same level of outputs. Conversely, in output-oriented models, DMUs are maximizing their level of outputs while keeping inputs constant. Basically, the difference is the ability that a DMU could control input or output quantity (Staňková and Papadaki, 2017). If it can control input, then an input-oriented version is preferable. In this paper, input-oriented model is employed.

Appearance of the efficient frontier depends on the nature of returns to scale. Returns to scale can be constant or variable. In the case of constant returns to scale (CRS), to maintain efficiency, the proportionate increase of inputs must be accompanied by the same proportionate increase of outputs. It should be taken into consideration that the integration of resources is not always the same in the education process. If they would be utilized at the same level, then we should calculate with CRS, accordingly, variable return to scale (VRS) is preferable. The assumption of VRS provides a more realistic expression of economic reality and factual relations, events and activities (Halásková, Halásková and Prokop, 2018).

3 Problem solving

The following input and output criteria were chosen for the DEA analysis: expenditure on teacher salaries as input, % of pupils success in Czech language, math and English language matriculation exams as outputs (see Tab. 3 and 4). In the case of % of pupils success in exams, the average values for the years 2013 - 2017 were used due to more accurate data when potential unexpected fluctuations in the performance of pupils in individual years were eliminated. The most commonly used inputs and outputs to measure school efficiency were selected, which have the greatest importance for the functioning of the school. Taking into consideration the entire sample of researched schools we can describe them as follows. Tab. 2 depicts the minimum, maximum, mean and standard deviation of each researched input and output.

Tab. 2: Statistical characteristics of inputs and outputs of the DEA model

DMUs = 36	Name	Mean	Maximum	Minimum	Standard deviation
For vocational secondary schools	expenditure on teacher salaries (per pupil)	34 755	41 606	29 832	3 094
	% of pupils success in Czech language exam	78.73	98.24	54.17	12.07
	% of pupils success in math exam	60.56	88.89	25.00	17.22
	% of pupils success in English language exam	85.54	98.67	50.00	11.75
For grammar schools	expenditure on teacher salaries (per pupil)	29 776	35 097	26 231	1 752
	% of pupils success in Czech language exam	97.49	99.01	92.56	1.70
	% of pupils success in math exam	94.46	98.67	86.52	3.59
	% of pupils success in English language exam	98.44	99.57	95.47	1.05

Source: own processing

This analysis used input-based measures of efficiency. The choice of the specific DEA model depends on which of the given characteristics can be influenced and which cannot. Due to the fact that the success of pupils in examinations can hardly be directly influenced, the input-oriented model was chosen. The results of the DEA analysis are presented in Tab. 3 and Tab. 4. School with a coefficient of efficiency equal 1 is effective, a coefficient lower than 1 indicates that school is not effective.

Tab. 3: Order of vocational secondary schools according to their VRS efficiency (from the best to the worst)

Vocational secondary school	Expenditure on teacher salaries in CZK (per pupil)	% success in			Efficiency VRS	Optimal utilization of capacities (in %)
		Czech language	Math	English language		
Secondary industrial school, Chrudim	33 797	89.74	84.21	96.47	1.00000	48.18
High school of chemistry, Pardubice	30 916	98.24	77.78	98.67	1.00000	88.00
Secondary school and food services, Pardubice	29 832	68.75	62.45	74.07	1.00000	65.67
Integrated secondary technical school, Moravská Třebová	29 932	80.00	63.54	82.56	1.00000	65.83
Business academy and secondary school of tourism, Chocẽ	30 136	95.24	82.54	97.43	1.00000	75.76
Integrated secondary technical school, Vysoké Mýto	32 976	76.25	88.89	85.71	1.00000	65.27
Secondary vocational school, Svitavy	32 147	80.00	50.00	90.54	0.93451	41.05
High school of horticulture and technical, Litomyšl	33 476	86.67	79.31	76.32	0.89877	84.85
Secondary automotive school, Holice	33 931	95.45	45.45	92.36	0.88978	70.80
Industrial secondary school, Letohrad	35 029	92.11	50.00	93.29	0.85913	51.45
Secondary technical school and vocational school, Lanškroun	35 259	82.35	73.25	50.00	0.85072	49.33
Secondary automotive school, Ústí nad Orlicí	35 621	78.21	65.79	92.31	0.84405	62.24
Secondary school for commerce, crafts and services, Žamberk	36 327	68.45	52.25	75.63	0.82171	37.59
Secondary technical school, Králíky	36 378	72.54	64.58	73.25	0.82116	48.44
Secondary agricultural school, Chvaletice	36 720	62.24	53.68	79.54	0.81416	52.14
Secondary technical school and vocational school, Polička	36 807	69.57	57.47	77.27	0.81152	40.00
Secondary school of civil engineering, Pardubice	37 512	85.00	60.00	93.57	0.80196	37.59
Secondary apprentice college for the gas industry and plumbing, Pardubice	38 200	54.17	50.00	89.74	0.78614	85.91
Secondary technical school of mechanical engineering, Třemošnice	38 497	60.00	25.00	97.52	0.78429	65.67
Secondary school of applied arts, Ústí nad Orlicí	41 606	79.69	25.00	94.64	0.72340	55.37

Source: own processing

Tab. 4: Order of grammar schools according to their VRS efficiency (from the best to the worst)

Grammar school	Expenditure on teacher salaries in CZK (per pupil)	% success in			Efficiency VRS	Optimal utilization of capacities (in %)
		Czech language	Math	English language		
Hlinsko	28 324	98.36	93.75	98.64	1.00000	58.96
Pardubice, Dašická	29 771	99.01	98.57	99.57	1.00000	72.20
Přelouč	26 231	97.44	86.52	96.53	1.00000	77.00
Polička	29 215	98.63	97.96	99.27	1.00000	88.34
Litomyšl	29 834	98.79	98.67	99.29	1.00000	90.26
Česká Třebová	28 122	96.61	94.75	98.15	1.00000	93.82
Chrudim	30 280	98.87	98.18	98.83	0.97573	66.53
Lanškroun	29 072	94.51	95.45	97.53	0.97550	84.68
Vysoké Mýto	29 646	97.23	96.43	98.76	0.96840	95.28
Žamberk	30 095	98.37	92.00	99.16	0.96560	79.84
Pardubice, Mozartova	30 255	98.74	96.15	98.77	0.96387	93.50
Ústí nad Orlicí	29 993	98.62	93.55	98.52	0.96327	89.52
Sport grammar school, Pardubice	30 576	97.58	93.75	99.21	0.95273	91.67
Holice	30 724	96.75	97.42	98.63	0.94492	81.00
Moravská Třebová	29 174	92.56	89.28	95.47	0.92083	62.78
Jevíčko	35 097	97.83	88.89	98.63	0.80676	48.81

Source: own processing

DEA analysis identified six effective vocational secondary schools and six effective grammar schools. The last column of the table contains optimal utilization of capacities. It was used data from the Ministry of education youth and sports, Czech Republic (2018b) about the administrative capacity of the school to calculate the optimal utilization of capacities. The administrative capacity of the school expresses the optimal (maximal possible) number of pupils of these schools in compliance with all legislative regulations. For evaluation of optimal utilization of capacities, it is desirable that actual capacities are equal or as near as possible to the optimal (determined) number of pupils of a school. The optimal utilization of capacities (OUC) can be calculated as quotient of actual (resp. real) number of pupils (A_{np}) and optimal number of pupils (O_{np}) that is the set capacity of a school, according to formula (Vrabková, 2017):

$$OUC = \left(\frac{A_{np}}{O_{np}} \right) * 100 \quad (1)$$

This indicator cannot be used as a parameter for DEA analysis because the funding of secondary schools takes into account the actual number of pupils. However, low capacity of schools is definitely inefficient in terms of insufficient use of technical possibilities. You can see that effective grammar school Hlinsko has one of the worst capacity utilization (58.96 %). On the other hand, the best use of capacities from all the schools studied has grammar school Vysoké Mýto (95.28 %) which is, according to the analysis, inefficient. Tab. 5 shows the target values for all schools, which did not reach 100 % efficiency (schools that are effective did not change inputs and outputs).

Tab. 5: Improvements for the schools

Secondary school	Expenditure on teacher salaries in CZK (per pupil)	% success in		
		Czech language	Math	English language
Secondary vocational school, Svitavy	32 147 to 30 042	80.00 to 88.18	50.00 to 73.74	90.54 to 90.54
High school of horticulture and technical, Litomyšl	33 476 to 30 087	86.67 to 90.98	79.31 to 79.31	76.32 to 93.67
Secondary automotive school, Holice	33 931 to 30 191	95.45 to 95.45	45.45 to 82.21	92.36 to 97.52
Industrial secondary school, Letohrad	35 029 to 30 094	92.11 to 92.11	50.00 to 78.64	93.29 to 94.38
Secondary technical school and vocational school, Lanškroun	35 259 to 29 995	82.35 to 82.99	73.25 to 73.25	50.00 to 86.63
Secondary automotive school, Ústí nad Orlicí	35 621 to 30 066	78.21 to 89.99	65.79 to 76.00	92.31 to 92.31
Secondary school for commerce, crafts and services, Žamberk	36 327 to 29 850	68.45 to 70.82	52.25 to 62.65	75.63 to 75.63
Secondary technical school, Králíky	36 378 to 29 873	72.54 to 72.54	64.58 to 64.58	73.25 to 77.27
Secondary agricultural school, Chvaletice	36 720 to 29 897	62.24 to 76.00	53.68 to 63.15	79.54 to 79.54
Secondary technical school and vocational school, Polička	36 807 to 29 870	69.57 to 72.99	57.47 to 62.86	77.27 to 77.27
Secondary school of civil engineering, Pardubice	37 512 to 30 083	85.00 to 91.28	60.00 to 77.61	93.57 to 93.57
Secondary apprentice college for the gas industry and plumbing, Pardubice	38 200 to 30 031	54.17 to 87.36	50.00 to 72.71	89.74 to 89.74
Secondary technical school of mechanical engineering, Třemošnice	38 497 to 30 193	60.00 to 95.46	25.00 to 82.19	97.52 to 97.52
Secondary school of applied arts, Ústí nad Orlicí	41 606 to 30 098	79.69 to 92.38	25.00 to 78.98	94.64 to 94.64
Grammar school, Chrudim	30 280 to 29 545	98.87 to 98.87	98.18 to 98.18	98.83 to 99.44
Grammar school, Lanškroun	29 072 to 28 360	94.51 to 97.05	95.45 to 95.45	97.53 to 98.39
Grammar school, Vysoké Mýto	29 646 to 28 709	97.23 to 97.73	96.43 to 96.43	98.76 to 98.76
Grammar school, Žamberk	30 095 to 29 060	98.37 to 98.58	92.00 to 97.22	99.16 to 99.16
Grammar school, Pardubice, Mozartova	30 255 to 29 162	98.74 to 98.74	96.15 to 96.50	98.77 to 99.05
Grammar school, Ústí nad Orlicí	29 993 to 28 892	98.62 to 98.62	93.55 to 95.58	98.52 to 98.81
Sport grammar school, Pardubice	30 576 to 29 130	97.58 to 98.60	93.75 to 97.56	99.21 to 99.21
Grammar school, Holice	30 724 to 29 031	96.75 to 98.29	97.42 to 97.42	98.63 to 99.08
Grammar school, Moravská Třebová	29 174 to 26 865	92.56 to 97.16	89.28 to 89.28	95.47 to 97.07
Grammar school, Jevíčko	35 097 to 28 315	97.83 to 98.36	88.89 to 93.72	98.63 to 98.63

Source: own processing

4 Discussion

The results of the DEA analysis found that 12 examined secondary schools are effective. Others are considered ineffective. The level of efficiency in other schools varies between 72.34 % and 100 %. From this range of values it is evident that the relative efficiency of the schools analysed is quite high and similar, meaning that schools are similar in the monitored parameters. This fact is probably due to the dividing the sample of schools into vocational secondary schools and grammar schools. Schools was divided in this way because of the different characteristics of the two types of schools mentioned above. Grammar schools showed significantly better pupils results and also lower expenditure on teacher salaries compared to vocational secondary schools. Higher standard deviation for vocational secondary schools

compared to grammar schools means large differences in pupil results and expenditure on teacher salaries and hence a bit higher differences in efficiency of individual vocational secondary schools. Grammar schools, on the contrary, have very few differences and their efficiency is more similar.

Furthermore, the optimal utilization of capacities at individual schools was investigated. Most schools showed very low capacity utilization. Grammar schools have an average capacity utilization of around 80 %, vocational secondary schools even less, about 60 %. This situation reduces the efficient use of public resources. If the schools make better use of their capacities, school expenditures on facilities per pupil would be lower.

The research question deals with whether a small number of pupils in classes can also have positive impact on their results. OECD (2017) states that often-mentioned benefit of smaller classes is that teachers can dedicate greater attention to individual students. To answer this question, the relationship between class size and the results of pupils in Czech language, math, and English language exams was sought. The correlation analysis was used. Correlation coefficients for the relationship between the class size and the results of pupils in exams are as follows: for Czech language exam is 0.49, in the case of math exam is 0.53, and for English language exam is 0.55. However, these positive correlation coefficients say that the higher the number of pupils in the class, the higher the percentage success rate of the pupils in exams. In this case, the correlation coefficients are about 0.5, which means a higher correlation rate. The dependence of these indicators was verified by regression analysis. The results of this analysis conclude that these indicators explain the model from not too high percentage (about 21 %). The research question can be answered that the relationship between class size and the results of pupils not been confirmed. Relationship between class size/student-teacher ratio and student achievement also has not been proven by studies (Pritchett, 2001; Bazhenov et al., 2015). In this case, we can see low capacity utilization as negative in terms of insufficient use of technical equipment.

Alexander et al. (2010) analysed the efficiency of New Zealand secondary schools by DEA analysis. After they used regression model to explain the efficiency scores in terms of other variables. They found that socioeconomic deprivation is negatively related to efficiency and proved positive effects from both teacher experience and qualification levels. Portela and Camanho (2016) lists the factors that affect the efficiency of secondary schools. These factors include good resources and infrastructure; motivated and stable body of teachers; effective control (in terms of class attendance, or discipline); self-evaluation and rigorous use of student performance data; involvement of students' parents, or leadership well adapted to the school context.

Aristovnik and Obadić (2014) used the DEA technique to a wide range of EU and OECD countries to evaluate the efficiency of secondary education. The results showed that this efficiency fluctuates significantly across most of the countries. Therefore, it suggests that justifying public secondary education spending is strongly recommended. Czech Republic and most EU countries have similar issues in secondary education. Public secondary schools are mainly funded according to the number of pupils and financial resources are allocated centrally in these countries. For this reason, school directors cannot affect the amount of funds received. Because of this method of financing, secondary schools keep number of pupils at the highest level, even if these

pupils do not have the academic requirements. This nuisance can then be reflected in the form of poor outputs.

Conclusion

The aim of this paper was to evaluate efficiency of 36 secondary schools in the Pardubice region. DEA analysis calculated that one third of these schools are effective. The rest of the sample are inefficient schools. Improving the surveyed indicators, i.e. reduction of the expenditure on teacher salaries (input) and increasing the percentage of pupils success in exams (outputs), is difficult under current legislative conditions. Schools have little impact on level of expenditure on teacher salaries. Current method of financing puts pressure on schools to accept the maximum number of pupils regardless of their academic requirements.

Due to the adverse demographic trend and because of the current way of financing, most of the schools examined do not use enough their capacities. The improvement of capacities of secondary schools can be considered in two ways. The first one is rationalization of capacities by merging of schools or by cancellation of schools (but this way is not popular with the public). The other one is rationalization of capacities by administrative reduction of capacities of secondary schools (reduction of number of pupils in a class).

From the next year, method of financing regional education will change in the Czech Republic. The calculation by number of pupils will replace the calculation by the number of hours of direct pedagogical activity. Regional authorities will no longer have the authority increase the amount of funds for secondary schools with low capacity utilization in order to maintain their established schools. Schools will no longer be pressured to accept and maintain the maximum number of pupils. This new funding system has the potential to rationalize and to make more efficient use of public funds. Demographic development shows that in the next ten years we can expect a modest increase in the number of secondary school pupils. Capacity utilization should therefore be improved. However, then there should be a further decline in the number of secondary school pupils (CZSO, 2014). Schools will therefore have to adapt to demographic trend again.

However, it is necessary to perceive obtained results of DEA soberly, especially because of the use of resources as input. Previous research has shown that pupil characteristics, such as gender and innate ability, socio-economic background and family size (Bazhenov et al., 2015) also have a great effect on exam performance. Another limitation of the DEA analysis method may be that it provides only a measure of relative efficiency that is calculated for each school in relation to the other schools in the sample. Therefore, if all schools included in the analysis have unfavourable levels of indicators, "the best ones" will nevertheless be effective. DEA method does not need to specify the optimal value of the indicators. In the context of further research into secondary school evaluation, it is appropriate to focus on establishing this optimal value for indicators and to use, for example, some multi-criteria evaluation model.

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Received: 21. 03. 2018, reviewed: 30. 08. 2018

Approved for publication: 08. 04. 2019

KONCENTRACE KRIMINALITY A VÝDAJE OBCÍ NA BEZPEČNOST A VEŘEJNÝ POŘÁDEK

CRIME CONCENTRATION AND EXPENDITURES OF MUNICIPALITIES ON SECURITY AND PUBLIC ORDER

Ivana Kraftová

Abstract: *The aim of this article is both to evaluate the relationship between population density and intensity of crime (in general), as well as the relationship between the expenditure on security and public order per capita, crime rate, and tying funds to a crime (on a sample of municipalities in the Pardubice Region). The relationship between population density and crime intensity is examined in European regions using two Eurostat typologies. Further examining relationships are judged by linear regression analysis, the dispersion and relations among standardized values of selected parameters, i.e. operating expenditures of municipal budgets spent in the area of security and public order per citizen, modified crime rate index, and tying of financial means to one criminal act. Although the direct proportion between population density and crime intensity has been demonstrated, the population of the municipality is not critical to the amount of its security and public order expenditure. Identified relations among the evaluated parameters are not completely analogous, the research has pointed to four different approaches in terms of solving the issues of security and public order.*

Keywords: *Population Density, Crime Intensity, Expenditure on Security and Public Order, Modified Crime Index, Tying Funds to a Crime, Municipalities of the Pardubice Region.*

JEL Classification: *H72, R53, Z18*

Úvod

Bezpečnost představuje čistý veřejný produkt s částečnou lokální determinací, je atributem kvality života, její zajišťování je úkolem vlád na všech úrovních. Významnou hrozbou pro naplňování vnitřní bezpečnosti a veřejného pořádku je kriminalita, klasifikovaná jako hrozba antropogenní, sociogenní. Ať již vnímáme kriminalitu v užším slova smyslu jako trestnou činnost, či v širším slova smyslu jako nikoli pouze trestnou činnost, ale i takové jednání jedince, které sice není trestněprávně postižitelné, ale je společensky nežádoucí (Novotný a Zapletal, 2008; Nuttall Ch. et al., 2005), jejímu snižování přispívají dvě strategie: preventivní a represivní. Preventivní strategie, která je obecně považována za sociálně i ekonomicky efektivnější, využívá celou škálu nástrojů (Welsh et al., 2015; Jichová a Temelová, 2012), pokročilé technologie nevyjímaje (Lio, 2015; Yang, 2014). Jedním z takových technických prostředků, zařazovaných mezi prvky situační prevence kriminality jsou městské kamerové dohlížecí systémy (dále jen „MKDS“), které umožňují vzdálený dohled nad určitou lokalitou (Gill a Spriggs, 2007; Koníček, Křeček a Kocábek, 2002). Na situační příčiny kriminálních činů ukazuje prostřednictvím tzv. crime triangle Svoboda (2016), rovněž jsou popisovány i tzv. teorií rutinních činností, která k vnitřnímu trojúhelníku „místo – pachatel – oběť“ přidává i vnější trojúhelník preventivních kontrolních prvků: „správce místa – dohlížeč pachatele – ochránce oběti“ (Clarke a Eck, 2010). V rámci ČR hraje

významnou roli na úrovni municipalit střední a větší velikosti obecní policie, která je svou podstatou doplňkem státní Policie ČR. Některé z obcí ČR pak rozšiřují působení obecní policie dalším technickým vybavením, např. MKDS. Nicméně nasazení MKDS je třeba věnovat náležitou pozornost v zájmu optimalizace dopadů, tj. minimalizace, resp. eliminace kriminality a maximalizace bezpečnosti s přiměřenými náklady (Taeheon, 2015; Liu a Tang, 2015). Nákladová efektivita MKDS je oblastí, v jejímž poznání je kritická mezera. Realizované analýzy dopadů MKDS, resp. CCTV (Closed Circuit Television Cameras) dokládají, že ke snižování dochází v případě záměrných, promyšlených trestných činů, nikoli impulsivních. Ke snížení četnosti dochází spíše u loupeží a krádeží než u násilných trestných činů jako např. vražd a znásilnění (Kim et al., 2014). Obdobně jako může být instalace MKDS spojena s pozitivní difuzí prospěšných účinků, může dojít rovněž k negativnímu projevu v podobě přesunu trestné činnosti do nemonitorované oblasti (Gill a Spriggs, 2007).

Práci se statistickými daty o kriminalitě považuje za významnou i tým odborníků pod vedením prof. M. Turnera (2014), který podtrhuje zejména jejich zpracování pomocí GIS (Geographic Information Systems). Tak se odhalí nejzranitelnější místa, která pak mohou být ošetřena metodou CPTED (Crime Prevention Through Environmental Design), do níž mohou být zahrnuty i MKDS jako nástroj situační prevence. Na druhou stranu Marešová (2011) upozorňuje, že policejní statistika pracuje pouze s ohlášenou kriminalitou, ale nezachycuje neohlášené a nezjištěné trestné činy, tj. latentní kriminalitu. Právě přesun latentní kriminality do evidované (tedy nárůst statisticky podchycených kriminálních činů) může být způsoben i instalací MKDS, neboť oběti trestných činů získají větší naději na odhalení pachatele (Gill a Spriggs, 2007).

Přestože je často zmiňovaná omezenost veřejných zdrojů (Pernica, 2011) – obdobně jako negativní důsledky kriminality pro kvalitu života občanů – není dosud věnována dostatečná pozornost vztahu vynakládání veřejných prostředků a jejich dopadů na zajišťování bezpečnosti v oblasti veřejného pořádku na úrovni municipalit. I v tomto případě je třeba najít cestu, jak problém „uchopit“, jak jej analyzovat a následně promítnout výsledky do praxe decizní sféry.

1 Formulace problematiky

První problém, který je nutné v souvislosti s hodnocením efektivnosti vynakládání finančních prostředků z rozpočtů municipalit explicitně popsat, je otázka vztahu koncentrace obyvatelstva a intenzity kriminality. Pokud by s sebou vyšší koncentrace obyvatelstva přinášela vyšší intenzitu kriminality, bylo by třeba to zohlednit při alokaci zdrojů na zajišťování veřejného produktu „bezpečnost“.

Druhý problém, který na něj navazuje, se týká výdajů na bezpečnost a veřejný pořádek (dále jen „výdaje BVP“), jejich adekvátnosti velikosti obce (měřeno počtem obyvatel) a vztahu k úrovni kriminality, která bezpečnost a veřejný pořádek narušuje. Na rozsah výdajů BVP obcí má zásadní vliv to, které nástroje obec k zajišťování bezpečnosti nasadí. Nejčastěji to bývají obecní policie a MKDS.

Již od roku 1991 mohou (tedy nemusí) obce v ČR zřizovat svou obecní policii, která zabezpečuje zejména místní záležitosti veřejného pořádku v rámci působnosti obce, a současně spolupracuje s Policií České republiky (ČR, 1991). Obec, která nezřídila svou obecní policii, může uzavřít s jinou obcí v témže kraji, která obecní policii zřídila,

veřejnoprávní smlouvu o vykonávání úkolů v oblasti bezpečnosti a veřejného pořádku na svém území.

Kamerové systémy jsou obecně instalovány a provozovány za účelem ochrany majetku a zajištění bezpečnosti osob. Otazník pochybností, který se nad nimi vznáší, je spojen s obavami ze zásahu do soukromí monitorovaných osob, proto k jejich provozování v ČR vydal Úřad pro ochranu osobních údajů v návaznosti na zákon č. 101/2000 Sb. (ČR, 2000) metodiku pro splnění základních zákonných povinností (UOOU, 2012). Provozovat kamerové systémy se záznamem je považováno za zpracování osobních údajů, což od 25. 5. 2018 již sice nepodléhá oznamovací povinnosti Úřadu pro ochranu osobních údajů, avšak dostává se do režimu GDPR (General Data Protection Regulation). Výjimečné postavení v tomto ohledu má „pro dodržení právní povinnosti správce“ Policie ČR (ČR, 2008) a obecní policie (ČR, 1991). Význam MKDS jako prvku situační prevence spočívá zejména v prevenci, tj. odrazování od narušování veřejného pořádku, páchání pouliční kriminality, a tak utváření tzv. bezpečných zón. Monitorována jsou místa veřejně přístupná, a to zejména taková, která jsou v rámci bezpečnostních analýz vyhodnocena jako riziková, tj. ta území, která mají vyšší index rizikovitosti, než je průměr ČR v daném roce (MV ČR, 2016). Pro rozhodování o alokaci rozpočtových prostředků je důležité vnímat i dynamiku změn - vysoká míra kriminality může vést k vyšším výdajům BVP, což je spojeno s nižší vázaností finančních prostředků na kriminální čin, posléze při účinném využití výdajů BVP by mělo dojít ke snížení míry kriminality, což s sebou ale nese vyšší vázanost finančních prostředků na jeden kriminální čin.

Cílem tohoto článku je jednak posoudit vztah mezi koncentrací obyvatelstva a intenzitou kriminality (obecně), jednak vztah mezi výší výdajů BVP na obyvatele, mírou kriminality a vázaností finančních prostředků na kriminální čin (na vzorku obcí Pardubického kraje). V rámci výzkumu byly stanoveny tyto hypotézy:

- α) vyšší koncentrace obyvatelstva je spojena s vyšší intenzitou kriminality;
- β) pro výši výdajů BVP obce je určující její velikost;
- γ) platí relace: výdaje BVP na obyvatele > index kriminality < vázanost finančních prostředků na kriminální čin.

2 Metody

Hypotéza α je verifikována jednak na úrovni evropských států, jednak na úrovni regionů ČR s referenčním rokem 2010. Hypotézy β a γ jsou verifikovány na vzorku obcí Pardubického kraje s referenčním rokem 2015.

Vztah mezi koncentrací obyvatelstva a intenzitou kriminality je zkoumán v rámci evropských zemí, v nichž jsou v souladu s typologií Eurostatu (2016a) porovnávány regiony převážně městské, přechodové a převážně venkovské; jednak v rámci České republiky, kde jsou – opět v souladu s příslušnou typologií Eurostatu (2016b) – posuzovány metropolitní a nemetropolitní regiony. V případě analýzy evropských zemí byl po eliminaci zemí s absencí dat utvořen vzorek 16 zemí (dále jen „E16“). Belgie byla zařazena i přes absenci údajů o vraždách a Polsko bez údajů o vraždách a krádežích vloupáním, ovšem vždy se stejnou strukturou dat ve všech třech typech regionů. Součty absolutních počtů kriminálních činů v jednotlivých typech regionů byly převedeny na relativní hodnoty (%) v jednotlivých zemích a ve vzorku „E16“

jako celku. Podle Eurostatu (2016b) jsou metropolitní regiony aproximací NUTS 3 v podobě funkčních městských celků s 250 000 a více obyvateli. V ČR jsou to Praha, Brno, Ostrava, Plzeň a s nimi spojené příslušné čtyři kraje. Zbývajících 10 krajů je klasifikováno jako nemetropolitní.

Intenzita kriminality je měřena počtem čtyř vybraných druhů kriminálních činů (násilné činy proti člověku, loupeže, krádeže vloupáním, krádeže motorových vozidel.)

Hypotéza α : „vyšší koncentrace obyvatelstva je spojena s vyšší intenzitou kriminality“, bude považována za platnou, pokud

a) v analyzovaném vzorku evropských zemí bude míra kriminálních činů v městských regionech vyšší než v regionech venkovských, a to jak ve vzorku E16 jako celku, tak alespoň ve 2/3 zemí tohoto vzorku;

b) četnost kriminálních činů bude v metropolitních regionech ČR vyšší než v nemetropolitních regionech.

Pro ověření platnosti hypotézy β a γ byly zvoleny obce Pardubického kraje. Zkoumaný vzorek 29 obcí s disponibilními daty tvoří tři skupiny: 14 obcí, které disponují jak obecní policií, tak MKDS (skupina A); 8 obcí, které mají zřízení obecní policie, avšak nedisponují MKDS (skupina B); 7 obcí, u nichž byla dostupná data a které nemají ani obecní policii, ani MKDS (skupina C). Z tohoto vzorku 29 obcí byl pak odvozen vzorek 19 obcí, které jsou současně samostatnými policejními obvodními odděleními a sledují se za ně statistická data kriminálních činů.

Při ověření hypotézy β byla uplatněna pro posouzení vztahu mezi počtem obyvatel obce jako nezávisle proměnnou a výši výdajů BVP jako závisle proměnnou lineární regresní analýza. Ta byla doplněna analýzou variability výdajů BVP uvnitř skupin A, B a C, a to pomocí disperze. Ukazatel disperze (1) má v sobě zakomponován aspekt velikosti obce, neboť pracuje s podílem osob dotčených příslušnou úrovní BVP výdajů na obyvatele.

$$D = 100 \frac{1}{y} \sum_{i=1}^n |vBVP_i - VBVP| \times p_i / P \quad (1)$$

kde: VBVP – výdaje BVP na obyvatele za celý hodnocený vzorek 29 obcí
vBVP_i – výdaje BVP na obyvatele i-té obce
P – počet obyvatel celého hodnoceného vzoru 29 obcí
p_i – počet obyvatel i-té obce

Při posuzování vztahů BVP výdajů ve vztahu k počtu obyvatel obce pomocí disperze a regresní analýzy byly vzaty v úvahu pouze provozní výdaje, neboť investiční dotace (např. na zřízení či modernizaci MKDS) získávají obce na základě zdůvodněné žádosti ze státního rozpočtu, nejde tedy primárně o alokaci obecních finančních zdrojů na tuto oblast.

Hypotéza β : „pro výši výdajů BVP obce je určující její velikost“, bude přijata, pokud koeficient determinace nabude ve všech třech skupinách obcí A, B a C, které se odlišují nástroji zajišťování bezpečnosti, hodnoty $R^2 > 0,8$.

Při ověřování hypotézy γ byla použita komparační analýza, při níž byly komparovány relace standardizovaných hodnot a) mezi výdaji BVP na obyvatele a modifikovaným indexem kriminality, b) mezi modifikovaným indexem kriminality a ukazatelem vázanosti finančních prostředků na jeden kriminální čin. Tato komparační analýza se týká vzorku 19 obcí, které jsou současně samostatnými policejními obvodními odděleními.

Modifikovaný index kriminality zahrnuje pouze ty skupiny kriminálních činů, které jsou významně ovlivnitelné fungováním obecní policie a MKDS, na rozdíl např. od domácího násilí, hospodářské kriminality či korupce. Jde o tyto skupiny: násilné činy proti člověku (1 %), loupeže a krádeže vloupáním (49 %), krádeže movitých věcí (43 %) a poškozování cizí věci (7 %). Čísla v závorkách ukazují na strukturu těchto kriminálních činů ve vzorku 19 obcí. Modifikovaný index kriminality I_k^* byl vypočítán podle vzorce (2):

$$I_k^* = \frac{k_i}{p_i} \times 1000 \quad (2)$$

kde: k_i – počet relevantních kriminálních činů i-té obce
 p_i – počet obyvatel i-té obce

Specifický ukazatel vázanosti finančních prostředků na jeden kriminální čin je zachycen vzorcem (3).

$$V^* = \frac{VBVP_i}{k_i} \quad (3)$$

kde: $VBVP_i$ – celkové výdaje BVP i-té obce
 k_i – počet relevantních kriminálních činů i-té obce

Hypotéza γ): „platí relace: výdaje BVP na obyvatele > index kriminality < vázanost finančních prostředků na kriminální čin“, bude považována za platnou, pokud bude naplněna u standardizovaných hodnot ukazatelů 80 % analyzovaného vzorku 19 obcí.

Hlavními zdroji dat v případě evropských regionů je Eurostat (2016a; 2016b), v případě dat ČR, Pardubického kraje a jeho obcí pak data Českého statistického úřadu (2016), Ministerstva financí ČR (2016a; 2016b), databáze neziskových organizací ČR zpracovávajících data z oficiálních statistik Policie ČR (Otevřená společnost, 2016) a z údajů Ministerstva financí ČR (Rozpočet Veřejně, 2016), v neposlední řadě také primární sběr dat ve formě dotazování zástupců obcí Pardubického kraje.

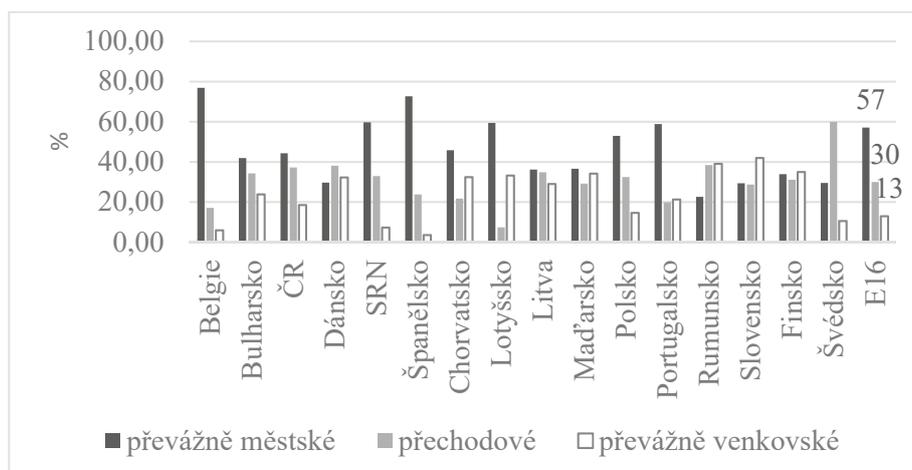
3 Rozbor problému

3.1 Koncentrace obyvatel a intenzita kriminality

První část výzkumu byla zaměřena na posouzení vztahu koncentrace obyvatel a intenzity kriminality, a to v rámci evropských zemí a regionů ČR podle typologií Eurostatu.

Výsledné zjištění o rozložení kriminálních činů v jednotlivých typech regionů vzorku zemí E16 zachycuje obr. 1. Výsledné hodnoty celého vzorku E16 (57 % - 30 % - 13 %) hypotézu potvrzují, avšak relace neplatí ve všech zemích. Vyšší intenzitou kriminality ve venkovských regionech než v městských se vyznačují Dánsko, Rumunsko, Slovensko a Finsko. Švédsko se vymyká nejvyšší intenzitou kriminality v přechodových regionech.

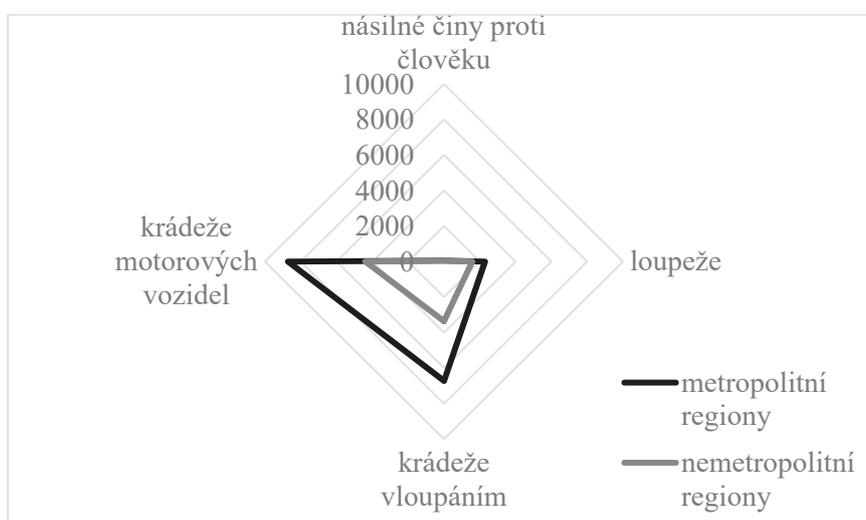
Obr. 1: Srovnání míry sledovaných kriminálních činů podle typu regionů v 16 evropských zemích



Zdroj: vlastní zpracování na základě dat Eurostatu (2016a)

Rovněž pohled na relace sledovaných kriminálních činů metropolitních a nemetropolitních regionů v ČR potvrzuje soustředěnost kriminality do míst s vyšší koncentrací obyvatelstva. Plocha obrazce na obr. 2, znázorňující četnost jednotlivých kriminálních činů, je pro metropolitní regiony signifikantně větší než pro regiony nemetropolitní.

Obr. 2: Srovnání počtu vybraných kriminálních činů v metropolitních a nemetropolitních regionech ČR



Zdroj: vlastní zpracování na základě dat Eurostatu (2016b)

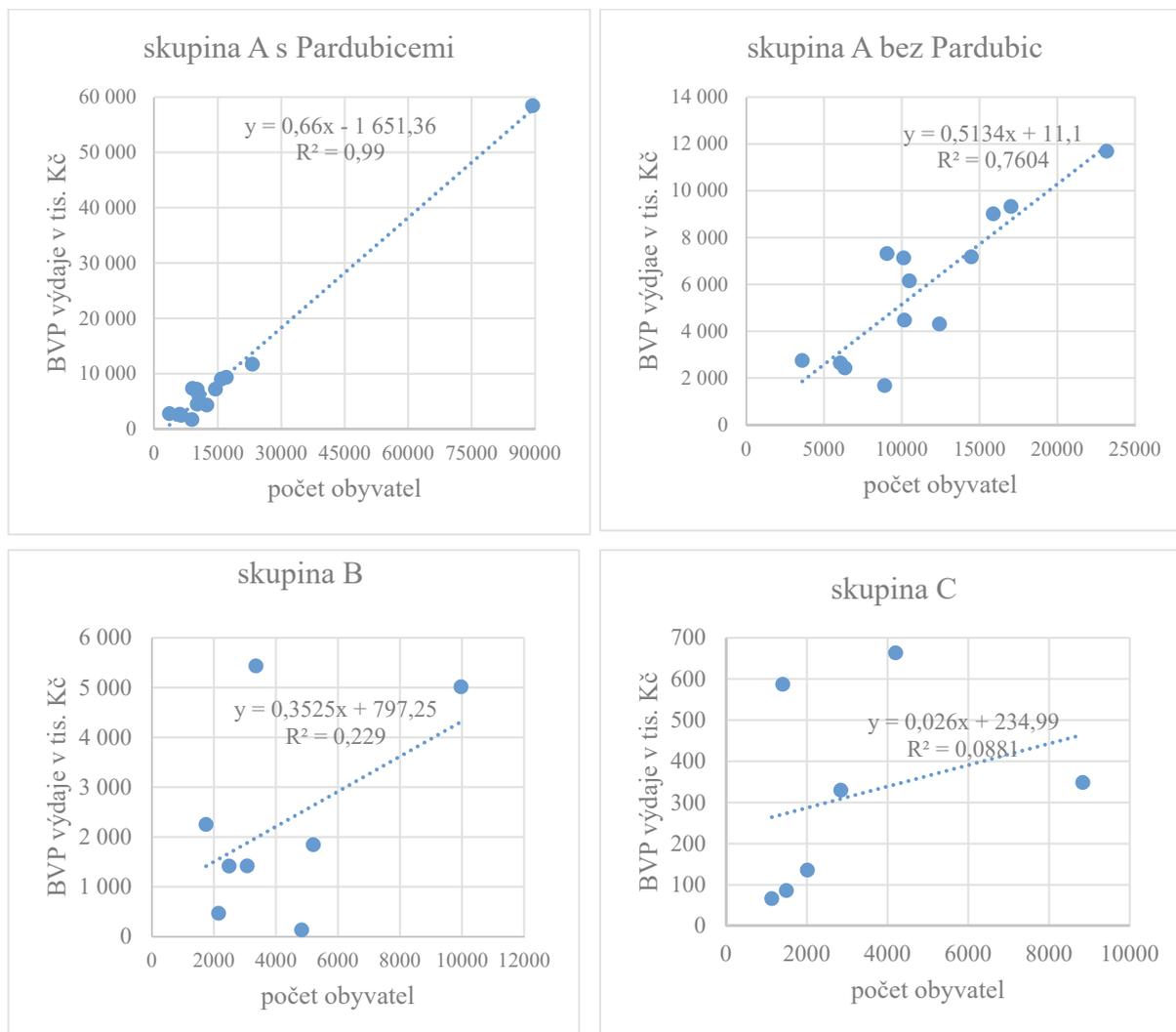
Obr. 2 ilustruje i četnosti jednotlivých kriminálních činů. Zatímco násilné činy proti člověku se pohybují v řádu desítek, ostatní tři typy kriminálních činů v řádu tisíců, přičemž prvenství si drží krádeže motorových vozidel.

3.2 Výdaje obcí na bezpečnost a veřejný pořádek v Pardubickém kraji

Regresní analýza, jejíž výsledky jsou zachyceny na obr. 3, platnost přímé úměry mezi počtem obyvatel a úrovní výdajů BVP ve skupině A potvrzuje, a to s vysokým koeficientem determinace pro celou skupinu A včetně krajského města Pardubic ($R^2=0,99$). Je patrné, že na tomto výsledku má právě město Pardubice jako „táhnoucí“ odlehlá hodnota významný podíl. Avšak i při vyloučení města Pardubic platí lineární

regresní vztah pro skupinu A s poměrně vysokou spolehlivostí ($R^2=0,76$). Výsledky regresní analýzy skupiny B a C, jak ukazuje obr. 3, dosahují dokonce výrazně nižší síly závislosti.

Obr. 3: Vztah mezi počtem obyvatel obce a úrovní výdajů BVP



Zdroj: vlastní zpracování na základě dat ČSÚ (2016) a Rozpočet Veřejně (2016)

S ohledem na vyslovený požadavek hodnoty koeficientu determinace $R^2 > 0,8$ ve všech třech skupinách obcí A, B a C nebyla hypotéza β : „pro výši výdajů BVP obce je určující její velikost“ potvrzena.

Výsledky propočtu disperze vedle toho ale ukazují, že obce skupiny A dosahují její nejmenší hodnoty (18,13 %), tj. v případě zřízení obecní policie i MKDS se BVP výdaje na obyvatele liší nejméně. Skupina B dosáhla hodnoty disperze 55,01 %, skupina C pak hodnoty 65,57 %. K výsledku u skupiny B je třeba podotknout, že v ní je obsaženo město lázeňského typu (Lázně Bohdaneč), v němž výrazně ovlivňují počet přítomných osob klienti lázní.

3.2.1 Relace mezi výdaji na bezpečnost a veřejný pořádek, indexem kriminality a vázaností finančních prostředků na kriminální čin

Přístupy obcí k problematice bezpečnosti a veřejného pořádku je patrná z výsledků komparační analýzy znázorněné v Tab. 1, v níž jsou obce řazeny vzestupně podle úrovně modifikovaného indexu kriminality I_k^* .

Tab. 1: Standardizované hodnoty sledovaných ukazatelů obcí a relace mezi nimi

Obec	Výdaje BVP /obyv.	Relace výdaje BVP /obyv. vs. I_k^*	I_k^*	Relace I_k^* vs. V^*	V^*
Letohrad	0,2233	>	0,0000	<	0,8789
Česká Třebová	0,3390	>	0,0835	<	1,0000
Chrudim	0,2996	>	0,1374	<	0,7646
Choceň	0,0079	<	0,1405	>	0,0294
Litomyšl	0,2591	>	0,1441	<	0,6512
Ústí nad Orlicí	0,2942	>	0,1507	<	0,7262
Žamberk	0,2566	>	0,1553	<	0,6272
Vysoké Mýto	0,2007	>	0,1948	<	0,4479
Polička	0,1012	<	0,2079	<	0,2210
Svitavy	0,3270	>	0,2390	<	0,6608
Pardubice	0,3931	>	0,2445	<	0,7855
Heřmanův Městec	0,0000	<	0,2636	>	0,0000
Moravská Třebová	0,3511	>	0,2921	<	0,6395
Hlinsko	0,2989	>	0,2939	<	0,5423
Chvaletice	0,2720	<	0,3271	<	0,4642
Lanškroun	0,4252	>	0,3550	<	0,6938
Přelouč	0,4903	>	0,4071	<	0,7367
Skuteč	0,2053	<	0,4807	>	0,2715
Lázně Bohdaneč	1,0000	=	1,0000	>	0,7904

Zdroj: vlastní zpracování s využitím dat ČSÚ (2016), Rozpočet Veřejně (2016, Otevřená společnost (2016)

Z výsledků analýzy lze odvodit čtyři rozdílné přístupy obcí k řešení otázky bezpečnosti a veřejného pořádku:

Tři obce (Choceň, Heřmanův Městec, Skuteč - světle šedé podbarvení) minimalizují své výdaje BVP na obyvatelstvo, takže i ukazatel vázanosti finančních prostředků na kriminální čin je velmi nízký, avšak index kriminality nepatří k nejnižším ve vzorku. Tyto tři obce by měly zvážit účinnost a dostatečnost alokovaných prostředků na danou oblast.

Dvě obce (Polička, Chvaletice - středně šedé podbarvení) vykazují relačně ukazatel vázanosti finančních prostředků na kriminální čin jako nejvyšší ze tří sledovaných ukazatelů, přestože se vyznačují nízkou úrovní výdajů BVP na obyvatele. Je možno dedukovat, že by nebylo záhodno alokaci prostředků na oblast bezpečnosti a vnitřního pořádku snižovat, neboť jejich modifikovaný index kriminality dosahuje spíše střední pozice v rámci standardizovaných hodnot.

Specifické postavení má lázeňská obec (Lázně Bohdaneč - tmavě šedé podbarvení), která vydává na obyvatele nejvyšší částku výdajů BVP při současně nejvyšší úrovni modifikovaného indexu kriminality. Relace mezi hodnotami výdajů BVP a počtem kriminálních činů jí však snižuje pozici v indikátoru V^* . Lze u ní konstatovat, že její rozpočtová alokace v hodnoceném směru má racionální základ.

Nejpočetnější skupina obcí (ostatní nejmenované z Tab. 1 - bez podbarvení) by se dala charakterizovat tím, že vynakládají relativně hodně výdajů BVP na obyvatele a současně dosahují nižších hodnot z hlediska I_k^* . To u nich s sebou nese vyšší ukazatel vázanosti finančních prostředků na kriminální čin. U těchto obcí by se dalo hovořit o jisté dávce opatrnosti, snaze o snižování rizika jako pravděpodobné ztráty z nárůstu kriminality.

4 Diskuze

Přestože existují jisté národní rozdíly ve vztahu přímé úměry mezi koncentrací obyvatel a intenzitou kriminality v regionech, byla hypotéza α byla potvrzena, neboť kromě celkových hodnot vzorku „E16“ platí tento vztah potvrzena v 75 % analyzovaných zemí. V samotné České republice z hlediska klasifikace regionů na metropolitní a nemetropolitní se tento přímo úměrný vztah rovněž potvrdil. Lze jej tedy brát za směrodatný při zajišťování bezpečnosti a veřejného pořádku jakožto veřejného produktu.

Výdaje BVP spadají ve veřejných rozpočtech v ČR podle platné rozpočtové skladby (MF, 2002) odvětvově do skupiny 5 – Bezpečnost státu a právní ochrana, a to kromě výdajů na obranu, civilní připravenost na krizové stavy, právní ochranu a požární ochranu a integrovaný záchranný systém. Jen pro srovnání relací: stát ze svého rozpočtu s výdaji 1 297 mld Kč v roce 2015 vydal na oblast bezpečnosti a veřejného pořádku cca 2,77 % (MF ČR, 2016a); Pardubický kraj, jehož rozpočtové výdaje dosáhly v roce 2015 úrovně necelých 20 mld Kč, vydal na tutéž oblast cca 1,05 % svých výdajů (MF ČR, 2016b).

V Pardubickém kraji je celkem 451 obcí. Přitom 83 % obcí Pardubického kraje nedosahuje hranice jednoho tisíce obyvatel; ve zbývajících 17 % obcí žije 73 % obyvatel kraje (ČSÚ, 2016). Z hlediska výdajů obcí na oblast bezpečnosti lze konstatovat, že malé obce financují pouze požární ochranu - zpravidla své dobrovolné hasiče, kteří v ČR představují významnou složku dobrovolníků a na které by v analýzách nemělo být zapomináno (Soltes a Gavurova, 2016). Méně často pak alokují finance do oblasti krizového řízení a ochrany obyvatelstva. Tu část výdajů na bezpečnost, která se týká veřejného pořádku, lze identifikovat v rozpočtech větších obcí, tj. těch, kde se počet obyvatel pohybuje nad hranicí jednoho tisíce.

Podle Ministerstva vnitra ČR (MV ČR, 2016) bylo k 1. lednu 2014 v ČR zřízeno 361 obecních (městských) policií, což znamená, že má obecní policii zřízenou cca každá 17. obec. To z pohledu analyzovaného Pardubického kraje vede k dedukci, že v tomto kraji by bylo očekávatelné, že obecní policii bude mít zřízeno cca 26 obcí. Realita této úrovně de facto dosahuje. V Pardubickém kraji má zřízenou obecní policii 22 obcí a 4 obce mají uzavřenou smlouvu s blízkými obcemi, které obecní policii zřídily.

Přestože hypotéza β , týkající se determinace výdajů BVP velikostí obce, nebyla potvrzena, neboť koeficient determinace ve všech třech skupinách obcí odlišujících se využíváním bezpečnostních nástrojů nedosáhl požadované hodnoty, stojí za povšimnutí, že skupina C (tj. obce bez obecní policie a MKDS) dosahuje nejmenší hodnotu koeficientu determinace a současně je v ní dosahována nejvyšší disperze. Proto i přes

nepotvrzení hypotézy β je vhodné velikost obce měřenou počtem obyvatel při rozhodování o alokaci rozpočtových výdajů brát v potaz.

Komparační analýza s využitím standardizovaných hodnot vybraných popisných charakteristik má za cíl najít společné a odlišné rysy z hlediska přístupů obcí k zajišťování bezpečnosti a veřejného pořádku a současně ukázat na účinnost alokovaných prostředků na danou oblast. Obce s vyšším počtem obyvatel předpokládají vyšší míru ohrožení kriminálními činy, spojenou bezpochyby i s vyšší mírou anonymity (potenciálních) pachatelů, a proto jí hodlají čelit adekvátními opatřeními spojenými s příslušnou finanční alokací. Snaha o minimalizaci ukazatele vázanosti finančních prostředků na kriminální čin by ve svém důsledku mohla vést ke zhoršení bezpečnostní situace v obci. Interpretace výsledku ukazatele V^* není jednoznačná: obsahuje jednak snahu po minimalizaci kriminálních činů (pak by při nulové kriminalitě byla financována pouze připravenost, resp. řešena situační prevence, matematicky by však ukazatel ztratil smysl), ale také snahu po minimalizaci BVP výdajů, což by však pravděpodobně mělo na bezpečnost v obci negativní vliv.

Z výsledků lze odvodit, že obce sice při svém rozhodování o alokaci finančních prostředků na danou oblast zohledňují dosahovanou míru kriminality, avšak je zřejmé, že toto rozhodování je ovlivněno i jinými aspekty (např. různé osobní i politické preference zastupitelů obce). Při rozhodování o podílu výdajů BVP na obecním rozpočtu by mělo být přihlíženo ke specifickým podmínkám jednotlivých obcí, viz např. obecní láněské místo.

Určitém omezením výzkumu je nedostupnost dat – jednak z hlediska prvků zkoumaných ukazatelů, jednak z hlediska časového, stejně jako nesoulad mezi vymezením obcí a obvodních policejních oddělení a tedy i ne zcela konzistentních statistických dat. Nezřídka je totiž obec zahrnuta do policejního obvodního oddělení jiné obce, což vedlo ke snížení počtu obcí v analyzovaném vzorku (z 29 na 19). Naopak inspirativním byly výše uvedené výsledky dříve provedených relevantních výzkumů zahraničních i českých odborníků.

Závěr

Na zajišťování bezpečnosti a veřejného pořádku jsou v České republice alokovány prostředky z veřejných rozpočtů nejen na úrovni státu a vyšších územně samosprávních celků (krajů), ale i samotných obcích, i když ne všech velikostí. U obcí do 1000 obyvatel tento typ výdajů není předpokládán, menší obce financují v oblasti bezpečnosti většinou pouze své dobrovolné hasiče.

Analýza prokázala, že na regionální úrovni (hodnoceno jak v rámci Evropy, tak v České republice) platí, že vyšší koncentrace obyvatelstva je spojena s vyšší intenzitou kriminality. Dedukovat z toho, že jednotlivé obce budou na oblast bezpečnosti a veřejného pořádku alokovat tím vyšší objem prostředků, čím větší počet obyvatel v nich žije, aby tak eliminovaly hrozbu vyšší míry kriminality, však nemá v reálu bezvýhradně opodstatnění. Výdaje BVP významně ovlivňuje, které nástroje pro zajišťování bezpečnosti a veřejného pořádku obec volí. Na sledovaném vzorku 29 obcí se ukázalo, že velmi blízkou úroveň BVP výdajů na obyvatele vykazují obce, které disponují jak obecní policií, tak MKDS. V této skupině obcí existuje i významná přímo

úměrná vazba mezi počtem obyvatel a výší výdajů BVP (přestože stanovené podmínky pro verifikaci hypotézy β nebyly splněny).

Vedle toho ale vzorek 19 obcí, které jsou současně policejními obvodními odděleními a za něž jsou sledovány potřebné statistické údaje, nevykazuje v požadované míře analogické relace mezi výdaji BVP na obyvatele, modifikovanou mírou kriminality a ukazatelem vázanosti finančních prostředků na kriminální čin. Obce přistupují z hlediska řešení otázek bezpečnosti a veřejného pořádku odlišně, byly identifikovány čtyři rozdílné přístupy.

Další výzkum této oblasti by se měl týkat jednak porovnání vývoje sledovaných parametrů v čase a v meziregionálním porovnání; byla by žádoucí i detailnější analýza výdajů BVP s případným využitím benchmarkingu. Prohloubení znalostí o daném problému by mohla napomoci i sonda do vnímání bezpečnosti a veřejného pořádku samotnými uživateli tohoto veřejného produktu, tj. obyvateli obce.

Poděkování

Článek byl zpracován s využitím dat soustředěných Ing. Alenou Sixtovou v rámci projektu SGSFES_2016_023 „Ekonomický a sociální rozvoj v soukromém a veřejném sektoru“.

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Kontaktní adresa

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Received: 18. 07. 2018, reviewed: 23. 11. 2018

Approved for publication: 08. 04. 2019

INVESTICE DO VĚDY A VÝZKUMU A PRODUKTIVITA PRÁCE V MSP V EUROZÓNĚ

R&D SUBSIDIES AND PRODUCTIVITY IN SMES IN THE EUROZONE

Radmila Krkošková

Abstract: *The paper contributes to the existing literature through analysis of relationship between labour productivity and government spending on research and development in the eurozone countries as a whole. In particular, small and medium enterprises should aim to increase the labour productivity and use the possibilities of funding from the structural funds.*

The purpose of this paper is to empirically investigate the relationship between labour productivity and government spending on research and development in the eurozone. In particular, its purpose is to investigate this relationship in the case of small and medium enterprises. By utilizing causality tests and error correction models, the results suggest that support of research and development is the cause of labour productivity growth in the long-term period. However, for the short-term period changes in labour productivity precede changes in government spending on research and development. Based on the findings, the study has several theoretical and practical implications.

The data sources were the Eurostat database. The data used have the character of annual time series in the period between 2004 and 2016. GRET software was used for the calculations.

Keywords: *ECM model, Eurozone, Granger Causality, Labour Productivity, R&D, SME, Solow Model, VAR Model.*

JEL Classification: *C01, L26.*

Úvod

Pojem eurozóna označuje ty státy Evropské unie, které přijaly euro jako svoji zákonnou měnu. Mezi stávajícími 28 členy EU se tak doposud stalo v 19 případech. Z hospodářského výkonu EU více než 70 procent připadá na eurozónu. Na území eurozóny žije více než 330 milionů obyvatel. MSP představují 99 % všech podniků v eurozóně. Definice malého a středního podniku je důležitá pro přístup k finančním prostředkům a podpůrným programům EU zaměřeným konkrétně na tyto podniky. MSP jsou definovány v doporučení EU 2003/361. Téma článku souvisí s programem Horizont 2020. Tento program má za cíl pokrýt celý proces od základního výzkumu až po inovativní produkty a procesy a jejich uvedení na trh. Horizont 2020 je komplexní program sdružující evropské nástroje podpory vědy, výzkumu a inovací. O výši investic do VaV informuje kapitola „Inteligentní růst“. Jsou zde uvedeny tři oblasti, ve kterých mají státy EU rezervy: inovace, vzdělání a digitální společnost. Oblast inovace se také zabývá investicemi do VaV, které jsou na nízké úrovni, a podíl soukromého sektoru na celkových investicích je nedostačující. V nových opatřeních ve srovnání s obdobím 2007-2013 se klade důraz na větší podporu MSP, jak uvádí ve zprávě Evropská komise (2015). Otázkou je, zda MSP budou investovat do VaV, a zda jim tato investice přinese vyšší produktivitu práce.

Jádrem práce je analýza dvou hypotéz, které se týkají vztahu mezi investicemi do vědy a výzkumu (VaV) a produktivitou práce (PP) v malých a středních podnicích (MSP) ve státech eurozóny. Jedná se o MSP v odvětví průmyslu, stavebnictví, obchodu a služeb. Není zde zahrnuto „finanční odvětví“.

Cílem práce je přijmout nebo zamítnout tyto hypotézy: H1: existuje dlouhodobý vztah mezi investicemi do vědy a výzkumu a produktivitou práce, H2: existuje krátkodobý vztah mezi investicemi do vědy a výzkumu a produktivitou práce. Tato práce rozšiřuje již existující články o investicích do VaV v závislosti na zvýšení PP.

Tento článek se zabývá vztahem mezi investicemi do VaV a PP ve státech eurozóny jako celku na rozdíl od autorů: Cin, et al., (2014), Karhunen, H., a Huovari, J. (2015), Irwin a Klenow, (1996), Criscuolo, et al., (2012), Cerqua and Pellegrini, (2014), kteří zkoumají tento vztah v těchto zemích: Korea, Finsko, USA, Velká Británie, Itálie.

1 Teoretická východiska

MSP jsou důležitou součástí zdravého hospodářství každého vyspělého státu. Proto je v zájmu každého státu co nejvíce podporovat vznik a rozvoj těchto společností. Počet MSP převažuje nad počtem velkých podniků. MSP jsou faktorem stability. Dokáží se ale také rychle a pružně přizpůsobit změnám, které mohou na trhu nastat, jak uvádí Veber and Srpová (2012).

Investovat do vědy a výzkumu je důležité v každém státě. Po programu Horizont 2020 přichází nový program Horizont Evropa. Program Horizont Evropa bude v období 2021-2027 představovat stěžejní nástroj podpory výzkumu, vývoje a inovací v EU. Prostřednictvím tohoto programu budou v EU výzkum, vývoj a inovace podpořeny souhrnnou částkou 97,6 mld. EUR, (Echo, 2018). Tento program bude také podporovat MSP. Předpokládá se tedy, že investice do VaV budou mít pozitivní vliv na efektivitu podniku.

Téma vztahů mezi investicemi do VaV a PP analyzovala řada autorů. Například práce Cin et al. (2014) empiricky prozkoumala dopady politiky na investice do VaV v korejských výrobních firmách. Autoři shledali, že existuje pozitivní vztah mezi investicemi do VaV a PP korejských MSP.

Karhunen a Huovari (2015) zkoumali vliv investic do VaV na PP. Výzkum byl proveden v letech 2000 až 2012 ve finských MSP. Nebyla prokázána pozitivní závislost na PP během pětiletého období po poskytnutí dotace na investice do VaV. Naopak, výsledky naznačovaly 2-4 % negativní dopad na roční růst produktivity MSP o jeden až dva roky později po investici do VaV.

Evropští politici aktivně podporují inovační programy zaměřené na podporu investic do VaV v MSP (Ortega-Argilés et al., 2009). Roste počet studií, které se zabývají vlivem výše investic do VaV na PP. Výsledky těchto studií nejsou jednoznačné. Vliv investic na VaV na PP je v USA nevýznamný (Irwin, Klenow, 1996). Stejně tak nebyla prokázána závislost mezi regionálními dotacemi a PP ve Velké Británii (Criscuolo et al., 2012) nebo v Itálii (Cerqua, Pellegrini 2014). Ve Finsku, jak uvádí Einiö (2014), mají investice do VaV z Evropského fondu pro regionální rozvoj pozitivní vliv na PP tři roky po poskytnutí dotace. Koski a Pajarinen (2015) hodnotí všechny dotace na podnikání ve Finsku a výsledky naznačují, že různé dotace (včetně investic do VaV) mají spíše negativní vliv na růst PP.

2 Metody

Ekonomická výkonnost země, vyjádřená velikostí hrubého domácího produktu na jednoho obyvatele (HDP/obyvatele) a dalšími ukazateli (míra růstu HDP, ekonomická úroveň, hrubý národní produkt, národní důchod, čistý ekonomický blahobyť), je nesporně ovlivňována investicemi do VaV. Mezi investicemi do VaV a ekonomickou úrovní jsou komplikované vzájemné vazby. Nicméně na základě dlouhodobých zkušeností jsou ve standardních ekonomikách v úrovni praktické politiky považovány investice do VaV za prorůstové investice a chápány jako faktor, který vede ke zvyšování PP. Má-li se PP zvyšovat, musí se MSP specializovat na obory, v kterých je účelné a efektivní využívat výsledky VaV.

2.1 Solowův-Swanův model

Při analýze ekonomického růstu je důraz kladen na produktivitu práce a lidské zdroje, vědu a výzkum jako zdroj technologického pokroku a kvalitu institucionálního prostředí jako důležitého determinantu podnikatelských aktivit.

Keynesiánské růstové modely byly v polovině 20. století zastíněny neoklasickými teoriemi růstu, z nichž nejznámější je růstový model R. M. Solowa. Neoklasické teorie hledaly vztahy mezi růstem produktu a růstem kapitálu a práce. Nedostatkem však bylo, že nevysvětlovaly zdroje hospodářského růstu. Technologický pokrok, jako zdroj růstu, byl zaveden do růstového modelu až ve 2. polovině 80 let, jak uvádí Holman (2002).

Růstový Solowův-Swanův model (Solow, 1956) je v podstatě rozšířením Cobb-Douglasovy produkční funkce o technologický pokrok, který má vliv na tvar produkční funkce v dlouhém období:

$$Y = F(K, A, L) \quad (1)$$

kde Y je produkt, K je kapitál, L je práce, A je úroveň technologie.

Funkce F má konstantní výnosy z rozsahu a platí zákon klesajících mezních výnosů. Solow uvažuje o zákonu klesajících mezních výnosů z kapitálu a to až do stálého stavu.

Z modelu vyplývá, že ekonomika roste s růstem produktivity práce (protože funkce F je rostoucí), ale už není schopen vysvětlit, proč některé země rostou rychleji a jiné pomaleji. Solowův model vede k následujícím tvrzením. Zvýšení úrovně používané technologie má příznivý účinek na produktivitu práce, růst produkce a růst zásob kapitálu. Průměrná produktivita práce roste v důsledku zavádění nových technologií přímo, ale i nepřímo. Pokud se ekonomika nachází ve stálém stavu, průměrná produktivita práce se rovná míře růstu technologického pokroku. Solowův model tedy dokazuje, že technologický pokrok je zdrojem neustále se zvyšujícího životního standardu, jak uvádí Mach (2001).

2.2 VAR/VECM model

Vector Autoregressive model (VAR) a Vector Error Correction model (VECM) umožňuje vyjádřit a analyzovat simultánní vztah mezi proměnnými. Arlt (1999) uvádí, že VAR analýza vychází z myšlenky, že všechny proměnné využité pro analýzu zvolené závislosti jsou náhodné a simultánně závislé. To znamená, že modelová struktura obsahuje pouze endogenní proměnné (kromě deterministické složky modelu), přičemž jejich maximální délka zpoždění je stejná.

Model VAR(p) lze zapsat v následující formě, kde se předpokládá, že $C_s = 0$ pro $s > p$:

$$Y_t = \eta + \sum_{s=1}^p C_s Y_{t-s} + U_t, \quad (2)$$

kde η ... je vektor konstant;

Y_t ... reprezentuje k proměnných modelu;

U_t ... je vektor náhodných složek modelu, kde $U_t \sim N(0, \sigma)$;

C_s ... je matice parametrů endogenních proměnných zpožděných o s období.

Zahrnutím dlouhodobého vztahu do (2) je získán VECM v následující podobě:

$$\Delta Y_t = \eta + \Pi Y_{t-1} + \sum_{s=1}^p C_s \Delta Y_{t-s} + U_t, \quad (3)$$

kde η ... je vektor konstant;

Y_{t-1} ... reprezentuje k proměnných modelu;

ΔY_t ... reprezentuje první diference k proměnných modelu;

U_t ... je vektor náhodných složek modelu, kde $U_t \sim N(0, \sigma)$;

Π ... je matice dlouhodobého vztahu; $\Pi = \alpha\beta^T$, kde α jsou odhadnuté parametry, které vyjadřují rychlost přizpůsobení systému a β je kointegrační vektor, resp. matice kointegračních vektorů;

C_s ... je matice parametrů endogenních proměnných zpožděných o s období.

Kočenda a Černý (2007) uvádí, že při konstrukci VAR modelu se předpokládá, že vztah mezi zahrnutými proměnnými je simultánní a symetrický. Nezbytným předpokladem pro odvození VAR modelu je stacionární povaha všech časových řad.

Časové řady lze analyzovat na základě jejich krátkodobých a dlouhodobých vztahů. V případě, že mezi časovými řadami existuje pouze krátkodobý vztah, je dostačujícím nástrojem pro analýzu tohoto vztahu VAR model. V případě, že je prokázána existence dlouhodobého vztahu mezi vybranými časovými řadami, lze pro analýzu použít VECM model. VECM model současně zachycuje a vyjadřuje krátkodobé i dlouhodobé vztahy. VECM model vychází z kointegračního přístupu, který modeluje nestacionární časové řady, jejichž dlouhodobý vztah je vyjádřen pomocí error correction mechanismu, jak také uvádí Stoklasová (2018).

Většina časových řad z oblasti makroekonomie a financí je nestacionární nebo integrována o řádu jedna I(1), jak uvádí ve studii Engle a Granger (1987). I(1) označujeme časovou řadu, jejíž první diference jsou stacionární. Z tohoto důvodu se provádí testování stacionarity dat neboli testy jednotkového kořene. V literatuře se často používá Augmented Dickey-Fuller test (ADF). ADF test umožňuje otestovat přítomnost jednotkového kořene na základě tří modelů. Model (4) představuje model náhodné procházky, model (5) obsahuje konstantu (μ), model (6) obsahuje konstantu (μ) a trendovou složku (t). Testované modely jsou definovány následujícím způsobem:

$$\Delta y_t = \gamma y_{t-1} + \sum_{i=1}^K \rho_i \Delta y_{t-1} + \varepsilon_t \quad (4)$$

$$\Delta y_t = \mu + \gamma y_{t-1} + \sum_{i=1}^K \rho_i \Delta y_{t-1} + \varepsilon_t \quad (5)$$

$$\Delta y_t = \mu + \beta t + \gamma y_{t-1} + \sum_{i=1}^K \rho_i \Delta y_{t-1} + \varepsilon_t \quad (6)$$

Zjištění řádu integrace jednotlivých časových řad vychází z nulové hypotézy: $H_0: \gamma = 0$, která říká, že časová řada obsahuje jednotkový kořen, tzn. že nesystematická složka časové řady je typu I(1). Proti nulové hypotéze je postavena alternativní hypotéza: $H_1: \gamma < 0$, která říká, že časová řada je stacionární.

2.3 Kointegrační analýza

Kointegrační analýza vychází z problematiky integrovaných procesů, kterými se poprvé komplexně zabývali Box a Jenkins. Kointegrační analýza zkoumá krátkodobou dynamiku a dlouhodobý vztah mezi proměnnými. Každý systém je vystaven neustálým šokům, z krátkodobého hlediska tedy nedosahuje rovnovážného stavu. I přesto však mezi jednotlivými časovými řadami může existovat vztah, který lze z dlouhodobého hlediska označit rovnovážným stavem. Arlt (2003) uvádí, že autoři Engle a Granger vyvinuli jednoduchý test kointegrace založený na testu stacionarity reziduí. Engle Grangerův přístup lze označit jako klasický přístup. Problém se objevuje v případě analýzy vztahu mezi více než dvěma proměnnými. Pak je lepší aplikovat Johansenův přístup. Výhodou Johansenova přístupu je to, že kromě testu kointegrace umožňuje explicitně řešit potenciální existenci více kointegračních vektorů.

Kointegrační analýza vychází z hledání nenulových tzv. vlastních čísel matice dlouhodobých vztahů (Π). Na základě tohoto testování je stanoven počet kointegračních vektorů v daném VECM modelu. Hodnot matice dlouhodobých vztahů (Π) je rovna počtu jejích nenulových vlastních čísel. Tento přístup využívá dvou testovacích kritérií: statistiku vlastních čísel (eigenvalue statistics) a statistiku stopy (trace statistics).

$$\lambda_{MAX}(r + 1) = -T \ln(1 - \lambda_{r+1}) \quad (7)$$

$$\lambda_{TRACE}(r) = -T \sum_{i=r+1}^N \ln(1 - \lambda_i) \quad (8)$$

K určení počtu kointegračních vazeb existují dvě kritéria. První kritérium (eigenvalue statistics) testuje platnost nulové hypotézy o existenci přesně r kointegračních vektorů oproti alternativní hypotéze vyjadřující výskyt $r+1$ kointegračních vektorů. Druhé testové kritérium (trace statistics) ověřuje platnost nulové hypotézy o existenci nejvýše r kointegračních vektorů oproti alternativní hypotéze, že se vyskytuje více než r vektorů. Výsledky druhého testového kritéria zachycuje Tab. 3.

3 Data

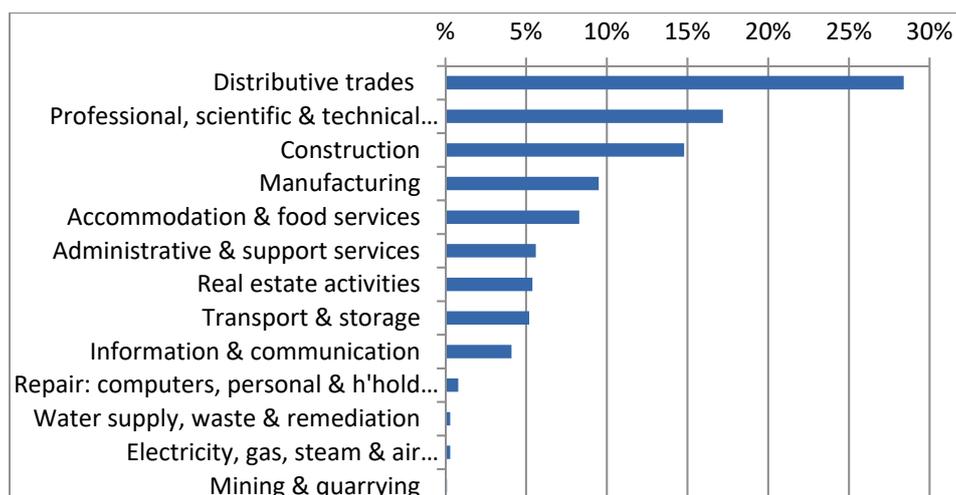
V praktické části článku jsou analyzována data získaná z database Eurostatu. Jedná se o roční data v období od roku 2004 do roku 2015. Investice do VaV pro státy eurozóny jsou označeny RD_EURO. Investice do VaV představují procento z hrubého domácího produktu, (Eurostat, 2017a). PP v eurozóně je označena LP_EURO. Produktivita práce v tomto případě je produktivita práce na zaměstnance za odpracovanou hodinu, (Eurostat, 2017c). Strukturu MSP v eurozóně v roce 2014 ukazuje následující Tab. 1 a Obr. 1. Tyto údaje se týkají "nefinančních podniků". Data se týkají firem v odvětví průmyslu, stavebnictví, obchodu a služeb. Celkový počet MSP v nefinanční podnikatelské ekonomice v eurozóně byl v roce 2015 odhadován na 16,5 milionu, jak je patrné z Tab. 1.

Tab. 1: Počet MSP v eurozóně (v miliónech)

Rok	2010	2011	2012	2013	2014	2015
Počet MSP	15,4	15,1	15,6	15,8	16,3	16,5

Zdroj: Eurostat (2017b)

Obr. 1: Struktura MSP v rámci nefinančních podniků



Zdroj: Eurostat (2017b)

MSP v eurozóně zaměstnávají 66,8 % zaměstnanců, (Eurostat, 2017b). Jedním z cílů strategie Horizont 2020 je, že by Evropská unie měla investovat 3 % HDP na VaV, jak se uvádí ve zprávě Evropská komise (2015).

Největší podíl hrubého domácího produktu investuje do výzkumu a vývoje Finsko. Tato země jako jediná překročila hranici tří procent. Rakousko, Belgie, Francie, Německo investují do VaV 2–3 %. Nejméně do VaV investují Kypr, Řecko, Lotyšsko, Litva, Malta a Slovenko, kde výdaje průměrně nepřekračují 1 %, jak se uvádí ve zprávě Evropská komise (2015). V dalším textu je analyzován vztah pro eurozónu jako celek.

4 Testování dlouhodobého a krátkodobého vztahu

Tato část článku se zabývá kointegračním testem modelu, který bude použit pro analýzu dlouhodobého a krátkodobého vztahu mezi investicemi do VaV a PP v eurozóně. Cílem je analyzovat tento vztah v případě MSP. Předpokládá se pozitivní vztah.

Byla zkoumána stacionarita časových řad a nebyla zamítnuta nulová hypotéza (H_0 : existuje jednotkový kořen), což naznačuje přítomnost jednotkového kořene v každé časové řadě, tedy nestacionaritu, což je předpokladem pro kointegrační test, jak uvádí Arlt a Arltová (2006). Pro testování stacionarity byl použit rozšířený Dickeyův-Fullerův test (ADF). Stacionarita byla zjištěna po první diferenci, jak je uvedeno v Tab. 2. Významnosti je míněna p-hodnota.

Tab. 2: ADF test

Data	t-statistika	Významnost	Výsledek
RD_EURO	- 2,37	0,368	Nestacionární ČŘ
LP_EURO	- 2,39	0,381	Nestacionární ČŘ
$D(RD_EURO)$	- 3,09	0,059*	Stacionární ČŘ
$D(LP_EURO)$	- 4,37	0,008***	Stacionární ČŘ

* statistická významnost na hladině významnosti 0,1

*** statistická významnost na hladině významnosti 0,01

Zdroj: program GRETL, vlastní zpracování

4.1 Testování dlouhodobého vztahu

Tato podkapitola se zabývá testováním první hypotézy, zda existuje dlouhodobý vztah mezi investicemi do vědy a výzkumu a produktivitou práce v malých a středních firmách ve státech eurozóny.

V této části se testuje počet kointegračních vztahů ve VAR(2) modelu pro endogenní proměnné (RD_EURO ; LP_EURO) pomocí Johansonovy metody, jak uvádí Johansen (1991). Trace test v Tab. 3 potvrzuje existenci 1 kointegračního vztahu pro VECM(1) model na hladině významnosti 5%, jak uvádí Johansen (1995). Jedná se o model, který obsahuje neomezenou úrovnovou konstantu a omezenou trendovou složku. Další informace lze najít v člancích Enders a Granger (1998), Enders a Siklos (2001). Hodnoty informačních kritérií: AIC (Akaiikovo informační kritérium) = - 3,66; SC (Schwarzovo informační kritérium) = - 3,36; LR (testovací statistika poměrem věrohodnosti) = 28,32.

Tab. 3: Kointegrační test stopy (Trace test)

Hypotéza: Počet Kointegračních vztahů	Vlastní číslo	Statistika stopy	Kritická hodnota (0,05)	Významnost
žádný*	0,474	6,408	15,494	0,0482
nejvíce 1	0,114	1,173	3,841	0,2792

* označuje zamítnutí hypotézy na hladině významnosti 0,05

Zdroj: vlastní zpracování

Existence jednoho dlouhodobého vztahu je dána kointegrační rovnicí:

$$EQ1 = RD_EURO_t - 0,121LP_EURO_t. \quad (9)$$

Kointegrační vektor vyjadřující rovnovážný vztah mezi RD_EURO a LP_EURO je (1,000, - 0,121). To znamená, že 1% nárůst v LP_EURO způsobí zvýšení RD_EURO o 0,121%. Tento závěr je v souladu s předpokladem, protože mezi proměnnými se předpokládá pozitivní vztah.

4.1.1 Je změna v PP příčinou změny investic do VaV?

V prvním modelu se testuje, zda je změna v PP malých a středních podniků v eurozóně příčinou změny investic do VaV. Výsledky modelu VEC uvádí Tab. 4.

Tab. 4: Výsledky modelu 1: Je změna v PP příčinou změny investic do VaV?

	Koeficienty	Stand.chyba	t-poměr	Významnost
<i>Konstanta</i>	4,174	9,008	0,463	0,6594
$D(RD_EURO(-1))$	- 0,054	0,623	- 0,086	0,9337
$D(LP_EURO(-1))$	- 0,005	0,046	- 0,113	0,9137
<i>ECI</i>	- 0,288	0,625	- 0,461	0,6614
DW statistika	1,923			

Zdroj: vlastní zpracování

Rovnice modelu 1:

$$D(RD_EURO_t) = \beta_0 + \beta_1 \cdot D(RD_EURO_{t-1}) + \beta_2 \cdot D(LP_EURO_{t-1}) + \beta_3 \cdot rez_{t-1} + \varepsilon_t, \quad (10)$$

kde $\varepsilon_t \sim N(0, \sigma)$, rez_t je reziduální složka.

$$\begin{aligned} D(RD_EURO_t) = \\ = 4,174 - 0,054 \cdot D(RD_EURO_{t-1}) - 0,005 \cdot D(LP_EURO_{t-1}) - 0,288 \cdot rez_{t-1} + \varepsilon_t \end{aligned} \quad (11)$$

Hodnota koeficientu EC1 není statisticky významná, takže změny v PP v MSP v eurozóně nezpůsobí dlouhodobé změny v investicích do VaV.

4.1.2 Je změna výše investic do VaV příčinou změny PP?

Ve druhém modelu zkoumáme, zda je změna výše investic do VaV příčinou změny PP v MSP v eurozóně. Výsledky modelu VEC uvádí Tab. 5.

Tab. 5: Výsledky modelu 2: Je změna výše investic do VaV příčinou změny PP?

	Koeficienty	Stand.chyba	t-poměr	Významnost
<i>Konstanta</i>	123,164	92,954	1,325	0,2335
<i>D(RD_EURO(-1))</i>	0,459	0,221	2,086	0,0531*
<i>D(LP_EURO(-1))</i>	0,021	0,009	2,163	0,0437**
<i>EC2</i>	4,565	1,656	2,755	0,0414**
DW statistika	1,79			

** statistická významnost na hladině významnosti 0,05

* statistická významnost na hladině významnosti 0,1

Zdroj: vlastní zpracování

Rovnice modelu 2:

$$D(LP_EURO_t) = \beta_0 + \beta_1 \cdot D(RD_EURO_{t-1}) + \beta_2 \cdot D(LP_EURO_{t-1}) + \beta_3 \cdot rez_{t-1} + \varepsilon_t, \quad (12)$$

kde $\varepsilon_t \sim N(0, \sigma)$, rez_t je reziduální složka.

$$D(LP_EURO_t) = 123,164 + 0,459 \cdot D(RD_EURO_{t-1}) + 0,021 \cdot D(LP_EURO_{t-1}) + 4,565 \cdot rez_{t-1} + \varepsilon_t \quad (13)$$

Příčinná souvislost je zachycena statisticky významnou hodnotou EC2 (4,565), což naznačuje, že v případě dlouhodobé nestability PP malých a středních podniků v eurozóně se tato proměnná změní o 456,5% během jednoho roku. Jinými slovy, úplné odstranění nestability by trvalo přibližně 0,2 roku (1/4,565), což znamená 2,4 měsíce. Pokud jde o regresní koeficienty, pak lze tvrdit, že PP pozitivně souvisí s investicemi do VaV, a to s ročním zpožděním, tedy růst investic do VaV je po jednom roce následován růstem PP. A to je v souladu s předpokladem, že mezi proměnnými se předpokládá pozitivní vztah.

Tab. 6 uvádí výsledky testování předpokladů modelu (13). Pro testování normálnosti se aplikuje Doornik – Hansenův test, který nezamítá nulovou hypotézu normálnosti reziduí. Test Ljung - Box nezamítá nulovou hypotézu o absenci autokorelace. Test ARCH - LM nezamítá nulovou hypotézu absence heteroscedasticity. Testy byly provedeny na hladině významnosti 0,05.

Tab. 6: Předpoklady modelu

	Autokorelace	Heteroskedasticita	Normalita
Nulová hypotéza	H ₀ : není	H ₀ : není	H ₀ : normalita
Test	Ljung – Box	ARCH – LM	Doornik – Hansen
Významnost	0,976	0,553	0,848

Zdroj: vlastní zpracování

Lze konstatovat, že hypotéza H1 byla potvrzena.

4.2 Testování krátkodobého vztahu

Tato podkapitola se zabývá testováním druhé hypotézy, zda existuje krátkodobý vztah mezi investicemi do VaV a PP v MSP ve státech eurozóny.

Obecně platí, že Grangerův test kauzality je konstruován tak, že odhaluje vzájemný pohyb časových řad prostřednictvím časových změn, nikoliv doslovně "kauzalitu" v tom smyslu, že jedna časová řada je příčinou druhé. Význam výrazu "Grangerova příčina" je ekvivalentní výrazu "předcházet" více než "příčina". Výsledky v Tab. 7 ukazují, že změny v LP_EURO předcházejí změnám v RD_EURO o 3 roky. Změny v LP_EURO lze tedy použít jako prediktor krátkodobého trendu RD_EURO.

Tab. 7: Grangerův test kauzality – Významnost

	Zpoždění		
	1	2	3
Nulová hypotéza			
D(RD_EURO) není příčinou D(LP_EURO)	0,2576	0,7986	0,9195
D(LP_EURO) není příčinou D(RD_EURO)	0,4498	0,1378	0,0498

Zdroj: vlastní zpracování

Lze konstatovat, že hypotéza H2 byla potvrzena.

5 Diskuse o výsledcích výzkumu

Teorie dosud neobjasnila, zda jsou investice do VaV příčinou růstu PP nebo jejím důsledkem.

Výsledky této práce ukazují, že existuje dlouhodobý vztah mezi investicemi do VaV a PP a lze tvrdit, že v eurozóně je změna ve financování VaV příčinou změny PP. V opačném směru tzn., zda je změna v PP příčinou změny investic do VaV, tento vztah nebyl potvrzen. V krátkém období bylo prokázáno, že změny v PP předcházejí změnám v investicích do VaV.

Dosažené výsledky odpovídají studii Cin et al. (2014), ve které autoři prokázali existenci pozitivního vlivu investic do VaV na PP. Lze konstatovat, že dosažené výsledky částečně potvrzují i výsledky studie Lach (2002), která uvádí, že dotace stimulují PP pouze v malých firmách. Podobný závěr uvádí i González a Pazó (2008), kteří uvádějí, že veřejné financování je efektivnější u malých firem a u firem s nízkou technologií.

Na druhé straně výsledky tohoto článku nepotvrzují poznatky získané jinými autory: Karhunen a Huovari (2015), Koski a Pajarinen (2014), Irwin a Klenow (1996), Criscuolo a kol. (2012), Cerqua a Pellegrini (2014).

Většina studií, např. Catozzella and Vivarelli (2011), Cappelen et al. (2012), Czarnitzki and Licht (2006), Garcia and Mohnen (2010), Stoklasová (2017), které se zabývají touto problematikou, uvádí, že samoúčelné zvyšování investic do VaV není zárukou, že PP bude růst.

Závěr

Tento článek analyzoval vliv investic do VaV na PP v MSP v zemích eurozóny. Cílem práce bylo přijmout nebo zamítnout tyto hypotézy: H1: existuje dlouhodobý vztah mezi investicemi do VaV a PP; H2: existuje krátkodobý vztah mezi investicemi do VaV a PP v MSP v eurozóně. Obě hypotézy byly přijaty, tzn., že mezi výši investic do VaV a PP existuje jak dlouhodobý, tak krátkodobý vztah. V dlouhém období je

změna výše investic do VaV příčinou změny PP. V krátkém období bylo prokázáno, že změny v PP předcházejí změnám výše investic do VaV o tři roky. Změny v PP lze tedy použít jako prediktor krátkodobého trendu změn výše investic do VaV. Přínosem článku byla analýza vztahu výše investic do VaV a PP ve státech eurozóny jako celku.

Výsledky Johansenova kointegračního testu potvrdily existenci kointegračního vztahu a potvrdil se také předpoklad existence dlouhodobého vztahu mezi analyzovanými časovými řadami. Použitý VEC model umožnil detekovat jak dlouhodobé, tak krátkodobé vztahy mezi zkoumanými časovými řadami. Výsledný model (13) ukázal, že existuje pozitivní vztah mezi PP v MSP v eurozóně a investicemi do VaV.

Príspevek prispíva k existujúcej literatúre prostredníctvom analýzy vztahu medzi investicemi do VaV a PP v zemích eurozóny jako celku. Zejména by tedy měly MSP usilovat o zvyšování PP a měly by využívat možnosti čerpání financí ze strukturálních fondů. Protože přímé podpory nejsou jediným nástrojem podpory podnikání, zůstává na jednotlivých státech, aby se pokusily vytvářet příznivější podmínky, které by ovlivnily kvalitu podnikatelského prostředí.

Poděkování

Tento článek vznikl za podpory Ministerstva školství, mládeže a tělovýchovy ČR v rámci Institucionální podpory na dlouhodobý koncepční rozvoj výzkumné organizace v roce 2018.

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Received: 22. 03. 2018, reviewed: 31. 08. 2018

Approved for publication: 08. 04. 2019

MOBILIZATION OF DOMESTIC RESOURCES FOR ECONOMIC DEVELOPMENT FINANCING IN NIGERIA: DOES TAX MATTER?

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Abstract: *The vagaries of flow of external financing and its negative impact on the sustainable financing of development in developing countries has made it expedient that developing countries look inward to domestic resources as a reliable and sustainable source of financing development as well as achieving sustainable economic growth and development. Nigeria as a developing country has heeded this policy option and has initiated different policies and programmes towards strengthening her domestic resource mobilization through improved taxation and non-taxation revenues. This study seeks to investigate whether tax matters to domestic revenue mobilization for development financing in Nigeria. Using time series data sourced from the Central Bank of Nigeria (CBN) and World Bank data base and applying Autoregressive Distributed Lag Model and Error Correction Model, the study found that lagged values of tax and total export matter in domestic resource mobilization. The study also found that certain lagged values of taxation displayed an inverse relationship with development which suggest some level of tax evasion, weak administrative tax system as well as official corruption. On the strength of the findings, the study recommended that government should intensify her tax drive through rationally expanding the tax base through creation of employment, closing loopholes for tax evasion and official corruption as well as reduced over-reliance on crude oil revenue which engenders resource curse. In addition, the government should re-enforce the Freedom of Information (FOI) Bill to promote information sharing that will ensure compliance to tax laws by tax payers.*

Keywords: *ARDL, Domestic Resource Mobilization, Taxation, Economic Development, Financing.*

JEL Classification: *F63 H20 H27*

Introduction

Domestic resource mobilization (DRM) which entails the generation of savings from domestic resources and their allocation to economically and socially productive investments has remained a key precursor to achieving the ambitious sustainable development goals such as poverty reduction (World Bank, 2016; Fakile, Adegbe and Faboyede, 2014). This was reaffirmed by the 2015 Addis Ababa Action Agenda that mobilization and effective use of domestic resources, underscored by the principle of national ownership, are central to achieving the sustainable development goals (United Nations Economic Commission for Africa-ECA, 2016). Financing development has been a key subject of discussion at the international arena; by both developed and developing economies alike. It is the effort made by government through its expenditure to achieve its developmental objectives. It is the process of contributing to the course of a project, in the form of investment, for the well-being of its citizens.

Developed countries are concerned with how to assist developing countries to achieve internal and international development goals and objectives through aids, loans, grants, etc. On the flip side, over the decades, developing countries are faced with enormous

development challenges and have therefore determined that they must build capacity to achieve sustainable growth in their infrastructure, combat corruption, and attract foreign direct investment and develop transparent financial systems as a sure way of achieving national economic objectives and international development goals (OECD, 2009).

To achieve sustainable domestic economic growth and development, financial policies made by developing countries must be designed to align with both national and international objectives. Finance plays prominent role in achievement of these objectives especially for developing economies (Cournede and Denk, 2015). There are different sources of development finance. These include; debt (domestic and foreign), Official Development Assistance (ODA), taxation, revenue from export sales, savings (household, firms and government), aids and grants, private sector financing, e.t.c (Katseli 2005; Gurria, 2008; Kemal, 2000; Kuada, 2013). However, of all the sources of domestic development finance, taxation has been noted as central to achieving the ambitious interrelated or integrated development objectives as envisioned by developing countries (OECD 2009). This perhaps is because taxation provides governments with the funds needed to invest in development and in the longer term, offers an antidote to aid dependence in the poorest countries and predictable fiscal environment to promote growth (OECD, 2009; Moravec, Kukolava, Regnerova and Ptacek 2016)). Furthermore, besides creating the enabling room for development, taxation is integral to the ‘good governance agenda’. This occurs through the stimulation of process of negotiation and bargaining between the States and their citizens thereby playing central role to more effective and accountable States.

Most African countries especially Sub-Saharan countries (SSA) rely more on external finances than domestic finances (Kuada, 2013) to the neglect of developing domestic resource channels. (Gutman, Sy and Chattopadhyay, 2015) noted that Sub-Saharan African Countries need to raise domestic finance to augment the progress being made in fiscal revenue. It therefore implied that Government of these countries must look inward for other means of financing development as there are diverse sources of finance for developmental purposes. Other sources of mobilizing revenue must be identified by these governments and not rely on foreign sources. Moreover, there has been improvements in revenue raising effort of Sub-Saharan African countries in the last few years, yet, these countries still mobilize less than 17% of their GDP in tax revenue which is far cry from the 35% average by OECD countries (OECD, 2009). Inter-Agency Task Force on Financing for Development (2016) noted that as at 2014, most low-income-countries of the world have their tax revenue share of GDP less than 15%.

In Nigeria in particular, the situation is not different. There was over-dependence on external finances (external debt), revenue from oil exploration among other sources to finance its developmental projects and policies and ensured a sustainable growth path. In recent years, Nigeria had faced challenges of financing its development given the revenue shock caused by decline in world oil price in 2016. This had led to a decline in government development expenditures, thereby leaving development financing gaps in all sectors of the economy. This has increased government deficit financing with external debt profile rising from 3,627.50 million USD in 2009 to 15,050 million USD in the second quarter of 2017. This has its attendant negative contemporaneous and intertemporal generational effects. To reverse this trend, Nigeria government has initiated some policies and programmes geared towards strengthening DRM. This step follows from research evidence that the only reliable and sustained sources of

government revenue are taxes and some non-tax revenue instruments, such as royalties and resource rents from extractive industries, to a limited extent, user fee for public services, generally delivered by local government (Junquera,-Varela, Verhoeven, Shukia, Haven, Awasthi, and Moreno-Dodson, 2017).

1 Statement of a problem

The clamour for DRM for economic development financing of developing economies has made countries to start looking inward for resource mobilization. The Nigeria government has recognized the fact that external resources such as Aid, Foreign Direct Investment and other sources may not provide a sustainable means of financing Nigeria ambitious development goals-both the sustainable development goals and that of becoming a major world player in the year 2030. In addition, there has been negative impact of the declining global oil price on the Nigerian economy. Given these scenarios, Nigeria government has shifted emphasis; focusing more on DRM through tax and non-tax revenues through policies and programmes. Nigerian government has carried out several reforms and restructuring and revamping of the tax system with the sole objective of making it its main source of revenue for financing its developmental projects rather than relying more on crude oil sales. For instance, the strengthening of the operation of the Federal Inland Revenue Services (FIRS) through improvement in tax administration, the introduction of the Tax Identification Number (TIN), the current Voluntary Assets and Income Declaration Scheme (VAIDS) are all parts of effort designed by government to raise the contribution of tax-to-GDP in the national economy.

Despite the various effort by government, it is yet to be clear whether tax matters in DRM in Nigeria. Moreover, while in some developing countries there have been positive results with massive increase in domestic revenue –direct and indirect tax, natural resource revenue (Runde, Savoy, and Perkins, 2014), there is yet to be sufficient empirical evidence in Nigeria on the place of tax in DRM for development financing beyond some anecdotal evidence. Hence, a key policy concern is whether tax matters in DRM for financing development in Nigeria? This forms the objective of the present study; to investigate whether tax matters to DRM in financing development in Nigeria.

2 Literature Review

There are plethora of studies on external sourcing of finance for economic development of developing countries, with its challenges and effects (debt burden, debt overhang, crowding out effects of debt, etc) on these economies, yet few studies have been carried out on DRM especially for developing countries and low-income-countries. This section explored some of the studies relating to domestic revenue mobilization.

Ovunda (2018) in examining burning issues in the Nigeria tax system and tax reforms on revenue generation, using Rivers State as a case study, revealed that tax reform has positive relationship with and influence revenue generation significantly.

Similarly, Nwadozie, Munthali Nantchouany and Diawara (2017) in their study on the capacity aspect of DRM identified weak tax regulation, tax evasion in informal sectors and agricultural sector, among others as capacity challenges in the mobilization of domestic resources. This idea was corroborated by Johnson (2016) in his study on

capacity building for DRM in Africa. He identified weaknesses of tax policy, among others as one of the main constraints inhibiting capacity building for DRM in Africa.

A study by Morrissey (2015) on aid and DRM in SSA countries established a link between aid and tax revenue. He noted that aid discourages tax effort when seen politically as a low cost of sourcing revenue, unless otherwise, seen from different perspectives (policies cum reforms). He further established that country studies revealed that aids associated with efficient tax reforms increased tax revenue. A similar study done by Mascagni (2016) corroborated that of Morrissey (2015). It was also observed that aid positively correlates tax revenue. This conclusion was reached from a study on Ethiopia.

Ayoki, Obwona, and Ogwapus (2005) assessed tax reforms and domestic revenue mobilization in Uganda and found that tax contributes to domestic revenue mobilization but at the same time with discriminating coefficients between direct and indirect taxes. The study by Fakile et al. (2014) also corroborates the finding that tax revenue contribute to domestic revenue mobilization

Ohemeng and Owusu (2013) noted that the quest to mobilize revenue domestically has resulted in many tax reforms in Ghana and other countries. They adopted social learning theory and RA (revenue authority) model in their study.

Bhatt and Meerman (1978) conducted a study on the role financial institutions play alongside government policies in DRM of developing countries. They identified tax expenditure as part of government policies, linking it to government savings and financial institutions at large. It was concluded that government policies (tax expenditure) and financial institutions play major role in DRM.

Smith and Wahba (1995) focused on role played by government finance (taxes) in economic development of 56 developing countries. The empirical result showed that tax (government finance) played a significant role in the development of these countries

3 Method

The study adopted ex-post facto research design and secondary sources of information/data were used. Data were sourced from Central Bank of Nigeria online Statistical Bulletin, 2016 and World Bank online data on Nigeria, 2016. Variables used include Gross Domestic Product (GDP) as a proxy for economic development (dependent variable), Taxation and Total Export variables (independent variable) as proxy for internal resource mobilization, all from 1970 to 2016. The choice of these variables lied in the fact that Nigeria generates its revenue internally from sales of its domestic resources (crude oil and their non-oil products: agriculture, manufacturing, mining and services), to outside world (export), and through taxation (direct and indirect tax). The value of GDP used is GDP at constant basic prices which does not incorporate indirect taxes. This takes care of the assumption of taxes revenue being a component of GDP. Also, for the assumption of export value being a component of GDP, the data used is that computed by the ITS (International Trade Statistics) from customs Bills of Entry (BE), showing the values and quantities of goods exported (Central Bank of Nigeria, 2005). This detached the components of taxes and export from GDP, thereby making the variables (taxes and export) independent of GDP.

The method chosen to analyse the data is bounds testing method of analysing level relationship and ADRL (Autoregressive Distributed Lag) by (Pesaran, Shin and Smith, 2001). The choice lied in the fact that a level relationship can be determined without

ascertaining the order of integration of the variables, that is, if they are stationary at levels or at first difference. (Pesaran, Shin and Smith, 2001) stated that ‘**The asymptotic distributions of these statistics (F-and t-statistic) are non-standard under the null hypothesis that there exists no level relationship, irrespective of whether the regressors are I(0) or I(1)**’. Therefore, the existence of a level relationship between variables can be tested irrespective of the state of the regressors, whether purely integrated of order zero, order one, or mutually cointegrated as this will help reduce the degree or rate of uncertainty in the analysis and loss of information in the process of differencing at either first or second differencing. But for the avoidance of doubt, the study tested the stationarity status of the variables using Augmented Dickey-Fuller unit root test

Error Correction Mechanism (ECM) alongside Autoregressive Distributed Lag Model (ARDL) was used to test the significance of the lagged variables and their speed of adjustment to equilibrium in the course of displacement from equilibrium position. To ascertain the reliability of the results, relevant diagnostic tests (Serial Correlation LM test and CUSUM Stability Test) were carried out.

It has been observed that time series data/variables give spurious results when estimated with OLS technique. To correct this abnormality, unit root and cointegration tests are conducted. The standard DF(Dickey-Fuller) test is estimated as;

$$y_t = \phi y_{t-1} + x_t \beta + \varepsilon_t \quad (1)$$

From equation (1), subtract y_{t-1} from the two sides

$$\Delta y_t = \Omega y_{t-1} + x_t \beta + \varepsilon_t \quad (2)$$

where $\Omega = \phi - 1$

The null hypothesis can be written as;

$$H_0 : \Omega = 0, \text{ otherwise,}$$

$$H_0 : \Omega \neq 0.$$

The validity of Equation (2) lies in the fact that the series is AR(1). If this doesn't apply i.e. the violation of error term, the application of the ADF test for stationarity becomes the correcting measure. Thus;

$$\Delta y_t = \Omega y_{t-1} + x_t \beta + \check{Z}_1 \Delta y_{t-1} + \check{Z}_2 \Delta y_{t-1} + \dots + \check{Z}_p \Delta y_{t-p} \mu_t \quad (3)$$

Equation (3) helps to eliminate the serial correlation in the residuals.

The null hypotheses for the level testing under the bound testing procedure between y_t and x_t as developed by Pesaran, Smith and Shin (2001) is shown below;

$$H_0: \theta_{yy} = 0, H_0: \theta_{yx} = 0, \text{ otherwise,}$$

$$H_0: \theta_{yy} \neq 0, H_0: \theta_{yx} \neq 0.$$

The bound test also allows for $\theta_{yy} \neq 0$, $\theta_{yx} = 0$ and vice versa. This implies that the variables can be of different orders i.e. I(0) or I(1) as long as Δy_t is I(1). With the bound testing of the null hypothesis $H_0: \theta_{yy} = 0$, $H_0: \theta_{yx} = 0$, if the value of the Wald test computed falls within the critical value bounds, the decision on the level relationship becomes inconclusive. If it falls outside the critical level (below the lower bound or above the upper bound), a conclusion is reached whether to accept or reject the null hypothesis.

The conditional ECM is given as

$$\Delta y_t = \alpha_0 + \theta_{yy}y_{t-1} + \theta_{yx}x_{t-1} + \sum_{t=1}^{p-1} v_t \Delta z_{t-1} + \Gamma \Delta x_{t-1} + \mu_i \quad (4)$$

This can be rewritten as

$$\Delta y_t = c_0 + c_1 x_t + c_2 (Y - \beta_t X)_{t-1} \quad (5)$$

where,

Δy_t = dependent variable,

x_t = vector of independent variables

$(Y - \beta_t X)_{t-1}$ = cointegration model stationary residuals

Based on the above, the model for the study is specified as;

$$\ln GDP = \beta_0 + \beta_1 \ln TAX + \beta_2 \ln TEXPO + U_i \quad (6)$$

where;

GDP = Gross Domestic Product, a proxy for economic development

$TEXPO$ = Total Export (oil and non-oil export)

TAX = Taxation

\ln = logarithm

The conditional ECM is thus specified as;

$$D \ln GDP = \beta_0 + \beta_1 D \ln TAX_{t-1} + \beta_2 \ln TEXPO_{t-1} + U_i \quad (7)$$

where,

$D \ln GDP$ is the difference of the log value of GDP

$D \ln TAX_{t-1}$ is the vector of the lag values of tax as an independent variable

$\ln TEXPO_{t-1}$ is the vector of the lag values of export as an independent variable

β_0, β_1 and β_2 are coefficients

4 Problem Solving

The results for the study are shown in the tables below. Tab. 1 is the lag length selection which was done using Least Square method. Tab. 2 is the unit root test using ADF test Tab. 3 is the Pesaran Bound Test (Wald Test) of determining level relationship among the variables. Tab. 4 is the Error Correction Mechanism (ECM), establishing the relationship between taxation and development financing, and determining the speed of adjustment to equilibrium in case of any displacement. Relevant preliminary tests (CUSUM test and Breusch-Godfrey Serial Correlation Test) were done to ascertain the stability of the model and the presence of serial correlation as shown in fig. 1 and Tab. 5. Tables 6 and 7 show the Wald Test of Short Run Causality for Taxation and Total Export on Economic Development.

Tab. 1: Selection of Lag order of the Economic Development Financing Equation

	Serial Correlation LM Test				
Lag Order	AIC	SBC	Obs*R-Squared	Prob Value	Decision
1	-2.61	-2.33	3.15	0.2078	N/A
2	-2.52	-2.12	12.65	0.0018	SC
3	-2.54	-2.00	19.23	0.0001	SC
4	-2.62	-1.95	6.35	0.040	SC
5	-3.09	-2.29	3.27	0.195	N/A
6	-3.45	-2.53	15.19	0.0005	SC

N/A (Not Available), SC (Serial Correlation)

Source: Authors analysis

The result in Tab. 1 revealed that lag order 1 and 5 had no serial correlation, judging from their probability values (0.2078 and 0.195 respectively) while Lags 2, 3, 4 and 6 are serially correlated. Among lags 1 and 5, the best lag order to be chosen is that with the lowest AIC and/ or SBC value, and this results in the selection of lag length lag order 5, with AIC of -3.09 and SBC of -2.29.

Unit Root Test

As noted earlier, the choice of the bound testing method of analysis by Pesaran, Shin and Smith (2001) lied on the fact that a long-run relationship can be determined without ascertaining the order of integration of the variables. For the benefit of doubt and for the robustness of the results, the order of integration of the variables was ascertained as shown in Tab. 2.

Tab. 2: Unit Root Test (ADF Test)

Variables	Levels	First Difference	Decision
<i>LnGDP</i>	0.827803	-5.751903	I(1)
<i>LnTEXPO</i>	-1.351984	-6.913035	I(1)
<i>LnTAX</i>	-2.633312	-7.092141	I(1)

ADF Critical Value = 2.92

Source: Authors result

The result in Tab. 2 shows that all the variables are integrated of order one (1), judging from the values of the first difference which is greater than the ADF critical value of 2.92. At levels, the ADF test statistics is less than the ADF critical value. Therefore, it can be inferred that the variables are stationary at first difference.

Tab. 3: Bounds Testing for the existence of level relationship (Wald Test)

		Critical Value Bounds at 0.05		
Lag Order	F-statistics/ Prob.	Lower Bound I(0)	Upper Bound I(1)	Decision
5	13.94423/ 0.0000	3.79	4.85	Existence of a level relationship

Source: Authors analysis

Tab. 3 shows that the value of the F-statistic (13.94423) lied above the upper bound value of 4.85 at lag length or lag order 5. In other words, the value of the F-statistics is greater than upper bound value Therefore, we reject the null hypothesis of no level relationship between variables and state that a long-run relationship exists between the variables. Thus, we conclude that a level relationship exists between the variables used for this study.

Tab. 4: ECM Form of ARDL for Economic Development Financing
Dependent Variable: lnGDP

Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	0.016564	0.012011	1.379069	0.1784
$D(\ln GDP(-1))$	0.491003	0.139735	3.513818	0.0015
$D(\ln TAX(-3))$	-0.010053	0.007340	-1.369652	0.1813
$D(\ln TAX(-4))$	0.003493	0.007222	0.483636	0.6323
$D(\ln TAX(-5))$	-0.007509	0.006332	-1.185869	0.2453
$D(\ln TAX(-6))$	-0.032130	0.006383	-5.033684	0.0000
$D(\ln TEXP(-1))$	0.019766	0.020202	0.978385	0.3360
$D(\ln TEXP(-2))$	-0.036829	0.020723	-1.777216	0.0860
$D(\ln TEXP(-3))$	0.051815	0.021821	2.374556	0.0244
$D(\ln TEXP(-4))$	-0.030470	0.022172	-1.374213	0.1799
$ECM(-1)$	0.957583	0.277208	-3.454386	0.0017

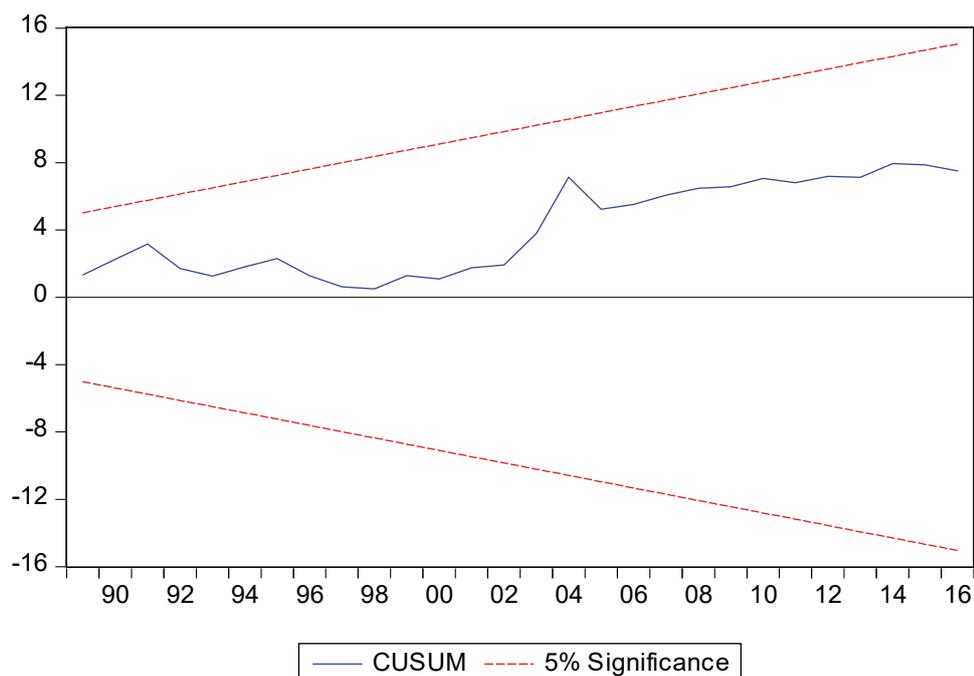
$R^2 = 66\%$, Adj. $R^2 = 54\%$, F-statistic – 5.646977(p-value of 0.000118), AIC = -3.047062, SC = -2.582620

Source: Authors result

The result in Tab. 4 shows that the first lagged value of GDP [$D(\ln GDP(-1))$] is statistically significant in explaining the current value of GDP (dependent variable), with a probability value (p-value) of 0.002. The sixth lagged value of tax [$D(\ln TAX(-6))$] is also negative and statistically significant in explaining current GDP value, with p-value of 0.0000. On the other hand, the third lagged value of Total Export [$D(\ln TEXP(-3))$] is statistically significant in explaining current GDP value. The other variables are not statistically significant. The ECM coefficient (-0.9575) with p-value of 0.002, is largely negative and statistically significant, implying that the speed of adjustment to equilibrium in the cause of any displacement is 96%. R-squared of 66% shows that 66% of the dependent variable is explained by the independent variable. This implies goodness of fit in the result. F-statistic of 5.646977 with a probability value of 0.000 shows that the explanatory variables are statistically significant in explaining the dependent variable

It is necessary to ascertain the stability of the variables used and this was done using CUSUM Stability Test shown in fig. 1.

Fig 1: CUSUM Stability Test of Economic Development Financing Equation



Source: Authors result

The CUSUM Stability Test revealed that the variables are stable, judging from the CUSUM line which lies between the 5% significance lines. Thus, economic development equation is stable, effortlessly passing the 5% significance level.

On the other hand, Breusch-Godfrey Serial Correlation Test was also used to test for the presence of serial correlation in the model as shown in Tab. 5.

Tab. 5: Breusch-Godfrey Serial Correlation L.M Test

Test	Value	Prob.
F-statistic	1.212385	0.3132
Obs*R-squared	3.296231	0.1924

Source: Authors result

The result of the Breusch-Godfrey Serial Correlation LM Test shows that the Observed R-Squared is 3.296231 (ρ -value = 0.1924). This implies that no serial correlation exists in the model. Thus, we accept the null hypothesis of no serial correlation in the model. Therefore, we can confidently accept the result from the Error Correction Model.

4.1. Short run Causality of Economic Development Financing Equation

To determine the short run causal relationship between the dependent and the independent variables, the study applied Wald test as shown below in tables 6 and 7.

Tab. 6: Wald Test of Short Run Causality for Taxation

Test Statistic	Value	Df	Prob
F-statistic	5.333899	3. 29	0.0047
Chi-square	16.00170	3	0.0011

Source: Authors result.

Tab. 6 result indicates a short run causality between all the lagged values of taxation and economic development. This implies that all the lagged values of tax put together can cause economic development. Therefore, income or revenue from tax can be used to finance economic development. This conclusion was reached from the F-statistic value of 5.333899 with a ρ -value of 0.0047.

Tab. 7: Wald Test of Short- Run Causality for Total Export

Test Statistic	Value	Df	Prob
F-statistic	3.498257	4, 29	0.0190
Chi-square	13.99303	4	0.0073

Source: Authors' result.

Tab. 7 on the other hand revealed a short run causal relationship between the lags of total export and economic development, judging from the F-statistic value of 3.498257 with ρ -value = 0.02. This implies that income generated from export sales can also be used to augment Tax in financing economic development in Nigeria.

5 Discussion

The analysis revealed the robustness of the result. The result of the short-run causality for taxation Wald test in Tab. 6 suggests that tax revenue matters in domestic mobilization of resources for development financing judging from the significance of the F-statistic as shown in Tab. 6. The result corroborates earlier studies by (Ovunda 2018; UNECA, 2016; Runde, Savoy, and Perkins, 2014; Fakile et al, 2014; Ohemeng and Owusu, 2013; Ayoki, 2005). The implication of the above is that tax revenue when properly expended on the countries development policies and infrastructure provision can help to boost the rate of development of the economy. The same is applicable to export in Tab. 7. On the other hand, the significance of the third lagged value of total export (Tab. 4) in explaining economic development goes to show that besides tax revenue, revenue generated from previous exports of domestically produced resources (goods and services) play important role in financing development in Nigeria. This implies that government can finance development from accumulated proceeds from export sales. Another important point to note is the significance of the sixth lagged value of tax revenue in the ARDL/ECM result (Tab. 4). This suggests that an inverse long-run relationship between tax and domestic revenue mobilization for development financing. This result has serious implication for policy intervention. There could be some plausible explanations to this seemingly counter-intuitive result. One possible reason for such result is the resource curse argument in which Nigeria government has paid less attention to the proceed from tax as a source of fund for development financing, and hence rely mainly on revenue from crude oil sales. Thus, constraining development financing to tax revenue could not facilitate development in the long run. Another plausible reason for such relationship/result may be that there is high level of tax evasion in the economy as well as weak tax administration and official corruption which could lead to misappropriation of tax revenue proceeds. All these reasons call for proactive policy and programmes.

Another important issue from the results is the speed of adjustment to equilibrium in the case of displacement. The ECM result effortlessly passed the 5% significant test. Therefore, the stability level of the model is high since the speed of adjustment is 96%.

The robustness of the result is further enhanced with the reliability and stability test using the Breusch-Godfrey LM test for serial correlation, and CUSUM test respectively. Thus, the model is highly stable and reliable.

Conclusion.

Tax as revenue for government is an asset to the government of any country and when properly generated and utilized can be channeled into financing development expenditure. Several studies had shown that tax had a significant role to play in development financing for developing economies. This study aligned with the others by ascertaining that domestically mobilized resource (tax) matters in financing development of developing economies. This was confirmed from the analysis of a long-run relationship existing between taxation and Economic development financing. Even the short-run Wald test also revealed that taxation matters in development financing in Nigeria. This goes to show that Nigeria government can harness more tax revenue or resources by increasing their tax revenue through expansion of their tax base, expanding their export trade for more revenue generation, augmenting it with income sourced from other domestic resources, to finance its developmental projects without relying more on Foreign aids, foreign borrowing, and donations from foreign countries. Importantly, the findings that the sixth lagged value of taxation exhibits an inverse relationship with development suggests that proactive policy steps need to be taken. For instance, there is need for government to strengthen the tax administrative machinery; close loopholes for tax evasion and official corruptions, thus ensuring improved tax revenue and effective utilization of tax revenue proceeds respectively. Creation of employment will also guarantee increased tax base which will also improve tax revenue mobilization. The much reliance of foreign resources had made the country to experience the debt overhang problem and crowding out effect of external borrowing. Also, some conditionalities given by the multilateral bodies (International Monetary Fund and World Bank) had yielded no positive outcome in the amelioration of the challenges that led to the contraction of these loans. Given that the clamour for domestic mobilization of resources by developing countries had been a global debate, Nigeria should continue to harness its domestic resources, reform its tax system from time to time in line with global best practices and finance its development without much reliance on aid/loans from developed countries. This is where the recent Nigeria government effort towards prosecuting tax defaulters is a welcome development. In fact, government should strengthen legislation to punish tax defaulters at the same time making the tax payers-friendly and convenient. Nigeria government should give more bite to the freedom of information (FOI) bill to promote information sharing that will ensure that eligible tax payers comply with tax laws.

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Received: 15. 03. 2018, reviewed: 13. 09. 2018

Approved for publication: 08. 04. 2019

THE EVALUATION OF THE PROGRAMME FOR CRIMINALITY PREVENTION IN THE CZECH ARMED FORCES

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Abstract: *The aim of this article is to evaluate the Programme of Social Crime Prevention, a central government program funded in the Czech Republic since 1995, in the defence sector. Employing correlation analysis, author scrutinizes relationships among extent of military criminality in the All-Volunteer Force, qualities of military labour force, and amount of money spent on the programme after 2005 when compulsory military service was abolished. The evaluation proved that taxpayer money is allocated to the programme with no relationship to development of criminality. The extent of criminality is decreasing only as a consequence of ageing of military labour force. The programme met its aim when compulsory military service was in force. At that time, military power relied on immature young men rotating in one year cycle and not performing their duties willingly. However, this past situation is still supported by bodies of the Parliament responsible for the military.*

Keywords: *All-Volunteer Force, Criminality, Demographic Ageing, Public Expenditure Programme, Prevention*

JEL Classification: *F52, H59.*

Introduction

The Czech Republic experienced a vast transformation of the polity in the 1990s. In order to cope with negative social impact of such transformation, the Czech government adopted a policy of fighting against social pathology phenomena, such as alcohol abuse, gambling, streetwalking, teens delinquency, antisocial behaviour, etc. which emerged as consequences of post-communist transformation (Burinánek 1997, 2014; Katrňák-Tyrychtrová 2016). This policy is represented by the *Programme of Social Crime Prevention (Program socialni prevence a kriminality)* which has been funded by the state budget since the mid-1990s. The Ministry of Defense (MOD) took part in the programme from its beginning in order to tackle antisocial behaviour of young men drafted into the military. Due to a bad social background many of them, the antisocial behaviour used to spread over the military organization where conscripts formed a substantial majority. Hence, compulsory military service used to be considered as a powerful vehicle for additional education of such people. In addition, such educational activities were seen as a remedy mitigating anomia (Buriánek 1994, Rabušic-Mareš 1996), a troublesome consequence of the transition from communism to liberalism.

However, that paradigm has changed by the abandonment of conscription since the mid of 2000s. Despite the fact that the military recruitment and retention policy is merely based on volunteering since 2005, amount of money requested by the MOD and finally approved by the government for purpose of fighting social pathology phenomena in the military remains rather high. It is strange because an All-Volunteer Force (AVF) is usually composed with soldiers who do not incline to criminal behaviour because they are selected more carefully than conscripts in order to retain in a long-time service. In

this view, the aim of the article is to assess the Programme of Social Crime Prevention (PSCP) which is a central programme funded across several ministries, and programmed and coordinated by the central government (see appendix A, and B).

1 Statement of a problem and sample selection

Both budgeting (Wildavsky 1978) and public policy (O'Toole-Meier 2004) sometimes suffer from inability to cut expenditures programmes losing their relevance and impact. Some programs are funded not for their necessity but for inflexibility of bureaucracy to recognise essential changes. Continuing such programmes secures jobs for bureaucracy (Parkinson 1962) instead of inducing outcomes which can justify the programme vis-a-vis budgetary authorities. Either a changed paradigm or an introduction of Zero-Base-Budgeting (Jones-McCAferry 2010) usually brings about an evaluation of such programmes and their reconstruction in accordance with the 3Es concept (Jääskeläinen-Lönnqvist 2011).

1.1 The Programme of Social Crime Prevention

Besides, the Programme of Antidrug policy and the PSCP are the oldest public expenditure programmes in the Czech Republic funded by the state budget in general. Although the PSCP was already established in the mid-1990s, it has not been described by any financial indicator in budget bills until 1998 (see appendix B). The PSCP was shaped (see appendix A) by the right-wing government already in 1993 (Ministerstvo vnitra 1993) for Fiscal Years (FY) 1993–1995. Its aim was expressed in response to an impact of the mass privatization in the era of Czechoslovakia on the national economy (Lorenz-Hraba-Pechačová 1999, Harper 2001) as well as on the society. As believed in this period, the society was experiencing social anomie, a condition in which unmoral behaviour of individuals is on raise because of an enervation of society to limit this behaviour by public and authorities (Buriánek 1994, Rabušic-Mareš 1996).

The PSCP is a bottom-up-programme spread over a set ministries (see appendix B) focussing on issues of education and re-education of target audience, such pupils, drug-addicted people, prison population, social deprived people, etc. Each ministry has been obligated to draft its internal programmatic documents which ought to operationalise the term of social prevention by definitions of pathologic behaviour in their particular environment (Ministerstvo obrany 2018). In the opinion of the agency dilemma, the principal in the PSCP is the Ministry of Finance. It is a member of the national body shaping the policy of criminality prevention (NKU 2008) although it has no responsibility in crime and anti-social behaviour prevention. It just holds the budget. The programme has been audited three times by the Supreme Audit Office so far (NKU 2001, 2008, 2018)

1.2 Sample selection

Despite the centralized approach in policy making, the budgeting was broadly decentralized (a bottom-up programme) and the volume of appropriations inflated. Appropriations for the PSCP authorised by the government were reduced significantly in 2008 and the government changed its policy of subsidies despite the fact that there

has not been a significant drop in quantity of prison population. Nonetheless, number of prosecutions was on decrease.

Analysing the appendix B carefully, it is difficult to find any clear pattern of budgeting. However, some ministries pegged the amount of appropriations on the same limit for a lot of FYs without any regards with real economy and results of PSCP. On the other hand, the PSCP may be a good example for studying the budgeting from the point of view of cultural theory as A. Wildavsky (2000) did (Swedlow 2000), because each ministry involved in the PSCP has its own strategy of budgeting. Just one ministry differs from others. Whilst a majority of ministries usually either keep the same appropriations for more FYs or try to maximise it (Keller 2010), the MOD usually requests for each FY a different amount of money although number of prosecution tends to decrease (see appendix C). By such behaviour, the MOD becomes a conspicuous example of rational budgeting and it may be considered as a good sample for an evaluation of the social crime prevention policy funded by the PSCP.

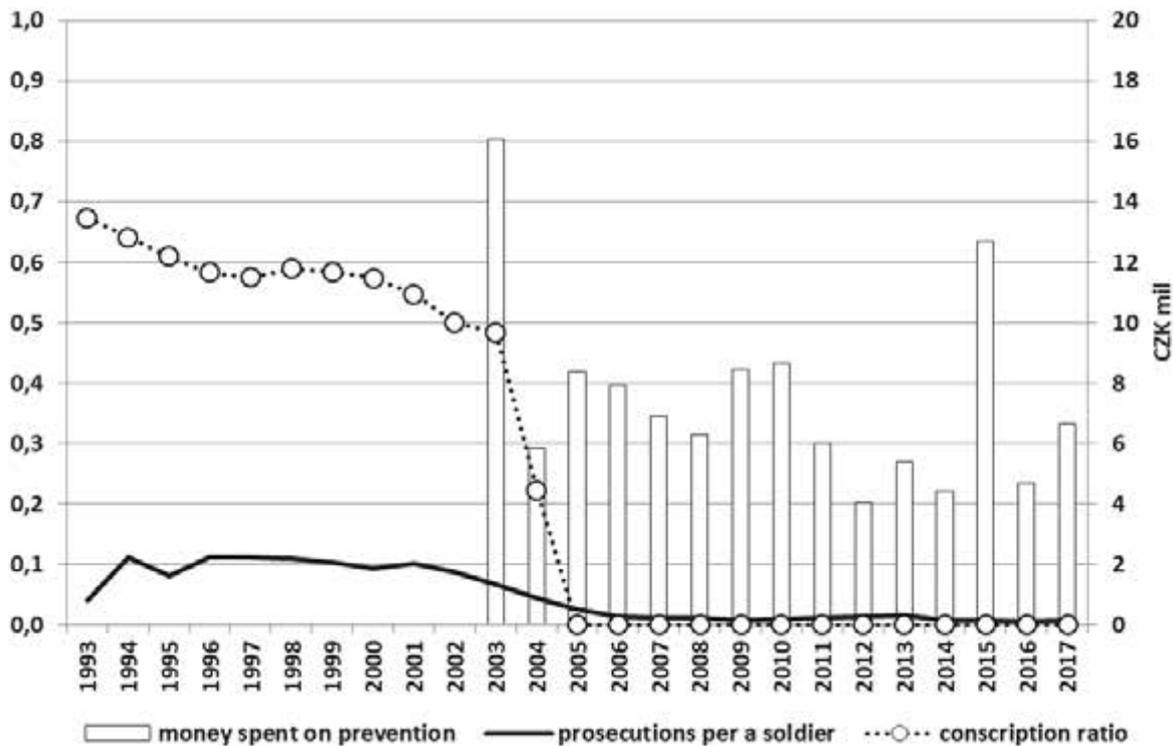
In addition, the need to evaluate the PSCP is driven not only by the fact that such a task may have a value from a scientific point of view, but there is an impact on real life. After 20 FYs of social prevention at the MOD, the media informed that 26% of military personnel saw corruption in the defence sector omnipresent in general and 5% of them have experienced corruption as daily routine. In addition, 5% of military personnel take part in mass demonstrations of extremists and one half of them would not hesitate to elect a political party which wants to resolve the Sinti-and-Roma question radically. (CTK, vel 2015) In that respect, it is questionable whether the PSCP is really effective, in particular, when pathologic behaviour such as clientelism, nepotism, patronage, and plagiarism have never been put on the list of objectionable behaviour within the defence sector (Ministerstvo obrany 2018).

1.3 Conscription, the All-Volunteer Force and prevention of crime

After the end of the Cold war, the Czech Republic experienced not only peace dividend (Rockoff 1998), a relief of resourced by their demilitarization, but it had to face to an influx of criminality (Buriánek 2014). As presented in Fig.1, the Czech military, established after the break-up of Czechoslovakia in 1992, experienced a similar development like the civil society. Due to the fact that conscripts used to comprise a substantial part of the military power, most of the crime investigated by the Military Police (MP) was committed by conscripts. Also, being a sample of society, conscripts could hardly behave in a different way than they did in their civilian lives. This assumption is usually utilized in longitudinal studies of adolescent behaviour, as presented by Stenbacka et al (2011). As displayed in Fig. 1, a substantial turning point came up with the shift to the AVF announced by the government prior to parliamentary election in 2002 when the military criminality dropped down significantly.

Yet, the change from a model of organization of military power to completely different one has not been yet reflected in attitude towards to criminality prevention at the MOD. Adopting documents, such concepts, strategies, and ministerial orders for fighting against criminality and similar phenomena on multiyear basis and its approach to prevent the defence sector from criminality after shifting to the AVF is exactly the same as it was before organizational changes.

Fig. 1: Conscription ratio, the strength of military power, and number of criminal acts investigated by the Military Police in the Czech Republic, 1993–2017



Source: Ministerstvo obrany (2019), Vojenská policie (1993-2018)

1.4 The problem of quality of military labour force

It is a well-known fact that the extent of criminality is affected by structure of population. For instance, women are less delinquent than men; in particular, women are less violent than men (Carrington 2001, Taylor-Bragado-Jimenez 2009). Likewise, the level of education (the affiliation with social classes and values) and average age affect criminality rates (Powel-Wadihin 2008, Farrington 2017). Thus level of criminality linked to a specific population should reflect its evolution.

Because number of career soldiers is rather increasing since the shift to the AVF (see appendix C), the significant characteristics describing the military should be education and age. In this point, the AVF differs significantly from the conscription army. The university education is required by officers; however, other rank groups also intend to study at universities and colleges in order to get promotion. That is why the number of graduates among non-commissioned officers in the Czech AVF has been growing since 2005 (Ministerstvo obrany 2006-2017).

Additionally, the Czech AVF is an ageing one. When average age of a career soldiers was about 32 years in 2005, the average age exceed 35 years in 2017 (Ministerstvo obrany 2006-2017). It means that overwhelming majority of soldiers received their maturity and become established. Having their families and a prospect of an extension their first and any next term, they act with consideration and in a responsible manner in order not to jeopardize their living standard.

Finally, fluctuation of military personnel in AVF is minor in comparison with a conscription army where conscription ratio, a share of soldiers serving by military

coercion on the military power Haltiner (2003), is higher. Also, we can expect that seniority of military personnel and its career selection should contribute to reducing criminality in the military despite the reduction of appropriations on the PSCP programme at the MOD.

2 Analytical framework

According to Bovens, Hart, and Kuipers (2008), i.e., the evaluation always depends on the point of view of particular approaches employed in the evaluation process. The most common approach in the policy evaluation is the programmatic one due to the fact that funding of a particular public policy is funded by expenditure programmes (Bovens-Hart-Kuipers 2008). In that opinion, we expect rationality in defence spending. By 2000, such rationality ought to be ensured by the zero-base-budgeting as a part of the PPBS implemented as a vehicle of defence spending transparency (Ochrana 1993).

Fig. 2: The model for policy evaluation

multi-years programme (the Programme Social Crime Prevention)						
aim	Fiscal Year (allocation)		prevention (action)		response (impact)	
	planned	spent	activities	force	behaviour	criminal acts
→	CZK mil		→	quantity, structure, gender, age, education, etc.	→	MP statistics
min C, Cr	Mp	Ms	?	Q, Crat, Am, Erat	?	C, Cr
government (under Parliamentary supervision)			the military		a soldier	

Captions:
C... number of criminal acts
Cr... criminality ratio
Mp... amount of money approved by the Parliament
Ms... amount of money spent
→... causality/determination
Q... number of soldiers (Qc... number of soldiers in service by use of coercion, Qe... number of graduated soldiers)
Crat... conscription ratio
Am... average age
Erat... higher education ratio

Source: (own)

Taking into account institutional organization of the central government, budgetary cycle (Doležalová 2011, Brechler 2014), national polity, principles of public programmes evaluation (Vedung 2000), and available data (see appendix C), a model for the purpose of evaluation of policy of crime prevention in the Czech defence sector was developed as presented in Fig. 2. The model describes construction of the PSCP as a part of the central government policy as well as the link with the budgetary cycles. Significant indicators available for the evaluation are presented in Fig. 2.

As presented in Fig. 2, data can be applied either as primary data extracted from annual reports, such as human resource yearbooks (Ministerstvo obrany 2006–2017), ministerial books used by the Parliament as part of budgetary control, almanacs and statistics on crime in military issued by Military Police (Vojenská policie 1993–2017), or as relative data, i.e., ratios. Also, we developed three ratios as indicators applicable for the purpose of evaluation of budgetary program of social prevention and prevention of crime within the defence sector:

$$Cr_t = C_t/Q_t \quad (1)$$

$$Crat_t = Q_{c_t}/Q_t \quad (2)$$

$$Erat_t = Q_{e_t}/(Q_t - Q_{c_t}) \quad (3)$$

where $t = N$, $N \subset (0, \infty - 1)$.

Fig. 1 implies options for evaluating the program from both material (quantity and quality of military labour force versus criminality) and financial point of view (cost of programme versus criminality). We employ correlation analysis for evaluating the hypotheses:

- H1A: Amount of money spent by the MOD on prevention does not contribute to decline of criminality in a particular FY ($Ms_t \rightarrow \min C_t, Cr_t$);
- H1B: Amount of money spent by MOD on prevention in the previous FY does not contribute to decline of criminality in the next FY ($Ms_{t-1} \rightarrow \min C_t, Cr_t$);
- H2A: Force quality does not inflict criminality, in particular, the higher level of education the lower number of criminal acts ($\max Erat_t \rightarrow \min Cr_t$);
- H2B: Force quality does not inflict criminality, in particular, ageing of force contributes decreasing of criminality ($\max Am_t \rightarrow \min Cr_t$);
- H3: Allocation of money in a particular FY does not reflect the experience with fluctuation of crime in the past ($\min (Cr_t - Cr_{t-1}) \rightarrow \min Mp_t$); hence, the MOD follows principles of economical rationality – only the desired effect is covered by adequate amount of money.

Hypotheses H1 and H3 focus on economic rationality, i.e., public money ought to be spent only in such a case if it brings effect intended by the budgetary program. Otherwise, it might be considered as public money wasting. Hypothesis H1 reflects experience with criminality presented in the literature cited above.

In essence, the evaluation focuses on the period of the AVF (2005–2017, $N = 13$). Nonetheless, some financial data is related to 2018 and to the pre-AVF-period (see appendix A, B, C). Financial data was provided by the government through ARIS (MOF 1999-2008) and MONITOR (MOF 2009-2018), an information portal of Ministry of Finance of the Czech Republic (Ministerstvo obrany 2019), and in ministerial books. Data employed in the analysis is to see in the appendix C.

3 Results

Processing data by software Statistica, version 13, we determined results of correlation analysis presented closer on Tab. 1.

Tab. 1: Results of correlation analysis, N = 13 (FY 2005–2017)

hyp.	x	y	$y = x + r$	R	σ
H1A	Ms_t	Cr_t	$y = -1E-07x + 0.0124$	0.04043	2,426.5889
H1B	Ms_{t-1}	Cr_t	$y = -5E-07x + 0.0154$	0.22510	2,386.1871
H2A	$Erat_t$	Cr_t	$y = -0.0087x + 0.0143$	0.02645	0.0176
H2B	Am_t	Cr_t	$y = -0,0016x + 0,0681$	0,62312*	1.7245
H3	$Cr_t - Cr_{t-1}$	Mp_t	$y = -85.023x + 5.9045$	0.28718	0.0063

*... significant at $\alpha = 0.05$

Source: (own)

As displayed on Tab. 1, only the hypothesis H2B is false. Thus the extent of military criminality appearing in the Czech defence sector is affected by ageing of population within the military organization largely. Positive trend is observed when ratio of graduates is higher, yet this impact is not significant from the statistical point of view. This result was to be expected because the longer career soldiers are in the military service, the longer they are exposed to social crime prevention within the PSCP.

In addition, there is no statistical significant relationship between crime occurrence and money planned/spent on the PSCP. Hence, the programme seems to be funded with no regard to extents of criminality in the past or future. The volume of appropriations of the programme is rather independent from quantifiable outcomes of the programme; in particular, when amount of money spent on the PSCP is usually less than appropriations authorised by the government. The crime is declining, however it is disputable, indeed, if this desirable course of crime ratio is an impact of activities funded by the state budget in fact.

4 Discussion

The amount of money either planned or spent on criminality prevention in the public sector is set as a specific indicator in the MOD's budget according to national budget law. Nonetheless, there is no link between appropriations authorized to the program by the Parliament and outcomes of the programs measured by indicators of military criminality. For all that, both budget bills (as ministerial books) and budget acts (as ministerial books) should be scrutinized by relevant bodies of the Parliament on annual basis in order to justify the spending on social crime prevention in the MOD in accordance with the 3Es-approach. Yet, analysing the ministerial books for the last ten FYs, we realized that there is similarity of 80% of the text related to justification of program expenditures in this period. Moreover, there are no programme objectives measurable by indicators. Furthermore, the PSCP is out of public control because money spent in the FY 2014 exceeded three times the amount of money authorised by the Parliament. – As an indicator approved by the Parliament in a particular national budget, the amount of appropriations marked as the indicator cannot exceed during a FY such a financial limit.

In addition, a lack financial integrity in the PSCP was apparent already in Fig. 1. – Although the criminality was slightly rising between 2010 and 2013 the cost of the program was cut back. However, neither the MOD nor Members of Parliament took this change into account. – What is the criterion for justifying the financial request

asked by the principal – a MOD's wish? Despite the fact that the PSCP is easy to analyse from point of view of transparency (Benito-Bastida 2009), its evaluation by authorities supervising the programme, e.g., the Ministry of Finance, the Committee on Defence in the Chamber of Deputies is rare. From the point of the volume of defence spending (CZK 40-60 billion) in a FY, the PSCP (CZK 4-8 million) is minute; yet, it must be of importance for national security due to the aim of the programme. Nevertheless, the evaluation proved significant drawbacks. Also, it remains questionable, whether the programme has accomplished its aimed purpose.

It seems that the PSCP is more beneficial to ministerial bureaucracy operating it than to the military. In accordance with theory of bureaucratic organization, Merton's (1940) goal displacement appeared. The PSCP facilitates jobs for bureaucrats instead of conclusive contribution to national security. Yet, administrative corruption (Caiden-Caiden 1977) might be hidden agenda in the programme as well when would take into account the leak into media (ČTK, vel 2015) and the MOD's statements (2017, 2018). The PSCP seems to be out of managerial and public control for many FYs and that situation affords a bulk of opportunities for internal privatization of public power within the bureaucrats. As a kind of corruption, such a goal displacement might be found harmful to the military organization. The evaluation of just one programme run by the MOD, supports observations done by Kriz (2010) and Young (2018a, 2018b). Kriz challenges quality of civil-military relations in the Czech Republic after 20 years of transformation. A significant part of it is the budgetary control conducting by an expert body of the Parliament responsible for the defence and military.

Young questions the transformation of new NATO countries from the Central and East Europe. He observes not only cultural differences in defence planning but he criticises the fact that those countries spend usually their defence spending on things not related directly to the defence, e.g., on the military welfare state (Mittelstadt 2015). Only the Czech MOD runs three military hospitals, one medical institute, and a chain of three-stars-hotels. In addition to this, one military university, one military high-school, and a sport centre are reported (ca CZK bn 1.5 in FY 2019) as defence spending in accordance with the NATO definition. Hence, the transition from communism to democracy is still continuing (Berend-Bugaric 2015) because of vivid differences in values as Young (2016, 2018a, 2018b) presents.

Conclusion

The evaluation of the PSCP in the defence sector during the AVF era proved that there is no relationship between the extent of the military criminality and the sum of money allocated to the purpose of criminality prevention. The crime ratio is rather decreasing due to aging of soldiers and their social maturity. Hence, the PSCP does not work in a sensible, defensible way. From that point of view, it is questionable who really benefits from the programme. Although the PSCP is minute in comparison with defence spending in a FY, it is beneficial to ministerial bureaucracy instead of taxpayers. Considering the evolution of PSCP as a test pit into culture of budgeting in a NATO country from Central and East European region, the results support observations presented by other scholars (Young 2018a, 2018b).

Acknowledgement

Author would like to thank to the Ministry of Defence of the Czech Republic for data and extra information needed for this article.

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Received: 23. 05. 2018, reviewed: 08. 10. 2018

Approved for publication: 08. 04. 2019

Appendix A Management of the Programme of Social Crime Prevention and crime statistics, 1993-2019,

FY	Budgeting government	Authorisation of documents for justifying and evaluation of the PSCP		Number of prosecutions	Prison population	
		the span covered by a conception (strategy) ^{a)}	report ^{b)}		defendants	convicts
1993	-	-	-	398,505	7,810	8,757
1994	right-wing	1994-1996	(x)	365,265	8,828	9,925
1995	right-wing		x	368,624	8,000	11,508
1996	right-wing		x	387,374	7,887	12,973
1997	right-wing	1997-2000	x	397,845	7,736	13,824
1998	right-wing		x	425,930	7,125	14,942
1999	left-wing		x	426,626	6,934	16,126
2000	left-wing		x (A)	391,310	5,967	15,571
2001	left-wing	2001-2003	x	358,362	4,583	14,737
2002	left-wing		x	372,341	3,384	12,829
2003	liberal left-wing		x	357,740	3,409	13,868
2004	liberal left-wing	2004-2007	x	351,629	3,269	15,074
2005	liberal left-wing		x	344,060	2,860	16,077
2006	liberal left-wing		x	336,446	2,399	16,179
2007	liberal left-wing		x (A)	357,391	2,254	16,647
2008	right-wing		2008-2011	x	343,799	2,402
2009	right-wing	x		332,829	2,360	19,374
2010	right-wing	x		313,387	2,443	19,449
2011	right-wing	x		317,177	2,613	20,541
2012	right-wing	2012-2015		x	304,528	2,183
2013	right-wing		x	325,366	2,308	14,301
2014	right-wing		x	288,660	2,185	16,433
2015	liberal left-wing		x	247,628	1,960	18,850
2016	liberal left-wing		2016-2020	x	218,162	1,907
2017	liberal left-wing	x		203,303	N/A	N/A
2018	liberal left-wing	x (A)		N/A	N/A	N/A
2019	liberal left-wing	-		-	-	-
2020	liberal left-wing	-		-	-	-

Notes

x... the report noted

A... the start of an audit by the Supreme Audit Office

a)... documents usually authorized in the last quarter of a FY prior to the first FY covered by the authorized document

b)... reports are usually set as governmental agenda in April; by the end of 2015, they used to be set priorities for the upcoming FY; since 2016, there is an action plan

source: ČSÚ (2018), Government (1993–2019)

Appendix B Authorised Appropriations on the Programme of Social Crime Prevention, 1998-2019, CZK thousand, %

FY	Welfare state			Security sector				Total	Economic annual growth (%)
	Ministry of...								
	Education, Youth, and Sport	Public Health	Labour and Social Affairs	Interior	Justice	Finance	Defence		
1998	14 843	33,000	0	0	6,865	2,450	0	57,158	-0.3
1999	8,033	0	15,498	3,900	4,110	10,000	4,925	41,541	1.4
2000	7,712	0	15,498	3,900	4,816	0	12,000	31,926	4.3
2001	10,000	0	87,500	3,900	4,700	0	20,080	106,100	2.9
2002	9,810	0	140,200	3,900	11,290	0	15,000	165,200	1.7
2003	10,202	1,200	177,200	3,900	29,512	0	16,700	222,014	3.6
2004	10,202	1,140	168,340	3,900	29,894	0	6,500	213,476	4.9
2005	10,202	1,500	254,186	3,900	48,221	0	7,920	318,009	6.5
2006	10,202	1,500	228,767	3,900	15,115	0	7,920	259,484	6.9
2007	10,202	1,500	0	3,900	15,787	0	6,920	31,389	5.6
2008	10,202	50	0	83,491	11,350	0	6,321	105,093	2.7
2009	10,202	50	0	82,691	11,664	0	8,474	104,607	-4.8
2010	9,754	48	0	78,324	9,194	0	8,727	97,320	2.3
2011	8,778	40	0	56,256	4,460	0	6,003	69,534	1.8
2012	8,134	50	0	56,256	11,985	0	4,209	76,425	-0.8
2013	9,134	50	0	56,256	8,025	0	5,441	73,465	-0.5
2014	8,134	50	0	56,250	6,070	0	3,324	70,504	2.7
2015	8,134	400	0	56,250	6,605	0	4,777	71,389	5.3
2016	8,135	400	0	60,445	6,595	0	3,198	75,575	2.6
2017	8,132	400	0	60,000	11,595	0	6,671	80,127	4.3
2018	8,132	381	0	61,000	16,395	0	6,654	85,908	N/A
2019	8,132	305	0	61,000	11,795	0	6,583	81,232	N/A

source: *Sbirka* (1993–2019) *World Bank* (2018)

Appendix C Main data applied in analysis

FY	Career soldiers	Conscripts ^{a)}	Military personnel, total	Higher education ratio	Conscription ratio	Number of prosecutions	Number of prosecutions per a soldier	Money spent by the MOD ^{b)} on the PSCP, CZK thousand	Mean age of a career soldier, years
<i>t</i>	<i>Q_v</i>	<i>Q_c</i>	<i>Q</i>	<i>E_{rat}</i>	<i>Cr_{at}</i>	<i>C</i>	<i>Cr</i>	<i>Ms</i>	<i>Am</i>
1993	33,282	68,630	101,912	N/A	0.67	4,008	0.0393	N/A	N/A
1994	30,413	54,326	84,739	N/A	0.64	9,492	0.1120	N/A	N/A
1995	27,654	43,178	70,832	N/A	0.61	5,685	0.0803	N/A	N/A
1996	26,340	36,797	63,137	N/A	0.58	7,020	0.1112	N/A	N/A
1997	23,759	32,174	55,933	N/A	0.58	6,271	0.1121	N/A	N/A
1998	22,966	32,942	55,908	N/A	0.59	6,179	0.1105	N/A	N/A
1999	23,721	33,281	57,002	N/A	0.58	5,837	0.1024	N/A	N/A
2000	23,184	31,185	54,369	N/A	0.57	5,064	0.0931	N/A	N/A
2001	20,627	24,955	45,582	N/A	0.55	4,635	0.1017	N/A	N/A
2002	21,249	21,235	42,484	N/A	0.50	3,636	0.0863	N/A	N/A
2003	21,055	19,783	40,838	N/A	0.48	2,677	0.0669	16,055	N/A
2004	22,145	6,359	28,504	N/A	0.22	1,233	0.0442	5,848	N/A
2005	23,110	0	23,110	N/A	0.00	608	0.0269	8,351	31.37
2006	24,229	0	24,229	0.312	0.00	318	0.0135	7,907	31.98
2007	24,334	0	24,334	0.288	0.00	283	0.0120	6,894	32.42
2008	24,103	0	24,103	0.277	0.00	280	0.0119	6,307	33.01
2009	23,136	0	23,136	0.263	0.00	174	0.0078	8,446	33.41
2010	22,261	0	22,261	0.272	0.00	219	0.0103	8,655	33.86
2011	21,751	0	21,751	0.280	0.00	226	0.0107	5,989	34.46
2012	21,733	0	21,733	0.285	0.00	302	0.0143	4,062	34.88
2013	21,011	0	21,011	0.294	0.00	324	0.0163	5,398	36.05
2014	20,864	0	20,864	0.304	0.00	174	0.0086	4,403	36.59
2015	21,970	0	21,970	0.313	0.00	143	0.0067	12,704	37.13
2016	23,184	0	23,184	0.310	0.00	140	0.0062	4,694	37.22
2017	24,251	0	24,251	0.311	0.00	171	0.0072	6,666	37.34

Notes:

a)... Length of compulsory military service: 18 months (1993–1994), 12 months (1995–2004)

b)... Ministry of Defence (MOD)

source: *Ministerstvo obrany* (2019), *Vojenská policie* (1993–2018), *MOF* (1999–2008), *MOF* (2009–2018); calculation based on data from *Ministerstvo obrany* (2006–2017)

WORKPLACE FLEXIBILITY TO IMPROVE ORGANIZATIONAL PERFORMANCE

Binal Shah, Aleš Gregar

Abstract: *Workplace flexibility is recognized as the application of collective interventions in an organization. It is also known as various supportive technologies and strategies of the Human Resources Department. The purpose of this study is to design workplace flexibility strategies that are essential for organizational leaders and HR managers to sustain and improve organization competitiveness (improved productivity and improved financial performance) along with aging employees' performance. Data collection from a large-scale survey of 2000 aging employees from a different organization in India. Participants in the survey study were based on employees' experience within the organization. The research interviews coded by focusing on the level of flexibility given to aging employees, focusing on managers' influence on the performance of aging employees, examining internal and external sources that impede performance. The study results organization and HR managers' may increase the performance of aging employees by enhancing flexibility strategies that provide a positive assortment of motivational tools and opportunities. In addition, the findings suggest collaborative decision making between HR managers and aging employees has a positive relationship with work attitudes and the engagement of employees. The results of the study can make organizations more competitive that could improve aging employees' retention rates.*

Keywords: *Workplace Flexibility, Flexible Work Arrangements, Employee Engagement, Retention, Human Resource Practices.*

JEL Classification: *J22, J28, M54, O15, L10.*

Introduction

The Indian labor market has been described as one which leaves a lot to be desired. Wages have also been widely described as imperfect, and income distribution as uneven. These factors are to blame for the growing gap between the rich and poor, and older people in particular. Regarding the employer-employee relationship changes in retiree health benefits and pension provisions indicate that in India boomers have remained committed to the workplace (Prithiviraj, 2002). Workplace flexibility in India continues to vary between organizations.

Flexibility assists in addressing the relation between the employers and employees which affect business outcomes. Indian companies focus on attaining flexibility for dealing with changing market conditions. The job market is rapidly developing, and that influences the economic situation of the country. The government of India has also introduced several policies to enhance the function of the temporary workforce. The concept of contract staffing has accepted by the government as means to increase the rate of productivity in the office ambiance (Camisón & Villar-López, 2014). Various firms across the country

have worked on providing facilities to protect the health and well-being of their workers. The inclusion of several business strategies also enables the corporation to enhance flexibility in the workplace. Indian firms endeavor to include contractual staff in order to increase the profit rate. The present study has focused on how the impact of workforce flexibility on employee retention influences the business performance of the enterprise.

According to Glover and Butler (2011), the demands for an appropriate workplace has increased. Maintaining work-life balance and reducing working-related stress has become a necessity for all individuals, irrespective of their sector of work. In India, employers are becoming concerned for their employees and their needs are taken into consideration, so as to acquire and retain their talents. In this context, a variety of Indian companies is striving towards making changes in the work pattern of their employees.

The goal of this article is to address flexibility strategies at workplace lead the performance of aging employees and organization. These studies provide flexibility arrangements that can help and guide aging employees to perform better. The few published Human Resource strategies studies that explicitly focus on aging employees and the gap in the current research on the impact of workplace flexibility intervention and practices. The Flexibility models and theories contempt that the workplace flexibility can be improved by providing sufficient incremental variables. The focus in this article is on improving aging workers 'productivity and outcomes, such as work-life balance, job satisfaction, aging employees 'retention and performance.

1 Literature

Addressing the effects of workplace flexibility on aging worker productivity and organizational performance

Over the past decade, the emphasis on employee flexibility has been increased, as nowadays employers are focusing on developing a flexible workplace for the company in collaboration with their employees (Hill et al., 2008) defended "Flexibility" is a broad term, which specifies different things.

The inclusion of a flexible workforce is vital for managing the business operation efficiently. The active involvement of staff in increasing the ratio of productivity positively affects the business operation. The participation of a flexible labor force enables the corporation to prevent further damage in the workplace (Patel, et al., 2013). Therefore, the organization focuses on offering proper training to staff making them aware of the desired objectives.

The concept of productivity aids in identifying the business outcome that is availed by the enterprise. The inclusion of a flexible workforce creates a positive impact on the ratio of productivity. The active participation of a skilled labor force aids in increasing the business and sales performance. The flexibility of working area is beneficial for reducing the stress faced by the employees in the work area. The facilities offered by the corporation enable the workers to maintain their professional and personal life effectively. This encourages the labor force to provide proper service in the office environment.

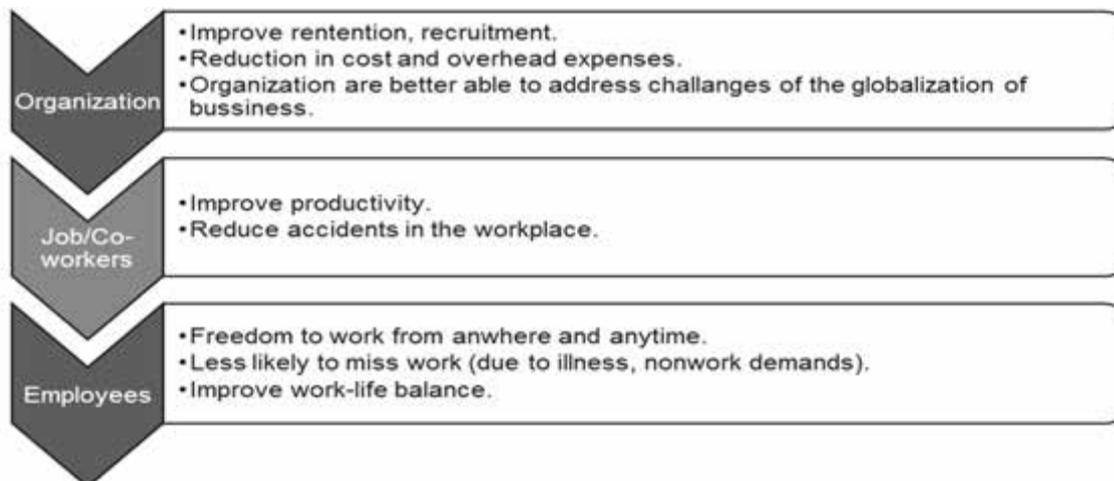
Most studies on flexibility, have utilized diverse, flexible work possibilities with the help of the assumption of “more is better” perception which directs the idea of faith. For instance, a wide range of flexible options offered by the organization is ineffective, if the demands of worker are not met by the assistance of these options. It can also operationalize that flexibility, regarded as the subjective assessment of respondents, based on which workplace flexibility can satisfy the needs of employees and employers. As discussed in the preceding section, aging employees have required flexibility work opportunities and this has an effect on the productivity and organization performance. The existing analysis will fill the research gap found in the literature review. It has also been observed that there is a positive relationship between employee engagements and innovation in the workplace (Oeij, et al., 2012). Moreover, numerous studies found a relationship between aging employee engagement and organizational outcomes such as aging employee’s productivity, and revenue generation (Towers Perrin, 2005; Gibbons, 2006). (Gibbons, 2006) has concluded by the conference board that there is substantial evidence that the engagement of employees at work has a positive effect on productivity and performance at individual, team, and organizational levels. Organizational studies have established that various benefits are attributable to workplace flexibility for aging employees.

1.1. Theory and Hypothesis

The literature on the flexible workplace has discussed the practices of high-performance work environments. This type of work environment indicates that companies can improve performance, with the assistance of the productive elements of the strategy of Human Resource Management, by looking for methods to attract, engage and motivate aging employees by providing them with enhanced personal development and efficacy (Glover & Butler, 2012; Berg et al., 2004). There is also some provisional evidence that perceived workplace flexibility helps to attain an enhanced balance between work and life, which in turn leads to an increment in job contentment, assurance, and efficiency (Origo & Pagane, 2008). Other benefits to an organization derive from family-friendly policies, which lead to a decrease in employee turnover and absenteeism. (Barmby, Ercolani, & Treble, 2004; Lusinyan & Bonato, 2007).

The objective of this paper is to demonstrate the relationship of flexibility in the workplace to aging-worker productivity and organizational performance. According to the literature, the utilization of flexibility should promote the resources and capabilities of aging employees to meet the hassles of work thereby enhance their productivity. Moreover, a higher degree of support from the organization is related to a higher rate of employee engagement, which will in turn result in increased employee retention and business performance.

Fig. 1: Benefits of Workplace Flexibility



Source: Adopted from <http://www.shrm.org/about/foundation/products/pages/leveraging-workplace-flexibility.aspx>

Different theories are available for managing the workforce in the office environment. Contingent Workforce Management (CWM) focuses on managing temporary staff in the workplace. The model is used to fulfill corporations' long-term objectives. CWC theory is vital for management of freelance workers in the workplace. The decreased ratio of workforce flexibility is the disadvantage visible in this model. A business with continuous operational changes can adopt this workforce management theory for developing the business function (Korschun et al., 2014). On the other hand, the Blended Workforce Model (BMW) focuses on merging the contractors, employees, and consultants in order to improve the business operation. The flexibility of the workforce aids in enhancing the organizational function (Camisón & Villar-López, 2014). The use of BMW model by various enterprises has increased in recent times as it aids them in attaining flexibility in the workplace. However, the current model aids management of the permanent labour force to produce better service from them; the result of a recent survey has highlighted the fact that a large number of corporate staff are now temporary recruitments and, therefore, the use of this model would not be fruitful to attain proper service from them.

In the case of managing contingent labour, the model of the Managed Service Provider Model (MSP) plays a vital role that influences the business operation. The companies involved in the outsourcing business process also avail themselves of this model for managing the workforce smoothly (Korschun et al., 2014). A cost-effective approach facilitates the scope of business and sales operation. The inclusion of a law regarding contingency labour has also aided in improving the quality of service provided by them. Functional flexibility is another factor that enables the enterprise to manage the workforce effectively. It is beneficial for resolving conflicts between managers and staff which affect the business operation. The incorporation of functional flexibility is vital for managing teamwork efficiently. It aids in attaining the views of different team members on strategies for enhancing the business function. The Multi-Generation Workforce Management model

(MGWM) assists in introducing various strategies that can be used by corporations to achieve workforce flexibility (Camisón & Villar-López, 2014). The model enables the organisation to attain the feedback of the workers regarding the service provided to them. The innovative ideas offered by staff members also aid the enterprise in achieving its desired business objectives.

1.2. Hypothesis

The incorporation of multiple models of workforce management is beneficial for enhancing flexibility in the workplace. It also cooperates in achieving stability among the function of the workforce. The employment of various business models aids in gaining competitive advantage in the current market situation. Based on the literature and theory, we present three hypotheses:

Hypothesis 1 (H1): The impact of workplace flexibility on the organizational performance along and employee productivity will be positive.

Hypothesis 2 (H2): Workplace flexibility will influence employee productivity in a positive way by maintaining work-life balance.

Hypothesis 3 (H3): Workplace flexibility will affect the employee performance and the organizational results positively.

2 Methods

The current study has focused on using the explanatory research design for attaining important conclusions in support of the present study. The survey method has also used for deriving valid and proper information about the current research topic. It has aided in identifying the impact of a flexible labor force on productivity. The use of this investigation method is essential for deriving authentic data in order to advance the research work.

The present study has focused on using the primary research method for deriving the accurate information from human resources (Taylor, et al., 2015). Both qualitative and quantitative data analyses are useful in gathering valuable information for the current research topic. The survey and questionnaire formats are essential for collecting quantitative data. On the other hand, interviews sessions are useful for gathering qualitative data.

A survey was carried out among a sample of India's profit and non-profit organizations. Around 2000 Respondents, first approached by telephone, received an internet link or postal questionnaire, upon affirming their willingness to cooperate. Organizations under study are "establishments". Respondents are (managing) directors/owners, senior HR-managers, and other aging workers. The analyses were performed on a sample of 2000 aging employees from a different organization. The sample obtained consisted of 42.3 % managers and 27.1% senior managers. Additionally, 24% respondents were assistant manager and while the rest did not include their job designation. Most respondents (41.7%) had a bachelor's degree, 25.8% had a Master's degree, 21% had a two year-professional qualification, and 11.5% of respondents had a doctorate. Of the aging employee's sample, 50% were male and 40% were female. The large sample of were

45-54 years old (42.8%), 55-64 years old (31.8%), and 65-70 years old (15%). In the survey, all relevant measures were explored, including engagement of employees, work-life balance, working-hours, and flexible retention of employees.

3 Measures

The analysis of the resultant data is vital for deriving relevant conclusions for the current research topic. Different methods can be used for analyzing the data, such as an interview or survey for gathering the opinion of the respondents (Mackey & Gass, 2015). The view of employees can be canvassed by conducting surveys in the workplace. The open-ended question format can be used for attaining the views of staff regarding flexibility in the office environment. The introduction of the interview process is beneficial for obtaining the views of managers relating to the impact of working flexibility on the performance of the workers. The close-ended question format should be used for achieving the qualitative data on current research topics. The information investigated enumeration variables: these included age, gender, aging-employee productivity of aging employee, and organization performance.

3.1 Independent Variable

Where a particular job is shared between two or more individuals; compressed working weeks, where workforces squeeze total working hours into 3 or 4 days rather than 5; job enrichment by providing training for aging employees; job redesign where specific tasks are rendered physically or psychologically easier for aging employees to perform; individual performance-related pay, linking salary progression to assessment of individual performance or competence rating.

3.2 Dependent Variable

Organizational Performance (“To what extent do you agree or disagree with the following statements on organizational performance in the last two years?”: “The labour productivity in our organization has improved,” “The growth in turnover in our organization has improved” and “The increase in profit in our organization has improved” [or financial outcomes for not-for-profit organizations], 0= disagree, 1= agree).

3.3 Covariates

Various factors are known to contribute to aging-employee productivity: these include age and gender are continuously variable and gender (0= male, 1= female). The size of the organization will be measured in terms of total number of employees. Workplace and job experiences will be assessed as open questions, resulting in continuous variables. Management level will be determined according to the standard job classification (CBS, 2001) and according to gender (i.e. male vs. female). The concept of workforce flexibility also creates an impact on the productivity ratio considered by the corporation. An increasing rate of productivity plays a vital role in managing the stress level of existing

workers in the office ambiance. The job functions of the employees also contribute in facilitating the satisfaction level of staff in the workplace.

4 Problem Solving

Hypothesis 1: The impact of workplace flexibility on organizational performance along and employee productivity will be positive.

Tab. 1 demonstrates that aging and the impact of a flexibility program on performance are positively ($r = .251$) correlated. Therefore, with an increase in age a flexible schedule helps to achieve better employee performance and generate better organizational performance. The Managed Service Provider Model (MSP) has focused on offering flexibility that enables workforce management. The analysis has assisted in identifying the relation between flexibility and the business performance of an enterprise.

Tab. 1: Paired samples correlations of aging and workplace flexibility on performance

	N	Correlation	Sig.
Pair 1 How old are you? & Impact of flexibility programs on performance	1692	.251	.000
Pair 2 What types of flexibility practices does your organization offer to all employees? & Impact of flexibility programs on performance	1702	-.126	.000

Source: Own

The flexibility of organizations negatively correlates ($r = -.126$). *with* employee performance. Therefore, offering high flexibility reduces the organizational performance.

In Tab. 2 the $t = (-0.639)$, $p < 0.005$ of pair 1 is less than the significant value at a 9% confidence interval. Therefore, it accords with the null hypothesis. This means that aging and organizational performance are positively related. Therefore, a null hypothesis is rejected. Flexibility and organizational performance are not positively related. The current analysis has helped to identify the impact of flexibility on the business function of the corporation. The model of functional flexibility has focused on addressing the relation between a business function and its effect on the business operation. It also enables workers to change their job roles to attain the desired objectives of the corporation.

Tab. 2: Paired samples t- test of aging and flexibility program effect on performance

	Paired Differences				t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower			
Pair 1 How old are you? - Impact of flexibility programs on performance	-.553	1.795	.044	-.639	-.468	12.675	1691.000
Pair 2 What types of flexibility practices does your organization offer to all employees? - Impact of flexibility programs on performance	1.709	3.609	.087	1.538	1.881	19.537	1701.000

Source: Own

Hypothesis 2: Workplace flexibility will influence employee productivity in a positive way by maintaining work-life balance.

The analysis in Tab. 3 indicates that the degree of flexibility offered by an organization and its employee productivity are highly correlated ($r = .542$). With the increase of flexibility, productivity will increase.

Tab. 3: Paired samples correlations of usage of flexibility and employee productivity

	N	Correlation	Sig.
Pair 1 Using the flexibility scale below, how would you rate the current culture of flexibility at your organization? & Usage of Flexibility on employee performance, by organization turnover	1700	.542	.000

Source: Own

The $t = (-32.118)$ and $p < 0.005$ in Tab. 4 is less than the significance level at a 95% confidence interval. The outcome proves the null hypothesis. Therefore, flexibility in workforce helps to develop employees' performance and reduce organizational turnover.

Tab. 4: Paired samples t- test impact of flexibility and employee productivity

	Paired Differences					t	do	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Using the flexibility scale below, how would you rate the current culture of flexibility at your organization? - Usage of Flexibility on employee performance, by organization turnover	1.000	1.284	.031	-1.061	-.939	32.118	1699	.000

Source: Own

In the current situation, the Multi-Generation Workforce Management Model (MGMW) plays a vital role in managing the workforce in the enterprise. The increasing ratio of flexibility enables the workforce to attain the desired goals of the business firm. The professional skills of the employees also facilitate them in reaching the desired objectives.

Hypothesis 3: Workplace flexibility will affect the employee performance and the organizational results positively.

Tab. 5 indicates that flexibility practices in originations and level of performance are positively correlated ($r = .828$), which signifies that with an increase of flexibility; the level of performance will increase.

Tab. 5: Paired samples correlations of flexibility program and level of performance

	N	Correlation	Sig.
Pair 1 Using the flexibility scale below, how would you rate the current culture of flexibility at your organization? & Impact of flexibility programs on performance	1700	.828	.000

Source: Own

In Tab. 6 the $t = (-63.130)$ and $p < 0.005$ than significance level at a 95% confidence interval. Therefore, the null hypothesis will be accepted. Thus, flexibility in workplace culture helps to develop a high level of performance. The regression of the two variables (workplace flexibility and employee performance) is (1524.368), and the regression coefficient is (.828.)

Tab. 6: Paired samples t- test of flexibility program and level of performance

	Paired Differences					t	do	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Using the flexibility scale below, how would you rate the current culture of flexibility at your organization? - Impact of flexibility programs on performance	-1.235	.807	.020	-1.274	-1.197	-63.130	1699	.000

Source: Own

Therefore, most employees consider that flexibility in work schedule provides to a greater or lesser extent/to some degree, benefits for employee growth. The Contingent Workforces Management Model (CMW) can be mention in this context. It provides strategies that can be used for bringing grater flexibility among workers in the office environment. The model is employed by the enterprise to assist in achieving both short- and long-term goals of the corporation. According to this model, the organization should focus on protecting the health and well-being of if staff and the inclusion of flexible working hours is similarly essential for attaining their trust and loyalty. The CMW model is necessary for achieving the stability in the workplace. In relation to this some people said companies invest in long distance phone calls to offer work time flexibility.

Therefore, a large number of people consider that flexibility helps to deliver moderately improves performance. The current response of the workers has helped to advance understanding of the impact of workforce stability on the level of job satisfaction among the employees. The model of a blended workforce is essential for managing the workforce efficiently. The model is beneficial for attaining the flexibility that postively influences the business performance of an organization.

Therefore, it can be seen that the majority of the people consider that flexibility helps to provide a better organizational turnover because the majority of the people responded as extremely positive, positive and neutral to this question. Therefore, there is a positive association between flexibility and turnover, but it is not mediated by motivation. This result demonstrates that the flexibility of employee performance helps to generate a high organizational turnover.

The study results conclude, in answering the central question, that flexibility at workplace is related in a positive and significant way to perceived, self-reported quantitative and qualitative organizational performance on the one hand, and to satisfaction with aging employee commitment on the other. The relations are rather modest, but in the expected directions, which implies that our theoretical assumptions are supported.

Conclusion

The finding of this study is that the majority of the people consider that flexibility contributes to providing better organizational turnover because the majority of the people responded as extremely positive, positive and neutral to this question. Therefore, the effect of flexibility on motivation does not provide high organizational turnover. This result demonstrates that the effect of flexibility on employee performance helps to generate a high organisational turnover.

The current research has faced certain limitations that have affected the progress of the work. The first limitation of the study design is the nature of the data. Handling a large array of data was its key drawback. Many respondents did not reply to all questions, which also acted as a key limitation of the research. The second limitation is that the survey method is a time-consuming process that fails to gather relevant knowledge in available time. The respondents failed to provide necessary feedback that might have enhancing the research. Lack of information from the respondents also created an obstacle to gaining a clear idea about flexibility in their workplaces. Achieving valuable resources, which might have created a hindrance for accomplishing future projects successfully. The inclusion of relevant information regarding workforce flexibility would be beneficial for fulfilling future projects.

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Received: 27. 03. 2018, reviewed: 04. 01. 2019

Approved for publication: 08. 04. 2019

COST SAVING VIA GRAPH COLORING APPROACH

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Abstract: *The implementation of graph algorithms on diverse tasks of economic problems has reducing costs potential in different areas of business activities. In the present paper we deal with an identification of optimal allocation of guide signs in a large exhibition hall with given spatial organization, when the move of a visitor is allowed only along given corridors. In order to achieve our aim we use modeling by a graph and graph coloring algorithm approach. Although our implementation model concerns distribution of issues in a large exhibition hall, similar algorithm could be utilized in many other navigational situations. Solving these kinds of tasks is relevant from economic point of view, because it reflects in cost saving and business prosperity. The better is the organization of the event, the greater is the satisfaction of clients and exhibitors, the higher is the probability that they will come again and that the business will prosper for each of the parties involved.*

Keywords: *Cost Saving, Modeling via Graphs, Optimal Distribution of Issues, Palette Coloring.*

JEL Classification: *C61, C65.*

Introduction

The big benefit of usage of mathematical instruments in economy is known for several decades of years. Herstein (1953) claimed that modern mathematical instruments improved economic analysis in the same manner as new mathematical methods did earlier to physics. Newly also graph theory as a branch of discrete mathematics finds widespread use in economics. Besides the modeling via graphs and the application of decision trees in risk management and decision making in economics (see e. g. Chin et al., 2009; Drabiková and Fecková Škrabul'áková, 2017a, 2017b; Lockyer and Gordon, 2005; Trucco et al., 2008; Vitali, Glattfelder and Battiston, 2011; Weber et al., 2012) also the implementation of graph algorithms in order to reduce costs in different areas of business activities is known.

A number of empirical studies proved that graph theory is significantly valid in costs saving purposes. In this regards, for example, the supply chains topic was analyzed by Wagner and Neshat (2010). The riskiness of supply chains was considered via tools of graph theory by Faisal, Banwet and Shankar (2007), as well. Application of the graph theory accompanied by costs saving can be found also in works of Drabiková and Fecková Škrabul'áková (2018), Rao (2006), Torres et al. (2016) and elsewhere.

The above examples typify just a part of potential that the study of graphs offers for real issues implementation. Optimization of methods, algorithms and processes is new trend in every area of business. Dealing with a specific business, the subject can be also solution of some specific task and achievement of emerges. In this paper we describe the usage of graph algorithms for reducing costs by solving a partial business task which is intended for needs of the company organizing various events. An exposition in a large exhibition hall is the case examined in this work. Efforts lead, on

the one hand, to optimizing organizational activities and, thereby, reducing costs of the organizer and, on the other hand, to the positive perception and feedback of visitors as well as exhibitors. From the long term strategic point of view, their repeated comeback is desired effect.

1 Problem formulation

In this paper we deal with a task how to identify an optimal allocation of guide signs in a large exhibition hall with given spatial organization when the move of a visitor is allowed only along given corridors.

We are solving this task by using graph coloring algorithms. According to our knowledge such an approach was never used before in order to find the allocation of guide signs in a large hall. Our graph coloring approach could be considered as a new possible way of solving similar problems on cost reducing. The issue that is solved here should be perceived as a particular task of a more complex work dealing with different tasks one has to solve while organizing an exhibition in a large exhibition hall.

Another particular task of this project dealing with an optimal distribution of information desks has been solved by Drabiková and Fecková Škrabuřáková (2018) by entirely different method than the one presented in this paper. In the paper of Drabiková and Fecková Škrabuřáková (2018) a method similar to k-means cluster method was used. While the original k-means cluster method uses the Euclidean distance as a metric and variance as a measure of cluster scatter, in that paper the square grid metric implemented on graph model of the exhibition hall was used and entirely different algorithm that lead to cost saving was introduced.

There are several reasons why to deal with these particular tasks coming from business expectations. The more optimal is the position of information desks detected, the lower are the organizational costs. The better is the allocation of guide signs, the easier is the orientation inside the exhibition hall. The better is the organization of the event, the greater is the satisfaction of clients and exhibitors. The greater is the satisfaction, the higher is the probability that clients and exhibitors will come again. The higher is the ratio of comeback people, the greater is the prosperity of the business for each of the parties involved.

There are many principles one has to follow when organizes exhibitions in a large exhibition hall given by minimal booth's size and their organization to larger blocks, local architectural conditions, business expectations, logical and other principles.

In our case the most determining facts were:

- the minimal booth size: $1\text{ m} \times 2\text{ m}$ (the base building block of all booths used),
- the minimal block of region associated with one type of commodity: $4\text{ m} \times 4\text{ m}$,
- the minimal width of the corridor between booths: 2 m ,
- not too large number of sets of commodities,
- logical principles,
- business expectations,

- local architectural conditions - fixed objects in the hall, e.g. restrooms, technical rooms, emergency exits, offices.

According to that all the booths and other movable objects were placed into the exhibition hall and the spatial organization of the hall was done.

2 Methods

Mathematics and graphs are used in different areas of everyday practice (see Ždímalová, 2016; Ždímalová and Vavříková, 2017). Beside architecture, construction and designing (see e.g. Rákay, Labant and Bartoš, 2018) they have widespread use in business activities as well, for instance for evaluating and managing supply chains sensibility (Wagner and Neshat, 2010), assessing the riskiness of clients (Faisal, Banwet and Shankar, 2007) and decision making (see e.g. Chitra and Subashini, 2013; Drabíková and Fecková Škrabuľáková, 2017a; Ince and Aktan, 2009).

The utilization is notable also in banking, finance, insurance and marketing. The special chapter in this sense is modeling by graphs - business networks, graphs of cooperation (see e.g. Vitali, Glattfelder and Battiston, 2011) and solving various economy-related problems via methods of graph theory, graph algorithms.

Graph theory is dealing with a special structures of discrete mathematics called graphs. Graphs are very worth for modeling objects - elements of some sets, and relations between them. Graph algorithms are then mathematical algorithms applied on these structures.

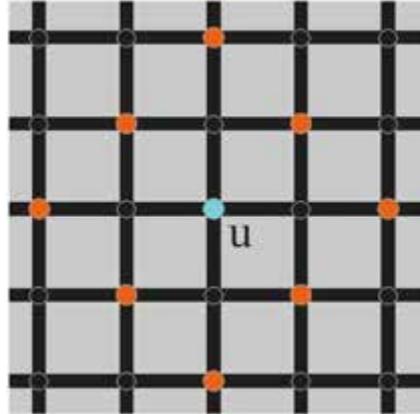
In this regard it should be mentioned that a graph H is an ordered pair $H=(V(H),E(H))$, where $V(H)$ is a finite set of elements called vertices, while $E(H)$ is a finite set of unordered pairs of vertices called edges. The coloring of the vertices of a graph H is a mapping from a set of colors to a set of vertices of H subject to certain constraints. As these constraints depend on the task that has to be solved, many different vertex-colorings of graphs have been defined and a large amount of different problems have been solved by using graph coloring algorithms.

A square grid graph is the graph $G_S(V(G_S), E(G_S))$ whose vertices correspond to the points in the plane with integer coordinates, and two vertices are connected by an edge whenever the corresponding points are at distance 1. A graph formed from a collection of points in the Euclidean plane by connecting two points by an edge whenever the distance between the two points is exactly one is called a unit distance graph. In this sense G_S is a unit distance graph.

In order to define a special type of neighborhood of vertices of G we used square metrics, which is known as postman metrics (see Fecková Škrabuľáková, 2016) too. The distance for a postman in a city where the roads are organized like a square grid is not the smallest distance between two points on the map of the city, but the length of the way he needs to walk using the streets.

In this sense 0-neighborhood of a vertex u of square grid G_S equals u itself, 1-neighborhood is represented by a set of neighboring vertices of u , further 2-neighborhood by a set of vertices in the distance two from u - see the highlighted vertices at Fig. 1, and so on. Clearly, if G is a subgraph of the square grid G_S , i -neighborhood of some vertex of G , is defined as a set of those vertices of G which distance from the very vertex equals i .

Fig. 1: 2-neighborhood of a vertex u



Source: (Authors)

All the graph theory terms used, but not defined here, can be found in Bondy and Murty (1976).

For achieving the aims and solving our practical problem, an adequate graph model (in the graph theory sense) of the exhibition hall was prepared.

This was done in several steps:

- drawing a computer-made scheme of the exhibition hall with all the booths in an appropriate scale,
- coloring the zones according to similar commodities presented,
- drawing a graph G_S ,
- defining the appropriate coloring of the vertices of G_S coloring of these vertices
- defining a graph G of possible clients' moves,
- palette-coloring the vertices of the graph G .

The computer-made plan of the exhibition hall, see Fig. 2, was made in a scale with a help of a square grid G_S . The areas rented by exhibitors were colored according to the presented set of commodities, diverse set of commodities obtained different colors. No set of commodities was colored full-white, or full-black. The same colors were assigned to the vertices of G_S covered by rented areas. All the remaining vertices of G_S obtained full-white color.

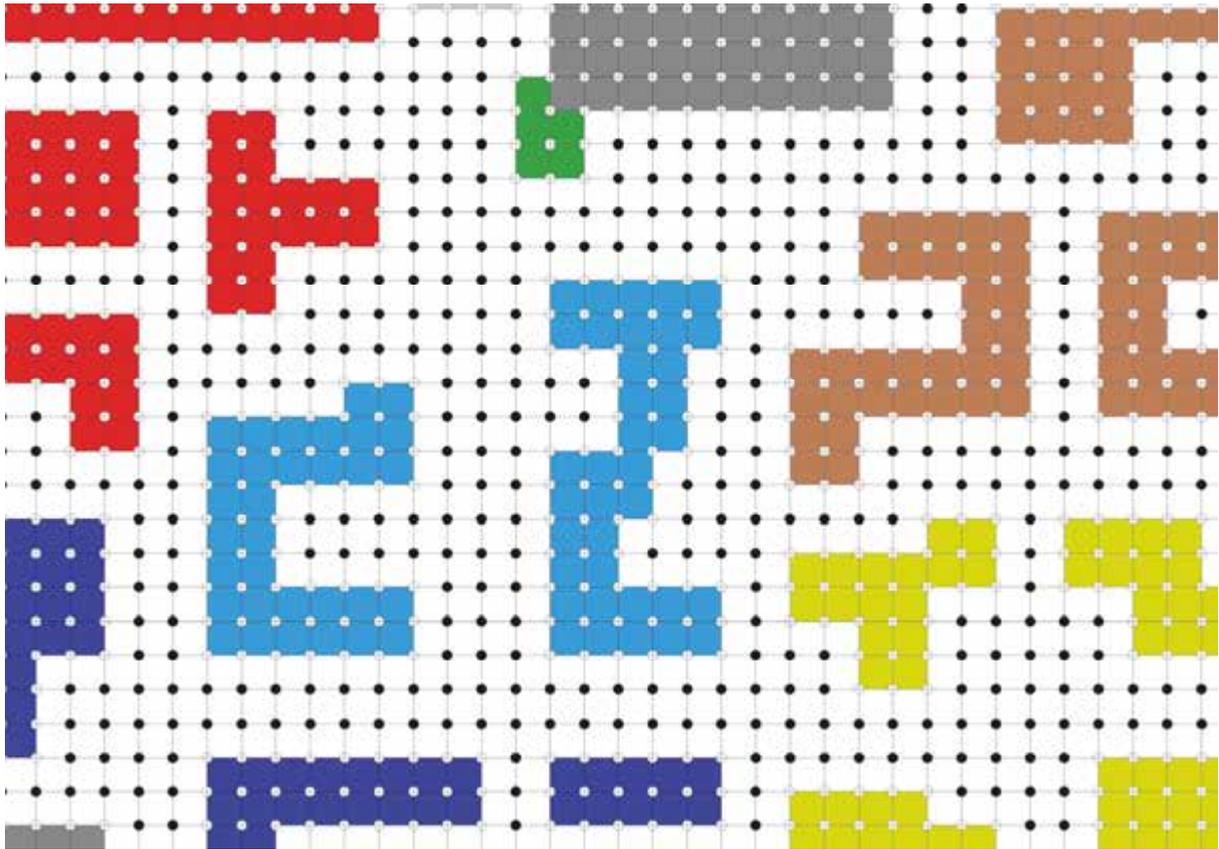
A graph G of slightly simplified possible movements of clients was defined as an induced subgraph of G_S on the set of vertices $V(G) \subset V(G_S)$ colored full-black at Fig. 2. Clearly, $G(V(G), E(G))$ is an unit distance and planar graph.

A palette coloring $\pi(G)$ of the graph G in which one or more color is assigned to each vertex was defined by the procedure that is summarized in the particular points below.

Let v be a vertex of a graph G . A color palette $P(v)$ (see Fig. 3) is assigned to the vertex v according to the following conditions:

- full-black color b is in $P(v)$,
- color c is in $P(v)$ whenever the Euclidean distance of the vertex v from the rented area colored c is lesser or equal to 1.

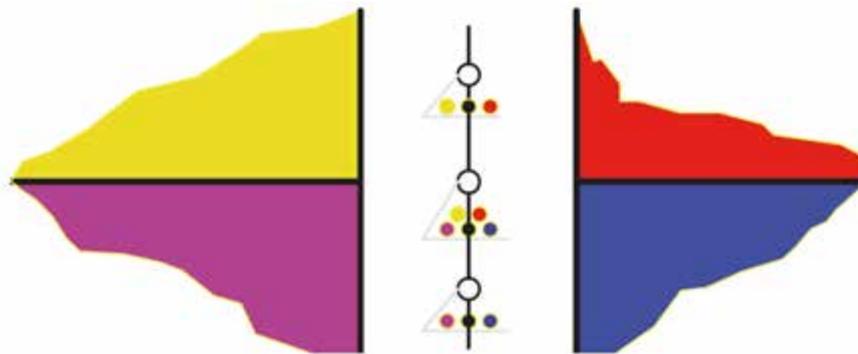
Fig. 2: Graphs G_S and G



Source: (Authors, based on Drabiková and Fecková Škrabul'áková, 2018)

Now denote $S_{P(v)}$ the size of a palette $P(v)$, i.e. the number of colors in $P(v)$. Clearly, $S_{P(v)} \leq 5$ for each $v \in V(G)$, see Fig. 3, as G is an unit distance graph and for every $v \in V(G)$; $b \in P(v)$. Finally, denote $N_i S_{P(v)}$ the number of different colors in palettes of the i -neighborhood of v .

Fig. 3: The situation in which there is a vertex v with $S_{P(v)} = 5$



Source: (Authors)

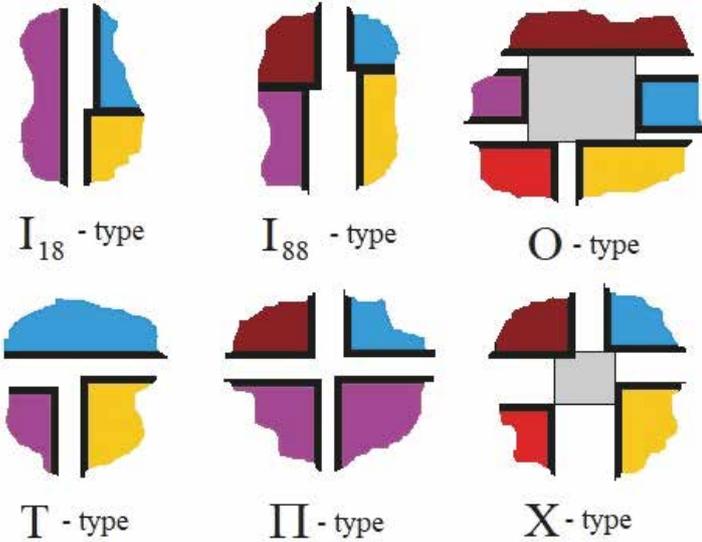
The preparation of an adequate and useful graph model was the crucial task of the research. Defining the appropriate coloring of the vertices of G_S and a graph G of possible clients' moves were the major objectives. Although the palette-coloring of graphs is known term in the discrete mathematics, its conjunction with the solution of economic task is the novelty of authors. According to our knowledge, it is one of the first, if not the first at all, application of palette-coloring of graphs in order to find a solution of an optimal allocation problem.

3 Solving the problem

In general, expositions in exhibition halls are organized functionally, that means that similar commodities are grouped together in some area of the hall although these areas might not be unique. The reasons are pure logical: duplicitous customers field of interest, price comparison of individual products and services, targeting on a specific group of clients, achievement of the competition, link-up new partners and many more. The better is the organization of the event, the greater is the satisfaction of clients and exhibitors, the higher is the probability that they will come again and that the business will prosper for each of the parties involved. The satisfaction depends on many factors, not only on big issues, but from details, as well. Therefore, good organizer of an event has to take care about the identification of optimal allocation of guide signs too. With the help of the graph G described in the previous section this task is easy solvable.

As the move of the visitor is allowed only along given paths, the guide signs should be placed at some points of these corridors. Their position should help the visitors of an event find one's way in the exhibition hall. The number of the guide signs should not be too large, because it lifts the expenses of the organizers, acts disturbingly and causes bewilderment. The guide signs have to be easy readable, hence, their shape, position and distance between two consecutive guide signs should respect the visual function of healthy human eye. The strategy of finding an optimal allocation of guide signs in the hall should respect all these natural conditions of the organizers of an event in the large exhibition hall.

Fig. 4: Meet of three or more color zones



Source: (Authors)

Remark, that a place, where 3 or more color zones of Fig. 2 meet, could be one of the following types: I_{18} , I_{88} , T , π , X , or O , where O groups together all the remaining situations. Out of these types only T , π , X and O are called crossroads and grey area in the middle of X -type and O -type crossroad, see Fig. 4, is called crossroad-square here.

The orientation at T -type and π -type crossroads is intuitive and easy, therefore, putting a guide sign here would not be economical. Hence, only X -type and O -type crossroads should be associated with a sign. Naturally, guide signs should be placed at crossroad-squares of the graph G . Cost saving and practical reasons do not allow to

associate all such vertices with a sign. The optimal allocation of the guide signs can be found in two steps:

1. Let v be a vertex of crossroad-square and let $i > 0$ be as small as possible such that $5 \leq N_i S_{P(v)}$. Then we place a guide sign at a position of v except that it would be necessary to apply some moves defined by condition 2.
2. Check, whether the distance (in postman metrics) between two consecutive guide signs of the same crossroad-square is greater or equal to 5. If not, replace these two signs by one (containing the join information from both) placed in the middle-point of the path between the points of two signs and repeat this procedure until the distance condition is fulfilled.

4 Reasoning

The only case when $N_i S_{P(v)} = S_{P(v)} = 5$ is for $i = 0$ and it is the one when v has distance 1 from four differently colored commodity sets. But in this case v is not lying at a crossroad-square - see Fig. 3, its degree is 2 and there is no reason to put a guide sign at a place of v . Hence, $i > 0$.

From the palette-coloring algorithm it is clear, that at crossroad-square of X -type or O -type crossroad there exist a vertex v for which $N_i S_{P(v)} \geq 5$ for some $i > 0$.

The second condition is natural, based on cost saving too. The condition for the minimal distance between two consecutive guide signs was not chosen randomly, but it rose from a visual function of healthy human eye.

For visual acuity testing are frequently used Snellen charts. Snellen's charts published in 1862 (Snellen, 1862) used alphabetic capitals and numbers in the 5×5 grid. Subsequent rows had increasing number of alphanumeric symbols decreasing in size. The patient read the symbols from the distance 6 m with one eye covered. This method is widely practiced also nowadays, most often with distance 5 - 6 m between the patient and the board, although the research of Ferris et al. (1982) showed that maximum visual acuity and minimum dispersion of visual acuity scores can be obtained at a test distance close to 4 m. Therefore, we consider minimal distance 5 m between two consecutive guide signs being optimal.

Conclusions

In the present paper we have shown an implementation of graph models and algorithms by solving a model cost saving task. We have described a fraction of more complex problem for a company organizing exhibition events. Namely, we have dealt with an identification of optimal allocation of guide signs via graph models and graph coloring.

We have found an adequate graph model of the given exhibition hall. We have defined its coloring thanks to which we were able to define the graph of possible clients' moves. The palette-coloring of this graph helped us to find an optimal allocation of guide signs in the large exhibition hall keeping in the mind all the conditions given by the organizers of an event in the hall. These natural conditions were defined with respect to visual function of healthy human eye, easy orientation in the hall, cost saving and satisfaction of both clients and organizers.

Although graphs were already used in many areas of economics in order to solve different problems, the usage of palette-coloring in this connection is a novel technique. According to our knowledge, it was never used before in this connection.

Solving the task presented is interesting both from economic and business-prosper point of view. The better organization of an event reflects in both clients and exhibitors satisfaction. Their comeback is welcomed for all parties involved. What is more, our proposed solution of the task has also a secondary effect reflected in cost-saving, as it is always a big advantage to know about the optimal quantity of information signs or optimal allocations of other items required.

Although our implementation model concerns distribution of issues in a large exhibition hall, similar algorithm could be utilized in many other navigational situations starting from orientation at a large campus, airport, bus or train station, shopping mall, city market, up to sport activities.

Acknowledgment

This work was supported by the Slovak Research and Development Agency under the contract No. APVV-14-0892 and by the grant VEGA 1/0908/15.

The authors would like to thank the anonymous referees for their valuable comments that improved the quality of this paper.

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Received: 24. 04. 2018, reviewed: 13. 09. 2018

Approved for publication: 08. 04. 2019

THE CURRENT PERCEPTION OF PERSONNEL MARKETING

Otakar Ungerman, Světlana Myslivcová, Jaroslava Dědková

***Abstract:** The basic prerequisite for the presented research was research of scientific databases. This theoretical basis is for primary two-level research. The first level consists of quality research for which important companies in the Czech Republic were selected, presenting applied personnel marketing. The result was 13 attributes which HR staff view as the way to conduct personnel marketing. The resulting attributes were the basis for quantitative research. For uncovering of potential latent attributes the results were subjected to factor analysis. The result of the research is a targeted overview of how companies perceive personnel marketing as well as how they use it. Research has been carried out in the Czech Republic, but the results are applicable globally, because all enterprises in survey have a parent company in the EU, USA, Japan or China, and apply their corporate culture. The results of the research are applicable both in the theoretical area where they moved to the examined issues forward and in the practical area where they may serve for better work with human capital.*

Keywords: Human Resources, Corporate Communication, Management, Personnel Marketing, Factor Analysis

JEL Classification: M31, M51.

Introduction

Thanks to the effects of the environment there is an apparent more intensive focus by personnel staff and managers on the market on human capital and its effective management in the company (Szarková, Andrejčák and Matkovčiková, 2014). Human work is currently the most important production factor. A person as the bearer of this production factor in this process of work handling invents, designs, produces and sells. Such person also realizes production and sales processes (Novotný, 2015). The phenomenon of the so-called new economy changes the factors for increasing the company's performance. Material assets ceased to play the main role in the company, as this main role has been taken over by human capital, innovation programmes and research (Šulák and Vacík, 2005). Human capital is spoken of by literature as a unique resource of a company which is capable of reacting to turbulence and changes in its surroundings which is difficult to copy. (Schultz, 1993; Dzinkowski, 2000; Štamfestová, 2014).

The subject of the presented project is personnel marketing. The main research question for the entire project was: **Which companies in the Czech Republic use personnel marketing today?** The paper was created based on extensive research which corresponded to primary research. The contribution specifies two main objectives, three partial objectives and two hypotheses.

Objective 1: To identify the attributes via which personnel marketing is applied in Czech companies.

Objective 2: The rationality of using discovered attributes in a company in practice.

- 2.1 To determine the frequency of the use of attributes of personnel marketing.
- 2.2 To determine the effectiveness of attributes of personnel marketing.
- 2.3 To determine the importance of the categorizing parameter, the size of the company.
 - H₁₀: The size of the company has no effect on the results of the effectiveness of attributes.
 - H₂₀: The size of the company has no effect on the results of the frequency of use of attributes.

1 Personnel marketing

Personnel marketing may be viewed from many angles, which is also apparent from the variation of individual definitions in literature. In this contribution the particular issue is perceived as such that within personnel marketing potential as well as current employees are understood as customers, which is apparent for example in theoretical opinions expressed in the work "Social relationships in organization and their management from Bednář et al. (2013), which mentions the thought of Philip Kotler from the work Principles of Marketing – "Employees can be understood as customers, and therefore the relationship between them and the company can be viewed from the point of view of consumption of a career." It can therefore be stated that personnel marketing is based on the continuous satisfaction of the needs and wishes of employees or potential employees (Kotler and Armstrong, 2015). The research of d'Ambrosové (2014) documents that personnel marketing is based on building a long-term relationship between the employer and employee. The author also claims that firms must above all strengthen long-term communication with employees and identify in advance all new HR trends such as personnel marketing. The concept of personnel marketing is spreading quickly around the world today, the result of the concentration of companies into large multinational corporations that track and introduce the latest HR methods, including personnel marketing (David, Griffith and Lee, 2016).

Jerzy Altkorn (2002) in his work defines personnel marketing with other words, but the basis, which is employee satisfaction and company competitiveness, remains the same. Is focused on creating specific capabilities of employees which lead to behaviour toward customers the main objective of which is for the company's competitiveness to remain at a high level (Otto, 2004). The application of personnel marketing primarily provides employees with satisfaction with their work, with working conditions, and with their employer, and fulfils their expectations. This of course secondarily leads to greater customer satisfaction, to building and maintaining strong business ties with customers and to increasing the companies effectiveness as a whole (Zarnik-Zulawska, 2012). Dvořáková (2004) in her view of the particular issue has pointed out that during the application of personnel marketing two segments can be focused on, specifically potential employees and current employees. Other current professional literature divides personnel marketing into internal and external categories and states that the contents and subject of personnel marketing are the means, tools and processes used for offers and sale of jobs on the labour market to those possessing the labour force and that this is a means of behaviour by the organization in the role of the seller of a job on the external and internal labour markets (Szarková, Andrejčák and Matkovčiková, 2015). In professional circles however the opinion can be observed also that it is not necessary to categorize personnel marketing (Kerzner and Kerzner, 2017). states that personnel

marketing can be categorized into internal and external categories, although this categorization cannot be radically maintained. Menšík (2013) in his contribution holds the opinion that division of personnel marketing into internal and external categories has no significance.

Marketing managers use a marketing mix to create their strategy. Some authors (e.g. Spielmann, 2015; Pratoommase, 2015; Ungerman and Myslivcová, 2018) also divide personnel marketing into a mix of five tools: product, price, place, promotion and personality. These individual tools are presented in Tab. 1.

Tab. 1: Personnel marketing tools and their content

PM tools	Examples of the use of personnel marketing tools
Product	Work position and demands on the employee; Organisation of work position; Work period; Work-life balance; Work satisfaction.
Price	Work position value; Work position expenses (salary/wages); Employee recruitment and training costs.
Place	Job location; Company culture; Company image.
Promotion	Job offer; Employer branding; Public relations.
Personality	Relationship between employee and employer; Professional and personality traits of employee; Employee attitudes; Ability to work on a team; Employee value system.

Source: own processing of external sources.

The table presents the resulting list of tools and examples of personnel marketing. Tools and examples from multiple authors are provided (Spielmann, 2015; Pratoommase, 2015; Bednář, 2013; Vysekalová, 2011; Gaddam, 2008; Šlapák and Štefko, 2015; Varian, 2016; Kociánová, 2010; Sukoco, 2017; Novotný, 2016; Mazánek and Konečná, 2016).

2 Research methods

As far as used methods are concerned, both the quantitative method and the qualitative method have been applied in research. Both research methods have been applied in connection with each other so that the qualitative method precedes the quantitative method. An in-depth interview was used for the qualitative research. Company culture was used as the sorting parameter to divide the in-depth interviews into four groups of respondents. The first group was composed of companies with Czech ownership, the second group those with European owners. The third group was composed of firms with American owners, the fourth with Asian owners. Three representatives were chosen from each group for in-depth questioning. Another condition for inclusion in the research was the use of personnel marketing. A key HR manager was always addressed for questioning. A total of twelve respondents were included in the group evaluation. The resulting list of personnel marketing attributes subsequently served as the foundation for the qualitative research, which was conducted by means of an electronic survey. Simple random sampling was used so that statistical evaluation methods could be employed. The basic group was composed of medium and large companies. A total of 550 companies from a database of firms were addressed for the survey. One-hundred relevant responses were obtained, i.e. a rate of

return of 18.2%. The lone sorting criteria was the size of the company: 61 large companies with 251 and more employees and 39 medium companies with up to 250 employees were included in the evaluation. The obtained responses were from the entire Czech Republic, primarily from the automotive industry. These firms are currently characterised as having a lack of employees and great employee turnover, especially in production. This labour shortage is especially apparent in regions with high employee rates, a situation that forces firms to implement personnel marketing in order to secure quality human capital. To ensure the validity of the survey, it was necessary to establish contact with the person from the HR department responsible for personnel marketing.

Respondent selection: for qualitative research, the selection of respondents was carried out via a method of multiple random selection, when a basic file was divided into four groups based on the applied business culture. From each category, a representative was selected, who was subjected to a subsequent in-depth interview. For qualitative research, direct random selection was chosen, where each unit of the basic set has the same probability that it will be selected.

Data collection method: for qualitative research, an in-depth interview method, where it was necessary to consider in advance the contents of questions, their formulation, their sequence and the length of the interview. These matters were resolved in the preparatory part, when detailed planning was carried out, along with testing and final setting of the scene. The basic aim during specification of the questions was to reduce coercion of answers as much as possible through question formulation, and therefore the questions were open, neutral and clear. For quantitative research, electronic questioning was used, which corresponded to arrangements made in advance in person or by telephone.

Data evaluation method: have been derived from the objectives of research and the type of examined data. The obtained data were evaluated by using the statistics program Statgraphics 16. **a) The descriptive statistic determines and** summarises information, processes it in the form of graphs and tables and calculates their numerical characteristics. Data processing methods were used in research: average, standard deviation, modus, median. **b) The testing of statistical hypotheses** serves to confirm a certain claim (hypothesis). The aim is to decide whether a certain hypothesis related to a basic file can be accepted or rejected. In the collected data, normalcy has been significantly rejected, because Wilcoxon's test of conformity of middle values was used.

3 Identification of personnel marketing attributes

The first aim was to identify the attributes via which personnel marketing is applied in Czech companies. In order to fulfil this objective a qualitative data collection method was used along with an in-depth interview. Companies presented as using personnel marketing were intentionally selected for the in-depth interview. The recordings obtained from in-depth interviews were subsequently evaluated by a team consisting of professionals in HR and marketing. Printed and audio records were obtained for all in-depth interviews. These records were gradually encoded, and a thematic homogenous response was provided under each code. The strength of the connection between codes was subsequently defined. Characteristics were then

assigned to individual codes. At the end, individual groups of homogenous expressions were precisely defined. The result was 13 attributes which check HR staff rank in the category of personnel marketing. The resulting list of tools was discussed with addressed personnel staff who agreed on. Each personnel marketing tool has been presented in brief:

1. Analysis of the competition's recruitment strategy can be presented with the aid of the personnel marketing definition of Fotr et al. (2012) as an analysis in which personnel strategies and personnel policies of the competition are continuously processed. Part of them is continuous monitoring of direct competition from the field as well as indirect competition on the labour market. The most applied method for analysis of recruitment strategy of the competition is benchmarking.

2. Research focused on identification of decisive criteria of applicants can be presented according to Otto's definitions (2004) and Koubek's definitions (2012) as part of the analytical component of creation of personnel strategy focused on internal analysis of employees. The aim of identification of decisive criteria is recognition of motivation forces that determine behaviour of applicants. The research is focused on identification of decisive criteria and on subsequent assignment of importance to individual criteria (Vysekalová et al., 2011).

3. Career pages for displaying on mobile phones, according to Ambrosová (2009) and Bednář (2013) but also based on the definition of the marketing mix in traditional marketing according to Vysokalova et al. (2011), Kotler and Keller (2007) and Borden (1994), can be presented as a new means of marketing communication. According to Frey (2011), the use of mobile phones is part of the interactive marketing campaign, the aim of which is to promote a work position. This method can be used in a short period of time to provide information quickly about an available job regardless of the place and time of the recipient.

4. Career profiles on social media can be combined with e-recruitment. Armstrong (2007) in his publication states that e-recruitment is used to acquire employees mainly via social media. Holm (2010) states that the recruitment is simply recruitment via electronic media. The currently most used professional social network is LinkedIn. Information is collected on professional networks regarding people from all over the world who are in groups based on their fields of expertise. Check environment Facebook is also used for career presentations (Novotová, 2016). Social media are an inexpensive way to address professionals.

5. The inclusion of gameplay elements in the recruiting process and communication is intended to make it possible to recognize which job applicants are best for the job. The inclusion of gameplay elements is used to obtain information about how an applicant behaves under stress, or under pressure or about what kind of role he is capable of fulfilling in a collective. Hovorka (2014) states that inclusion of gameplay elements recruitment communication is one of the least used means of personnel marketing. Gameplay elements are very effective for selection for management, mainly during use of the assessment centre.

6. Recruitment at universities is a means of obtaining employees from external sources. The advantage of employees acquired in this manner is great work effort of employees and new know-how, and disadvantages include costs for the process of

recruitment, and it takes longer to fill the job (Kociánová, 2010). Recruitment is usually carried out for fields of expertise with increased demands on the labour market.

7. Targeted recruitment campaigns for specific positions are part of the process of acquiring employees. Stýblo (2003) describes acquisition of employees as an ongoing process during which the best applicants are sought. Werther (1985) states that the success of recruitment is not easily measurable by the number of received applications. The correct type of applicant is much more important than the number of applicants. The targeted recruitment campaign is most often used in a situation when the required and most qualified candidates are not available on the labour market.

8. Separate career www pages according to Vysokajová et al. (2011) can be included in the tools of the communication mix in public relations. In personnel marketing (d'Ambrosiová, 2009), (Bednář, 2013), career pages are presented as part of the handover of comprehensive information to existing and mainly to potential employees. Use of corporate WWW pages for presentation of HR is an effective and inexpensive form of communication (Ungerma, 2014).

9. Corporate culture of an employer according to Koubek (2012) can be connected with these terms: decision processes, problem solving in the organization and the manner of behaviour in a superior's relationship with a subordinate. Company culture resolves the relationship between motivation and the motivation, satisfaction and dissatisfaction depending on the geographic location of the company's origin or that of its parent (Williams et al., 1989; Lukášová, 2010).

10. The video presenting company culture is a tool of marketing communication in which a message is delivered via multimedia technology, which is a combination of audio-visual messages with computers or other devices (Wimmers, 2009). Haywood (1998) states that the inclusion of a company's video presentation contributes to building a positive perception of the company and has an impact on everyone who is interested in the organization or who could be interested in it. The purpose of video presentation is to provide information in an attractive manner for ambitious and motivated future employees who are key to a company's success.

11. The welcoming package for new employees is a part of communication, and its purpose is to present a positive approach for company to new employees (Foret, 2011; Antošová, 2005). This method is a clearly focused type of communication targeting employees during the hiring and adaptation process. The welcoming package most often includes information in written form about the organizational structure, information about basic organization rules and standards, working conditions in the organization and advantages and benefits for employees.

12. The use of instruments to promote customer satisfaction fully corresponds with new trends such as staffing marketing (Poláková and Häuser, 2003). Webster and Lusch (2013) state that there is a need for transition from light and short-term problems to major and long-term problems. Tools supporting employees' satisfaction can include subsidized meals, above standard vacations, short-term leave for rest, contributions to retirement and life insurance etc.

13. Big data is a new term related to the processing of non-structured and not easily defined data which quickly changes in time. McAfee (2012) in his article states only that companies collect too much data but unfortunately do not know what to do with it.

He also states that if they want to transform the data into something valuable they will need new skills and will need to change their style of management. Big data can exist for example in the form of messages and images posted to social media.

4 Use of determined attributes and practice

The second defined objective is intended to “identify the rationality of using discovered attributes in a company in practice”. In order to fulfil this objective quantitative collection of primary data was conducted and the data was divided into two parts. The first focuses on the frequency of use of individual attributes of personnel marketing. Answers to questions can be understood as an objective means of recording use data. The second part assigns effectiveness to individual tools related to how personnel staff perceive them. The contact was established with 100 companies. A total of 61 large companies and 39 medium companies were included in the evaluation. The survey for the quantitative research was composed of two parts. The first part was composed of 13 attributes from the qualitative part of the research (see Chapter 3). The identified attributes were contained in two matrix questions measuring the degree of effectiveness and frequency on a scale of 1 to 6. The second part of the survey was composed of identification questions for determining information on the respondents. However, only company size, where certain differences were identified, was included in the presented research. Among the other sorting questions – field of business, company culture, type of company and company headquarters – no significant differences were determined. Therefore, only company size in Tab. 2.

The basis for subsequent statistical evaluation was determination of the **frequency** of the use of discovered attributes, which were the contents of the first partial objective which was to determine the frequency of the use of personnel marketing attributes. The questionnaire for research a frequency consisted of 13 attributes which were obtained from qualitative research. Companies responded to these attributes on a scale of 1 to 6, where one meant continuous use and 6 meant non-use. The average, variance, modus and median were calculated. The responses to the question "How often are personnel marketing tools used in your company?" are presented in Tab. 1. During the overall evaluation of the first partial objective very bipolar results can be observed, which is most apparent from the modus values. These are the attributes from frequency one and attributes from frequency six. There are almost no evaluations between these extreme variants. This situation can be interpreted as major agreement in opinions regarding individual attributes and their use or non-use. If the evaluation is based on the median, then such bipolarity is not so clear since there are attributes which do not acquire extreme values.

The second partial objective was to determine the **effectiveness** of personnel marketing attributes. The reason for evaluation of effectiveness was that there were in-depth interviews in which personnel staff stated that they wanted to use certain attributes more intensively. The type of company culture is the reason why the situation does not apply. A domestic company is often owned by a foreign company which has standardized rules for HR and which cannot decide operatively.

Tab. 2: The effect of a company's size on the resulting effectiveness and frequency of use and difference of attributes.

Effectiveness					Clas. of attributes			Frequency				
p-val.	sd	\bar{x}	\hat{x}	\hat{y}	No.	Difference	Size	\bar{x}	\bar{y}	\bar{z}	sd	p-val.
0.600	1.703	3.8	3	3	1	0,5	Medium	5	5;6	4.3	1.679	0.987
	1.509	3.3	3	3		1	large	4	3;1	4.3	1.509	
0.800	1.577	3.4	3	3	2	0,5	Medium	4	6	3.9	2.023	0.367
	2.150	3.3	3	3		1,2	large	5	6	4.5	1.598	
0.167	1.089	4.5	6	4	3	0,8	Medium	6	6	5.3	1.679	0.489
	1.922	3.6	4;6	4		1,6	large	6	6	5.2	1.346	
0.031	0.934	3.8	4	4	4	0,9	Medium	6	6	4.7	1.849	0.181
	1.912	2.5	1	2		1,3	large	4	6	3.8	1.958	
0.082	1.289	4.5	6	4	5	0,5	Medium	6	6	5.0	1.789	0.594
	1.932	3.4	2	3		1,5	large	6	6	4.9	1.634	
0.018	0.964	3.8	2;6	3	6	0,2	Medium	4	6	4.0	1.897	0.090
	1.229	2.0	1	2		0,8	large	3	1	2.8	1.701	
0.529	1.274	2.2	1	1	7	0,3	Medium	2	1	2.5	1.916	0.355
	1.853	1.6	1	1		0,3	large	1	1	1.9	1.329	
0.016	1.660	4.1	4	4	8	0,2	Medium	6	6	4.3	2.149	0.671
	1.776	2.4	1, 2	2		1,5	large	4	6	3.9	2.187	
0.091	0.693	3.2	2	2	9	0,1	Medium	3	2;6	3.3	1.954	0.865
	1.287	2.0	1	2		1,1	large	3	1;3	3.1	1.676	
0.002	1.349	4.8	6	5	10	0,7	Medium	6	6	5.5	1.036	0.150
	1.703	3.1	3	3		1,1	large	6	6	4.2	2.166	
0.670	1.509	2.5	2	2	11	0,4	Medium	2	1;2	2.9	1.916	0.055
	1.577	2.6	1	2		1,5	large	5	6	4.1	2.127	
0.167	2.150	2.4	1	1.5	12	0,4	Medium	3	1	2.8	1.991	0.350
	1.089	1.5	1	1		0,6	large	2	1	2.1	1.412	
0.121	1.922	4.9	6	5.5	13	0,4	Medium	6	6	5.3	1.555	0.779
	0.934	4.1	3	4		1,3	large	6	6	5.4	1.155	

Source: own calculation. (1 = maximum effectiveness, 6 = non-effectiveness)

Answers to the question "What kind of effectiveness do you assign to specified PM tools in your opinion?" The evaluation in Tab. 2. In the evaluation of the second partial objective it was determined that personnel staff agreed on the evaluation as demonstrated by the low variance. From all of the results 11 identified attributes can be labelled as effective. Only attribute 3, career pages for displaying on mobile phones, and 13, big data, are in two indicators (modus and arithmetic average) evaluated the same as ineffective and/or less effective. For these two attributes there is a need to re-evaluate whether to keep them in the list. For attribute 3 it is necessary to consider the current use of mobile marketing in practice, which already for a lengthier period of time has been understood as an effective marketing tool with a major future. The use of mobile marketing will grow with the number of smart phones in use among the inhabitants. For the second attribute 13 it is necessary to consider its expected future uses.

The purpose of this section has been to compare the frequency of use with the effectiveness of individual attributes and based on the comparison to respond to the second objective of the contribution, which is determination of the rationality of the use of discovered attributes. For this purpose a difference analysis was carried out in Tab. 2 which for each respondent compares the difference between the score of frequency and the score of effectiveness. For this purpose it makes the most sense to

use the results of the arithmetic average. The results of the difference analysis have confirmed that for all attributes effectiveness exceeds frequency. The difference ranged from 0.32 to 1.1 of the scale point. With the help of this comparison attributes were identified in relation to which frequency could be intensified, since they are understood by HR staff as effective. It can be concluded in general the differences exist between effectiveness and frequency. These differences are all for the benefit of effectiveness, which means that companies do not use discovered attributes in a rational manner, and there is room for improvement.

5 Influence of the sorting parameter

The evaluation of the research so far need not necessarily correspond to all companies from the point of view of the sorting parameter which was the size of the company. Therefore the third partial objective was determined, which was to determine the significance of the sorting parameter. A total of 100 companies were included in the evaluation, of which 61 were large with more than 250 employees and 39 were medium with more than 50 employees. Smaller companies were not included in the research. The reason for this was the expectation the company need not necessarily have a personnel department and therefore the responses to personnel marketing would not necessarily be valid. The effect of company size on the evaluation is based on testing of statistical hypotheses using Wilcoxon's method of a non-parametric test of conformity of middle values. The test is done separately for the frequency and effectiveness. The tested hypothesis is the same for both evaluations.

$H_{1,2}0$: The size of the company has no effect on the results stemming from research.

$H_{1,2}1$: non $H_{1,2}0$

Tab. 2 specifies the p-values for the conclusions of Wilcoxon's non-parametric test for individual attributes. The results of the test are complemented by an evaluation of the middle value median, modus, arithmetic average and variance. The testing was carried out at the level of significance = 0.05. For the evaluation of the effectiveness the test proved the statistically significant differences for attributes 4, 6, 8 and 10 among groups of respondents from middle sized and large companies. Overall for these attributes it can be stated that we reject $H_{1}0$ and accept $H_{1}1$: **“The size of the company has an effect on the results stemming from research.”** This evaluation is also confirmed by additional presented middle values. From all of the middle values in the table, it can be concluded that large companies associate higher effectiveness with identified attributes. For these four attributes higher effectiveness has been proved by modus, median and average. During evaluation of frequency, the test proved that no statistically significant differences existed in the evaluation of large and mid-sized companies, which is confirmed by the resulting p-value. Attribute 11 was closest to the confirmation of difference of middle values ($p \text{ value} \leq 0.055$). But even here there was no absolutely clear confirmation. In general it can be stated for all tools that: we do not reject $H_{2}0$ “The size of the company has no effect on the results stemming from the research” but we also do not accept $H_{2}1$. During comparison of the frequency among mid-sized and large companies there are no differences in use.

Conclusion

This contribution focuses on the current perception of personnel marketing in the Czech Republic. This area is currently understood as one of the progressive methods used in work with human capital. The contribution is based on research studies which have identified the creation and development of personnel marketing. Most of the information comes from foreign literature, and it can be stated that the term personnel marketing first appeared in German personnel work and was connected with the acquisition of labour and focused on a shortage of persons in the labour force with university education. In the Czech Republic scientifically valuable sources about this sector almost do not exist. From this point of view a unique project has been presented which provides a reflection of how Czech companies currently view the sector. The contribution is a compilation of theoretical knowledge and conducted primary research. The realized project presented by this contribution led to several important findings.

The first important finding is that it is not necessary to divide personnel marketing into internal and external categories. From a marketing point of view, an employee or potential employee is viewed as a customer. Personnel marketing applies to management of human resources on marketing approach, marketing strategy, marketing methods and techniques which are used consciously in HR management. Other important findings originated from conducted research. This fundamental discovery is the fact that all discovered attributes and factors that Czech companies include in personnel marketing are part of the strategic personnel plan. It cannot be stated that all parts of the strategic personnel plan are viewed by Czech companies as personnel marketing, but this is a very interesting finding. If the results of research are analysed in detail and combined with the personnel strategic plan, then three groups can be created. The identified attributes are part of the analytical, strategic and realization phases.

1st group consists of attributes 1, 2, 13, and the entire group can be placed under situational analysis, which is a basic source of information related to the strategic personnel plan. Needs to be determined constantly and continuously worked on.

2nd group consists of attributes 6, 7, 8, 9 and 12, and this group can be placed under personnel strategy, which is one of the basic points of strategic personnel planning.

3rd group consists of attributes 3, 4, 5, 10, 11, and this group can be characterized as short-term fulfilment of the personnel strategic plan. In plan hierarchy this activity is often referred to as tactics or as the action plan.

The Czech economy is currently experiencing a labour shortage. The results of the study could help HR departments gain competitive advantages in acquiring quality employees and retaining their current employees. The thirteen identified attributes could be the foundation of an HR strategy or a suitable addition to an existing strategy. The results of the quantitative research could help HR managers correctly determine the degree to which individual attributes should be included in their strategies. It is important to focus on attributes with high efficiency. An interesting fact discovered during comparison of the frequency of use and effectiveness is the ineffectiveness of current use. This has appeared in research and has proved that personnel staff would like to use all attributes more, but for certain reasons this is not accepted by companies. This situation could have two causes:

1) A company does not need to apply personnel marketing in the Czech environment. If we identify with the proven fact that demand for human resources is related to a country's GDP growth, then such claim is impossible to make. At a time of economic growth, demand for certain work positions exceeds supply. This leads to pressure on HR departments and subsequently to application of any effective means and to use of personnel marketing. The most recent significant growth in GDP in the Czech Republic occurred in 2014 and so far has lasted to the first half of 2016. This growth is leading to increased demand for certain types of jobs. These include technical and manual labour positions as well as key management positions. It can be concluded from this situation that the application of personnel management is necessary for most checked companies.

2) The management of a company is not willing to accept a marketing approach in HR. Large and medium-sized companies on which the research has been focused are often linked to their parent companies and cannot quickly change their strategy in work with human capital. A situation that appears often is when top management prevents deeper implementation of personnel marketing while waiting for a parent company's decision. The parent company often is unable to react flexibly to the situation and therefore prevents subsidiaries from acting operatively. Based on in-depth interviews and research, this second variant is a more likely reason why checked companies use personnel marketing to a greater extent.

It was claimed during the conducted research that personnel marketing is merely an increase in costs for HR. However, this claim has not been confirmed by any of the addressed HR staff. It can be claimed based on the research that increased costs for personnel marketing are perceived as an investment which overtime returns in the form of better quality human capital. The conclusion of the comparison which is based on research and primary studies is that HR staff know personnel marketing and attempt in most cases to implement it in the company. Since the method of examining HR is still relatively new in Czech conditions, this implementation is not yet perfect. In the future the use can be expected to be shifted to higher values in frequency of use. There is also not any consensus among Czech HR staff regarding the exact definition of personnel marketing. However, a basic agreement does exist that it is necessary to change the thinking in relation to employees and to begin to perceive them as customers around whom everything in the company revolves even in the case of manual labour professions.

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Received: 02. 01. 2018, reviewed: 25. 05. 2018

Approved for publication: 24. 10. 2018

ANALYSIS OF E-COMMERCE ACCEPTANCE USING THE TECHNOLOGY ACCEPTANCE MODEL

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Abstract: *The adoption of e-commerce by a population requires an analysis of its social, cultural and economic environment, so it is necessary to propose and validate models based on the particularities of each region. From this need arises present research with the objective to examine the factors of the E-Commerce adoption in university students of the Medellin city, through the technology acceptance model, adding the variables of Perceived Security and Trust. The quantitative methodological design consisted of a cross-sectional exploratory research study in order to validate the model. A quantitative self-administered questionnaire was applied to 369 university students from the city of Medellin. To check the validity of the measurement scale used, it was developed to confirmatory factor analysis. Various hypotheses were collected and the degree of association was measured by the statistical Somers' D and Cramer's V. In this study, the attitude is correlated in 0.61 with the intention, being the variable with the greatest impact. Furthermore, the ease of use, perceived usefulness and trust, are antecedent of online shopping intention*

Keywords: *E-commerce; Technological Acceptance Model; Online Shopping Intention; TAM.*

JEL Classification: *M10, O33.*

Introduction

The use of technology and internet in many fields is becoming stronger with the passing of time (Venkatesh, et al., 2016). Besides, technology has significantly impacted the lifestyle of people, their preferences, customs and habits, changing radically their behaviors (Hassan, et al., 2015). In this sense, communication technologies have revolutionized the global economy of all types of companies during the last decades (Martin & Vasilciuc, 2011), forcing to rethink their marketing strategies (Anato, 2006). Therefore, internet has become an essential platform to establish all kinds of links (O'reilly, 2007), including marketing, distribution and sales (Corbitt, et al., 2003).

Moreover, the increasing availability of Internet-enabled devices (such as smart phones and Tablet PC) has promoted changes in the behavior of online shopping (Wagner, et al., 2013; Madden, et al., 2016). For that reason, (Rapp & Islam, 2003) introduced the term "*multichannel e-commerce*" to describe a retail sale system based on Internet, mobile phones and multimedia kiosks in retail stores. In this type of trade, various activities are included such as the exchange of goods, services and information, online delivery of digital content, electronic fund transfers, promotional activities, advertising of products and services, among others (Wagner, et al., 2017).

Electronic commerce does not replace traditional commerce but creates a new type of trade combining both. It means, traditional trade will never cease to exist, since even large chain stores offer and sell their products in different geographical locations

through their websites (Shim, et al., 2013) (Nadeem, et al., 2018). To promote the use of e-commerce and use all its advantages, it is necessary to understand how and why people choose to adopt technology (Schuster, et al., 2015; Villa, et al., 2018). Therefore, this paper presents an application of Technology Acceptance Model (Davis, 1989; Ruiz, et al., 2011), in order to address the phenomenon of technological acceptance of e-Commerce in university students of Colombia. First, this paper presents the fundamental theory, followed by the model; then, the results and conclusions of the study are presented.

1 Statement of a problem

In recent years, many studies have focused on electronic commerce and its adoption (Al-Alawi & Al-Ali, 2015; Chaparro-Peláez, et al., 2016). Electronic commerce is defined as any commercial transaction where the parties interact in an electronic way instead of physical contact (Nezamabad, 2011). This type of commerce includes various activities such as the exchange of goods, services and information, the online supply of digital content, the electronic transfer of funds, promotional activities and advertising of products and services, among others (Wen, et al., 2001). Different transmission channels via internet or other computer networks can be established in different ways such as business to business, consumer to consumer, business to government, and business to consumer (Gorla, et al., 2015).

1.1 Motivation in the Decision of Buying on Internet

Within the context of electronic commerce, there are several factors that encourage or discourage a person to make a purchase. Understanding what motivates the purchase of goods and services by electronic ways, including internet, allow companies to focus their e-marketing strategies (Cao & Yang, 2016). The literature review shows two types of motivations: utilitarian and hedonic (Blas & Mafé, 2006).

Many conveniences can be found when looking at utilitarian motivations: time savings, variety and wide assortment, access to products not available in the local market, price reduction, easy access to information and lower costs (Blas & Mafé, 2006; Delafrooz, et al., 2011). Furthermore, studies conclude that convenience and comfort are factors that drive the online purchase anytime and anywhere (Ruiz, et al., 2011; Ndayizigamiye & McArthur, 2014).

In the literature, it has been found that for men the most important component of the purchase is low price and for women is convenience and timesaving (Blas & Mafé, 2006). In general, researches show that the most influential factor in purchasing decisions is trust (Abyad, 2011). Researches also present the aspects in the electronic media that companies should consider, i.e., customer service, quality, timely delivery, persuasive presentations, shipping and handling, reasonable prices, company reputation, transaction security and information privacy (Abyad, 2011). In the same way, economic incentives and value added -in terms of money, time and energy- are used to reduce the levels of risk (Nezamabad, 2011).

In that sense, there are two theories that support the topic. The Theory of Reasoned Action (TRA), which states that beliefs and perceived benefits in online shopping are mediated by attitudes (Delafrooz, et al., 2011); and the Technology Acceptance Model (TAM), which allows to identify two specific beliefs that affect the acceptance of

innovations in computer science: perceived usefulness and perceived easiness of use (Ruiz, et al., 2011). It is important to have in mind these models and how they can be used during the research.

In contrast to those theories, (Blas & Mafé, 2006) developed a study where it was observed that the principal reason why consumers use the Internet to buy is convenience. This is because internet brings several advantages like perform various activities simultaneously during the purchasing process, purchasing 7 days a week 24 hours, and it also avoids travelling to the dealer. Furthermore, it was established that there is also a positive and statistically significant relationship between the motivations of purchase and the volume of spending on Internet (Sila, 2019). With respect to customer loyalty, researchers have found that buyers who are guided by the price, exhibit less loyalty when purchasing and are unwilling to pay high prices. It was also shown that consumers, who maintain a positive attitude towards online shopping, maintain their purchase intentions (Delafrooz, et al., 2011). While another study has found that there is a direct effect between convenience and usefulness of the Internet as a means of purchase (Ruiz, et al., 2011).

Finally, it is recommended that companies guide their efforts to try to capture more consumers through the network, by strengthening their motivations to make more visible the act of purchase (Smith, et al., 2014). To accomplish this, companies must ensure an easy, simple and convenient online shopping process because it is less confusing to the potential customers (Delafrooz, et al., 2011).

1.2 Technology Acceptance Model

The Technology Acceptance Model (TAM) is a behavioral model that describes the background of the adoption of information technology (Davis, 1989). The model proposes that behavior is a product of Perceived Usefulness and Perceived Ease of Use, and a causal relationship of these two elements with the intended use of Technology (King & He, 2006; Diez, Valencia & Bermudez, 2017)

Perceived Usefulness is associated with the degree to which a person believes that using technology will improve its performance. On the other hand, Perceived Ease of Use is associated with the degree to which a person believes that using technology will have less effort to do an activity (Davis, 1989; Chalela, Valencia, Bermúdez & Ortega, 2016). These two variables have direct influence in the attitude towards the use of technology, and according to (Fishbein & Ajzen, 1975), the attitude is a learned predisposition to answer favorable or unfavorably with respect to a given object. It is considered that the attitude is a result of subject beliefs regarding the behavior and its results, and the importance given to such beliefs (Wagner, et al., 2013; Moreno-Agudelo & Valencia-Arias, 2017).

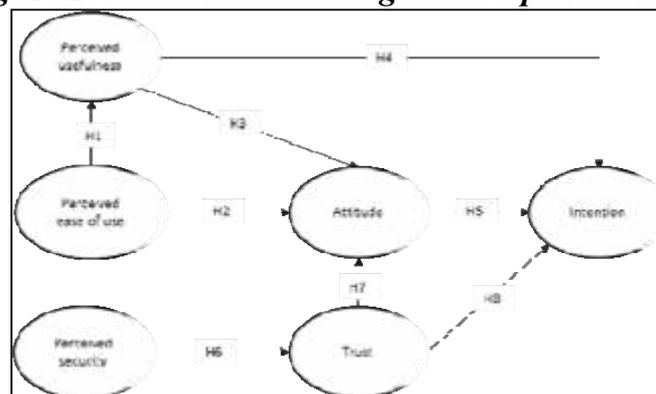
2 Methods

An additional element to the TAM model -fundamental in online shopping- is the Perceived Security and Trust. Security or control that individuals perceived from a transaction will be crucial for the generation of trust. Thus, Perceived Security is an important antecedent of trust (Kim , et al., 2011). And trust is understood as the certainty that an individual perceives that the expectations on the behavior of the other side will be satisfied (Gefen, 2000). Lack of trust leads individuals to inhibit their

intentions to develop behaviors (Gefen, 2000; Tavera, et al., 2011). According to the above, the following hypothesis and model (Fig. 1) are considered as presented in the work of (Tavera, et al., 2011):

- H1: Perceived Ease of use influences Perceived Usefulness.
- H2: Perceived Ease of use influences the attitude towards virtual transactions.
- H3: Perceived Usefulness influences the attitude towards virtual transactions.
- H4: Perceived Usefulness influences the intention of use Internet for transactions.
- H5: Attitude towards virtual transactions influences the Internet use intention for transactions.
- H6: The Perceived Security influences the Perceived trust.
- H7: Trust influences the attitude towards virtual transactions.
- H8: Trust influences the Internet use intention for transactions.

Fig. 1: E-commerce technological acceptance model



Source: (Tavera, et al., 2011)

To this transversal exploratory research, a quantitative self-administered questionnaire was applied to 369 students of the Instituto Tecnológico Metropolitano – ITM, Institución Universitaria Escolme and Universidad Nacional de Colombia. The sample selection was for convenience and for presenting characteristics of a homogeneous population, suitable for statistical studies and reliability tests (Becker, et al., 1987). The university population was used because their training and age makes them an attractive group to promote e-commerce (Vromen, 2007; Gupta, et al., 2008). To measure the factors of the model, a Likert Scale of five positions was proposed, where respondents indicated the level of agreement or disagreement for each element. All the items were on a five-point scale ranging from completely in disagreement (1) going from neutral (3) to strongly agree (5).

The data was collected in a virtual way, from a structured survey that contained the standard TAM scales adapted from Davis' scales (1989) and adapting some questions previously shown in the research of Gefen, Karahanna and Straub (2003) focused in capture interaction and perception of the students.

The questionnaire consists of four sections: Initially informed consent is presented, the objective of the study, the type of participation and the use of data. In a second section, three demographic variables are asked (occupation, age and level of studies).

In the third section, three filtering questions (dichotomous) are asked about Internet shopping experience, e-commerce recommendation and security perception. Finally, the fourth section is composed of 18 questions in Likert Scale, which are divided in groups of three questions in order to measure each of the variables stipulated in the model from different perspectives through the following constructs: perceived easiness of use, Perceived Utility, Attitude towards e-Commerce, Perceived Security, Perceived Confidence and Intention to use e-Commerce.

The intention to use factor is the output variable, so it is measured from several perspectives: intention to use e-commerce platforms, the use of additional mobile banking services for purchase and online purchase preferences versus physical goods purchases, in order to contrast these 3 perspectives of online purchase.

3 Problem solving

3.1 Validity Analysis

To check the validity of the measurement scale used, it was developed a confirmatory factor analysis using the statistical software SPSS. This analysis was performed in order to assess the validity and reliability of each variable -question- (Batista-Foguet, et al., 2004).

To achieve the convergence model was necessary to remove the SP2 indicator, since its standardized weight factor was less than 0.6. On the other hand, the average obtained from weight indicators on each factor was greater than 0.7 for all the constructs, indicating the presence of convergent validity (Tab. 1), as suggested by (Hair, et al., 2001).

Tab. 1: Convergent validity of standardized factors

Construct	Item	Standardized factorial weights	Average of standardized factorial weights
Perceived Ease of use	FUP1	0,876	0,845
	FUP2	0,892	
	FUP3	0,768	
Perceived Usefulness	UP1	0,910	0,910
	UP2	0,910	
Attitude towards e-commerce	ACT1	0,944	0,944
	ACT2	0,944	
Perceived security	SP1	0,857	0,708
	SP2	0,451	
	SP3	0,815	
Perceived trust	CP1	0,876	0,878
	CP2	0,874	
	CP3	0,885	
e-Commerce use intentions	IU1	0,931	0,931
	IU2	0,931	

Source: (Hair, et al., 2001)

Then, two indicators were obtained to determine whether the factor analysis could be done. First, Bartlett's sphericity test was calculated to detect the presence of correlation between variables, providing the probability that the correlation matrix collects significant values; therefore, p should be less than 0.05 or 0.01 critical level (Lévy, et al., 2006).

This analysis was complemented with one analysis of convergent validity and a discriminatory validity by check the confidence interval in the estimation of the correlation between each pair of factors. It should not contain a value of 1 (Anderson & Gerbing, 1988).

Subsequently, it was identified the reliability of the measurement model, and for that, the Cronbach's alpha for the respective scales of each construct was calculated having an adequate internal consistency of the measurement scale, as all Cronbach's alpha values are higher than the recommended 0.70 value (Manzano, et al., 2010)

3.2 Hypothesis Testing

The estimation of the structural model adapted to the use of e-commerce was conducted. Various hypotheses were collected and the degree of association was measured by the statistical Somers' D and Cramer's V. The first is a measure of association between two ordinal variables that takes a value between -1 and 1, where values close to 1 in absolute value indicate a strong relationship between the two variables, and values close to zero indicate that there is little or no relationship between the two variables (Kaplan, 2008). Furthermore, the statistical Cramer's V gives the degree of association between the variables taken into account in the formulation of hypotheses. The coefficient can take values between 0 and 1, where 0 indicates independence and 1 indicates dependence between variables (Malhotra, 2004). The values obtained from SPSS software for each statistical evaluated are presented in the Tab. 5. It has coefficients with higher associativity than 0.3.

Tab. 2: Hypothesis contrast

Hypothesis	Somers' D	Cramer's V
H1: Perceived Ease of use → Perceived Usefulness	0,582	0,429
H2: Perceived Ease of use → Attitude towards online shopping and transactions	0,548	0,429
H3: Perceived Usefulness → Attitude towards online shopping and transactions	0,61	0,452
H4: Perceived Usefulness → E-commerce use intention	0,529	0,385
H5: Attitude towards online shopping and transactions → E-commerce use intention	0,61	0,447
H6: Perceived security → Perceived trust	0,393	0,369
H7: Perceived trust → Attitude towards online shopping and transactions	0,429	0,387
H8: Perceived trust → E-commerce use intention	0,592	0,452

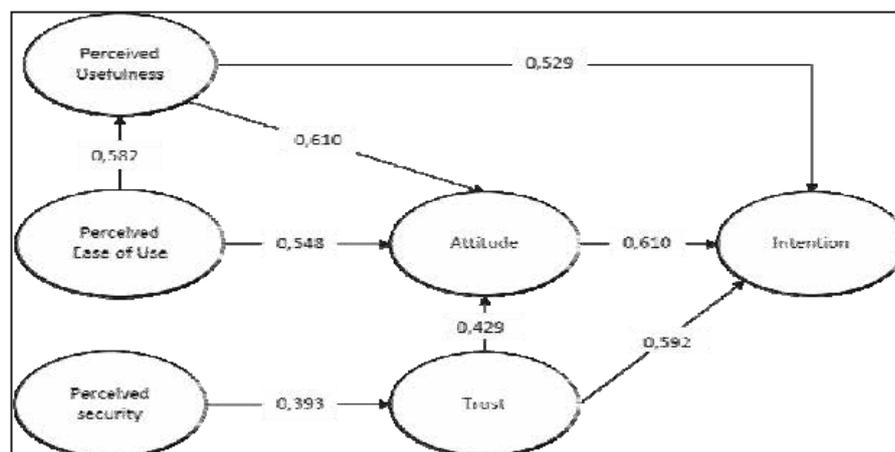
Source: (The authors)

The definitive model of this study (Fig. 2) was built with the relationships discussed above and the values of degree association of Somers's D. (Göktaş & İşçi, 2011). The results of the analysis of association of the variables showed that the Perceived Ease of Use, Usefulness and Trust are the variables that have direct influence on the attitude of using e-commerce. The instrument showed that 49.32% of respondents believe that it is simple to use internet when shopping / transactions. The ease of use has also direct influence on the perceived usefulness. It is consistent with the results of (Ruiz, et al., 2011) in another study on TAM, and the attitude towards the use of these platforms. According to the literature reviewed and our results, the perceived usefulness causes satisfaction leading to the perceived factors of ease of use and attitude about a state of the favourability over the use of e-commerce (Muyllea, et al., 2004).

In relation with the Perceive of security the trust is the factor with the weakest coefficient, explained as the variable that most affects the non-use of online financial services. According to Ventura (2019) although since 2009 there is legislation on computer crimes, the complexity of the rule and the lack of clarity make the processing of these crimes complicated administrative processes, maintaining little confidence in virtual operations by of the users.

The level of relationship between perceived ease of use and perceived usefulness is 0.582. It means that if the website offers a friendly platform to the user, the user will feel affinity and satisfaction, and later it will frequently access to the website. This is confirmed with a 38.25% of respondents according to the proposal before. On the other hand, an associativity degree of 0.548 between perceived ease of use and the attitude factor is evidenced, indicating that if the use of the technology is simple, people are more willing with the website. If the user easily understands a website, this will ensure non frustration and demotivation for visit the site.

Fig. 2: Definitive model



Source: (The authors)

In this study, the attitude is correlated in 0.61 with the intention, being the variable with the greatest impact for acceptance and intention to use e-commerce by respondents. Furthermore, attitude is also conditioned by the ease of use, perceived usefulness and trust, which place it as a direct and principal antecedent of online shopping intention. Perceived security is correlated in 0.393 with the perceived trust. Thus, as there are two predictors of online shopping, it is crucial to focus on them as external variables in the model.

4 Discussion

The strongest positive relationship was found between perceived usefulness and attitude towards use, showing the need to propose better strategies that show users the usefulness and advantages of e-commerce, since it is the most influential factor in the attitude towards the e-commerce and attitude is in turn the most influential factor in the intention to use. Therefore, it could be the most appropriate strategy to achieve a better adoption of the e-commerce. These findings are (Crespo, et al., 2013) who found that perceived usefulness has a positive influence on attitudes towards the use of electronic commerce, and on the perception of usefulness and ease of use of e-commerce, both with and without prior experience with web transactions. Faced with this, (Chen & Chen, 2014) suggest that factors such as the perceived quality of the product as a predictor for perceived usefulness in e-commerce should be included. In addition, (Ergün & Kuşcu, 2013) suggest that proactive market orientation and innovation orientation have positive impacts on perceived usefulness, and it is considered appropriate to deepen research these variables in future studies.

Faced with the positive relationship between the attitude and the intention to use e-commerce, studies such as (Bhati, 2016) suggests that this attitude depends on the knowledge that potential clients have about the risks of theft, information privacy and reliability of the provider. However, in the case of users with previous experience in online shopping, (Oliveira, et al., 2017) found that in addition to attitude, satisfaction must be included as a predictor of purchase intention, since factors such as interactivity, the clarity of information and convenience in the use of e-commerce platforms are elements that this population takes into account when making the decision to re-make a new purchase.

It is also found that exist a strong relationship between trust and intention to use, showing the need to implement strategies that generate security and confidence in users, in such a way that they feel comfortable giving their personal data and the quality of the products they will receive and use. This is consistent with the findings of (Azam, et al., 2012), who showed that trust has a strong impact on the decision to make online purchases, since security, privacy and compliance in the offered service are closely related to aspects such as confidence and satisfaction of making purchases online. In addition, (Tavera & Londoño, 2014) suggest that perceived trust constitutes the construct with the greatest empirical influence on the intention to use e-commerce, which implies that companies wishing to implement e-commerce as a channel to sell their products must generate computer and communication mechanisms that show users the reliability of online transactions on an e-commerce platform.

In developed countries it has been shown that trust depends on security and other variables because it has already been demonstrated in large studies with replication strength (Palvia, 2009; Shreya & Chatterjee, 2019; Ruppel, et al., 2003). However, in underdeveloped countries the weight of each condition is different due to particular macroeconomic situations and political stability and more unstable.

Conclusion

There is no doubt that development of markets and revolution of new information and communication technologies, especially the internet, has changed significantly the

behaviour of companies and consumers, which places electronic commerce in the target of studies and current research markets. This research has applied the technology acceptance model to study the phenomenon of acceptance of e-commerce. Specifically, this study designed and applied a questionnaire in order to research the components and variables that are part of the motivations and intentions of online shopping by the university population of the city of Medellín. In this sense, the study carried out becomes a valuable tool for the scientific community, to the extent that it makes use of TAM models previously validated by other authors, applied to groups of interest in a developing country, where the conditions of confidence have a variability different from those originally proposed in models applied in developed countries with different cybersecurity situations.

A reliable model was adjusted. Perceived ease of use and perceived trust constructs were the variables that had direct influence on the attitude of using e-commerce, which had an impact on the intention of purchase. Perceived security is reflected in the trust, which also generates a direct impact on the e-commerce use intentions.

According to the model results, if a company wants to sell its products successfully via internet, it must ensure a platform as simple as possible. In this sense, buyers can easily detect the added value or additional benefits of doing the purchase in this way, and not in the traditional one. Additionally, this case, with the university population, has a fundamental variable: the necessity of users' trusts in the use of the platform to do payments. The confidence is affected by the security that users perceive about platform. Therefore, the model shows a direct relationship between trust and perceived use intention constructs, indicating that companies should invest resources to make their customers feel confident to pay their products online.

With regard to the practical implications of the research carried out, its results provide key information for entrepreneurs seeking to impact university students, where they should consider factors such as confidence and ease of use perceived by them compared to the platforms available for electronic commerce, key aspect for those organizations that seek to reach their customers through different channels.

In addition, with the realization of the study it is possible to identify a new contribution to the field of knowledge, given that unlike most studies available on e-commerce, it has been prepared in the context of a developing country. that implies different positions on the part of the students and, therefore, diverse factors that affect the acceptance of new technologies, for this case, the incorporation of electronic commerce; what leads to the creation of knowledge from different social, economic and political contexts, and therefore, that nurture the investigative exercise in this field.

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Received: 22. 03. 2018, reviewed: 18. 02. 2019

Approved for publication: 08. 04. 2019

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Journal web page:

<http://www.upce.cz/en/fes/veda-vyzkum/fakultni-casopisy/scipap.html>

Title	Scientific Papers of the University of Pardubice, Series D
Publisher	University of Pardubice Faculty of Economics and Administration Studentská 95, 532 10 Pardubice, Czech Republic
Registration number	IČ 00216275
Edited by	Ing. Filip Gyenes
Periodicity	3 per year
Volume number	27
Issue number	45 (1/2019)
Place	Pardubice
Publication Date	23. 4. 2019
Number of Pages	187
Number of Copies	50
Edition	First
Printed by	Printing Centre of the University of Pardubice

MK ČR E 19548
ISSN 1211-555X (Print)
ISSN 1804-8048 (Online)

