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CONTENT

PREFACE

We are pleased to present the proceedings of the 13th international scientific conference Hradec Economic Days 2015, held by the Department of Economics and the Department of Management at the Faculty of Informatics and Management, University of Hradec Králové on Ferbruary 3 – 4, 2015.

Since its first year, the ´Hradec Economic Days´ conference has undergone dynamic development, and has been positively received by participants, as well as the Faculty and University management, which has been very motivating for the organizers. A significant achievement and a sign of recognition was the indexing of the Hradec Economic Days 2005 – 2011 conference proceedings in the CPCI (Conference Proceedings Citation Index) database on the Web of Science. We are making every effort to ensure that the proceedings from the following years are included in the database as well.

Apart from the increase in the number of participants, the hosting faculty also appreciates the quality of submitted papers, as well as the fact that the speakers at the Hradec Economic Days include leading professionals and researchers from universities and other types of institutions.

It has become a tradition to prepare the conference proceedings of reviewed papers, edited by Ing. Pavel Jedlička, CSc. They include the total of 263 papers, out of which 92 are written in English, 137 in Czech, 27 in Slovak, and 7 in Polish. The authors of the papers come from the Czech Republic (193), Slovakia (38), Poland (31) and Bulgaria (1). In terms of home institutions, the participants represent 32 Czech, 13 Slovak, 15 Polish universities or institutions, and one Bulgarian institution.

The papers are divided into and discussed in eight sections:

I. Current issues in banking and financial markets
II. Macroeconomic context of regional development
III. Tourism economics
IV. Enterprise economics and management
V. Economics and management of regions and enterprises
VI. Ekonomia i zarządzanie regionów i przedsiębiorstw
VII. Mathematical models in economics
VIII. Modern trends in management

The HED conferences are organised with the aim to present the results of research in the fields of economics, business economics, management, tourism and mathematical models, to provide a platform for encounters of experts in related fields, to enable making contacts, which is essential for submission of common research projects. The 2015 HED conference aspires to meet all of these goals, too.

Our acknowledgements go to all the conference organisers.

Hradec Králové, January 6, 2015

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INFLUENCE OF FOREIGN DIRECT INVESTMENTS ON THE CHANGES OF GROSS DOMESTIC PRODUCT IN THE SLOVAK AND CZECH REPUBLIC

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Keywords:
foreign direct investments – gross domestic product – relationship between FDI - GDP

Abstract:
The issue of foreign direct investments is very important mainly in the economies of middle and eastern parts of Europe. These issues are analyzed from an economic but also political point of view. The inflow of FDI is also connected with the process of privatization of previous companies, but also with establishing new ones. In this paper, there is analysed the development of two variables - gross domestic product in market prices and flows of foreign direct investments in the Czech republic and Slovakia during the last 20 years, then to analyse their relationship and influence of foreign direct investments on the gross domestic product changes.

Introduction

The Czech Republic and Slovakia have common historical development. Both the countries are gradually transformed into a market economy. Therefore, we can assume that the previous historical-economic development was very similar during the last 70 years before splitting. Differences occurred after the split of these two countries. One example of the difference is the using of currency. On joining the European Union on 1 May 2004 the Czech Republic became an Economic and Monetary Union member with a derogation as regards the introduction of the euro. By signature of the Accession Treaty to the European Union, the Slovak republic undertook to join to the Economic and Monetary Union and to use common currency - the euro. The country entered the European Union in the same period as the Czech Republic. Furthermore, with the accession to the European Union, inflow and outflow of investments are related, the economy is more open. The political scene has an interest through a variety of

incentives to raise foreign investment. Generally, the foreign direct investment (FDI) has positive effects on the economy of the host country. The question about promotion of foreign investment is in transitional countries very actual, and widely discussed in economic and political point of view.

1. Methodology

Several authors deal with this issue, they also focus on different countries. In case of transitive economics, it is mostly about positive and primary effects of FDI on the economic growth. Besides FDI, we distinguish indicators like gross domestic product in market prices, export, employment, etc. Foreign direct investment is generally considered to be an instrument how to stimulate economic growth of any country. Governments of transition countries try to encourage the inflow of FDI by various ways [6]. Foreign direct investment reflects the objective of obtaining a lasting interest by a resident entity in one economy (direct investor) in an entity resident in an economy other than that of the investor (direct investment enterprise) [2]. FDI is an important phenomenon in the global economy [3]. Economic theories and empirical studies support the notion that foreign direct investment is conducted in anticipation of future profit. The literature on foreign direct investment suggests that inflows of FDI can exert a positive influence on economic growth through the transfer of new technology and spill over efficiency. However, such a positive impact does not occur automatically, but rather, it depends on the absorptive capacity of the recipient country [1]. There are several studies dealing with the issue of the development of macroeconomic indicators, their prediction, and respective comparison of their development with other countries. As an example, author Fabry researched the relationship between three variables - FDI, export and economics growth [6]. The next two papers contain the information about relationship only between economics growth and export [4] and relationship of FDI and gross domestic product (GDP) [5].

Based on the inspiration from mentioned studies, we define the following purpose: *To analyse the development of two variables - gross domestic product in market prices and flows of foreign direct investments in the Czech republic and Slovakia during the*

last 20 years, then to analyse their relationship and influence of foreign direct investments on the gross domestic product changes.

This paper is appointed to the evolution of two selected indicators (gross domestic product and foreign direct investments). In resolving the contribution we used the available data published by Eurostat in free available databases. In this way have been transposed following variables:

- gross domestic product in market prices,
- flows of foreign direct investments to the country.

These indicators were analysed for two countries, Slovakia (SK) and the Czech republic (CZ). We selected monitoring of these two countries based on their joint historic evolution and breakdown only 22 years ago. Therefore, we can assume that the previous historical-economic development was very similar for last about 70 years before splitting. Based on these facts we define basic description of the selected data. The basic sample is data from 1993 till 2013. In case of FDI we use different number of values, in case of the Czech republic we get sample from 1997, in case of Slovakia from 2000. We create the time series of data for these countries:

GDP_i^c, where $c = \{CZ, SK\}$ and $i = \{1,2,\ldots,n_{GDP}^c\}$

FDI_i^c, where $c = \{CZ, SK\}$ and $i = \{1,2,\ldots,n_{FDI}^c\}$

where n_{GDP}^c means the number of GDP values of country *c* and n_{FDI}^c number of values of FDI for country *c*.

Then we can assume the impact of FDI on the amount of gross domestic product. However, we must assume that this effect is not immediate and may be delayed in time. Thus instantaneous volatility of individual values of FDI does not immediately affect the amount of GDP negatively. Therefore, we decided to follow the new variable which was created as the moving averages for three consecutive years, the value of FDI, and this variable we called FDI_AVE, so the average of foreign direct investments flows by 3 years.

Then we calculate this indicator as is stated below:

$$FDI\_AVE_i^c = \frac{FDI_i^c + FDI_{i-1}^c FDI_{i-2}^c}{3} \quad (1)$$

where $c = \{CZ, SK\}$ and $i = \{3,4,\ldots,n_{FDI}^c\}$.

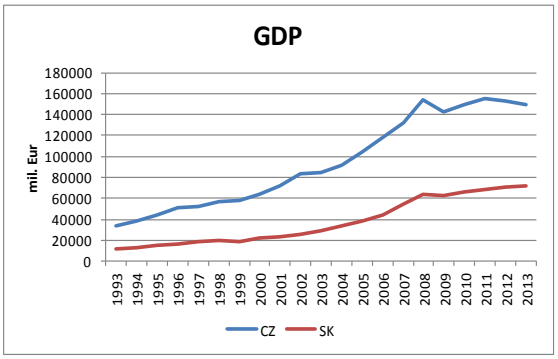
Then we examined the analysis of those variables development and their characteristics by basic statistical procedures and descriptive statistics. For examination of interdependencies we use correlation and regression analysis. Based on this we analyse a linear relationship of two variables by the Pearson correlation coefficient and quantify the impact of that relationship by linear regression analysis. We use the statements and procedures defined by Šoltés [9]. We correlate GDP and FDI, respectively GDP and FDI_AVE. On this basis, then we create regression model, which can be used to predict the development of GDP with respect to defining values FDI_AVE, since we assume that the impact of FDI is long-term and therefore it would not be appropriate to identify the impact of just a specific year, or already established, which would be economically questionable, or the next, which would mean a direct impact on GDP growth. Thus, we assume that the change in FDI acts for three years to the change the GDP. This fact could be changed and analyse in other studies and analyzes. Based on previous experiences we can argue that large investments are usually carried out just for two to three years.

2. Results

On this basis, we identified the tracking of GDP in the evaluated years. We found that the difference in the amount of GDP between these countries rises in the evaluated years. We also found that the impact of the economic crisis in 2009 occurred in the Czech Republic to a greater fall than in Slovakia. This is caused by the higher rate of relationship between the Czech economy and the German market than the Slovak economy. Subsequently, however, we can see that growth till 2011 was higher in the Czech Republic. In 2013 we identified also the reduction of the value of GDP in the CZ. In this paper we focus on the monitoring of foreign direct investment. In this case, we analyse what the value of foreign direct investment evolves in those years. We see

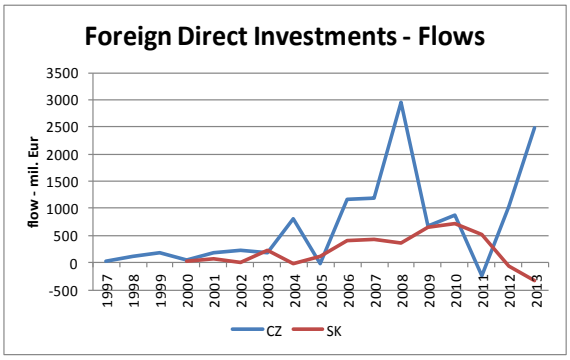
significant differences between these countries (CZ, SK), where in Slovakia the increase in the value of foreign direct investment until 2010 is, then, there is the decrease to the negative values (capital outflows) in the last two years (2012, 2013). For the Czech Republic, we see significant differences between years when there was an influx of capital.

FIG. 1: Development of GDP



Source: own processing

FIG. 2: Development of FDI



Source: own processing

Selected relationships between indicators we analyse by correlation coefficients stated in the next table (Tab. 1). We use the equation 1 to calculate the values of FDI_AVE which was correlated with GDP indicator. In this case of Slovakia we see that between FDI and GDP does not exist statistically significant linear relationship (p-value 0,2899), but in case of the Czech republic, we identify this relationship despite the high variance of the value of FDI by analysed years.

This means that the value of FDI is directly displayed in the value of GDP, while in Slovakia this is not true. In the case of FDI_AVE we can see that comparing to the previous relationship in the case of Slovakia, the value of correlation coefficient significantly increases. In this case, the correlation coefficient is close to 0,7 For both the countries, the relationship is statistically significant.

TAB. 1: Correlation coefficients between GDP and FDI/average FDI

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	SK		CZ	
	FDI	FDI_AVE	FDI	FDI_AVE
GDP	0.30443	0.69877	0.60878	0.77153
	0.2899	0.0115	0.0095	0.0008
	14	12	17	15

Source: own processing

Then we use linear regression to count the linear models for prediction of GDP by the values of FDI_AVE.

TAB. 2: Regression models for CZ and SK

	CZ		SK	
	F Value	Pr > F	F Value	Pr > F
F-test for Model	19.12	0.0008	9.54	0.0115
	Parameter Estimate	Pr > |t|	Parameter Estimate	Pr > |t|
Intercept	82236	<.0001	37171	0.0001
FDI_AVE	48.51614	0.0008	55.98807	0.0115

Source: own processing

Based on the stated regression models (Tab. 2) for the Czech republic we can define that per each millions of FDI which are inserted into the Czech economy from abroad the amount of GDP increased by 48,5 million Eur. In the case of Slovakia we can see that GDP growth is higher in this case, by 55,988 million Eur.

3. Discussion

When analyzing the relationships of FDI and GDP, as well as its impact, we identified several characteristics. We found out that the effect of variable FDI_AVE in case of the Czech Republic is higher, but the value of the regression coefficient is significantly higher. On this basis we can claim that through the use of FDI, the Slovak economy can

reduce the difference against the Czech economy with the same use of foreign investment. Other studies have shown the impact of FDI on economic growth in Russia and Albania. Conversely, the impact of economics growth on FDI inflow was observed in Hungary, Poland and Romania. Alici et al researched PZI in Turkey from the year 1987 to 2002. They observed that the inflow of PZI have no positive influences on the country economics growth [6]. In Estonia author reveal a negative impact of FDI and positive impact of GDP on export [6]. Other authors researched that empirical analysis shows that FDI alone play an ambiguous role in contributing to economic growth based on a sample of 62 countries covering the period from 1975 to 2000 and find that initial GDP and human capital are important factor in explaining FDI. FDI is found to have a positive and significant impact on growth when host countries have better level of initial GDP and human capital [7]. Adewumi conducted a study of the impact of FDI on growth in developing countries. Although his study was based on Africa, it can be extended to developing countries in general. His regression analysis led to the conclusion that the involvement of FDI with growth is estimated to be positive. A research carried out by Alfaro also analyzed the impact of FDI on growth, but in different sectors of the economy, namely primary, manufacturing and service [8].

Conclusion

From the beginning of the integration processes into the European Union, central and eastern states acquired a large amount of FDI from the other parts of Europe and the USA. Although the Czech Republic and Slovakia, they have very similar history for a long time. The development of FDI, as we can see in the figure 2, points to the fact that in the Czech republic, the investment flow is higher than the flow of investment in Slovakia despite the fact that Slovakia is an attractive country for investors because of low labour costs, the Euro as a domestic currency, there are preferential tax policies for investors too. These values were confirmed by means of the correlation analysis where we dealt with the influence of FDI development on the amount of gross domestic product in market prices in both the countries. Given the above we can assume that the influence of mentioned FDI is significant (was confirmed), but interest from the side of investors depends mostly on market conditions, by the other words, on the free enterprise.

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CHANGES IN PERSONAL INCOME TAX STRUCTURE AND THE FINANCIAL SITUATION OF LOCAL AUTHORITIES IN POLAND DURING THE 2004-2013 PERIOD

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Keywords:
personal income tax – tax rates – local government

Abstract:
This article aims is to analyze the impact of changes in the structure of taxes and tax-like charges on the financial position of local authorities in Poland. An important source of income to the Polish local authorities of all levels is income from their share in nation-wide taxes (Corporate Income Tax and Personal Income Tax). With the lowest level authorities (gmina), a very important source of income is the inflows from local taxes and charges. Therefore, this study assesses the impact of changes in the structure of taxes and tax-like charges on the financial position of local authorities in Poland.

Introduction

An important source of income to the Polish local authorities of all levels is income from their share in nation-wide taxes, especially personal income tax. Therefore, this study assesses the impact of changes in the structure of personal income tax on the financial position of local authorities in Poland.

The discussion is divided into three parts. The first one describes apportioning of the personal income tax as a source of income for local authorities. The middle part describes a method to estimate the loss of income suffered by the local authorities as a result of changes in the structure of personal income tax collected on general principles. The final part presents an estimate of such a loss of local authorities' income.

1. Apportioning of the personal income tax as a source of income for the local authorities in Poland

In the years 2004-2013, a share in the revenues from personal income tax (PIT) made a significant source of income of the Polish local authorities. For this reason, any structural changes to the PIT (rates, brackets, reliefs and/or exemptions) could have a significant impact on the financial position of local authorities, a fact that should be taken into account with any legislative initiatives in this regard [15, pp. 134-271; 16, pp. 140-271; 17, pp. 121-266; 18, pp. 117-274; 19, pp. 107-265; 20, pp. 115-281; 21, pp. 135-306; 22, pp. 146-; 23, pp. 141-326; 24, pp. 171-357].

During the period in question, the local authorities of various levels were allocated their respective shares in the revenues from personal income tax (PIT). Under Article 5(2) the Law on Local Authorities' Revenue of 13 November 2003 (i.e. of 2014, item 1115) (hereinafter - LLAR), a district's share in the revenues from personal income tax paid by the taxpayers resident within the district is 10.25%. The only exception was 2004 when, under Article 90(2) of the LLAR, the districts' share in the proceeds from their residents' PIT was temporarily reduced to 8.42%. Additionally, Article 6(2) of the LLAR provides for a province's share in the revenues from personal income tax paid by the taxpayers resident within the province, and this share was rated at 1.60% during the period in question. In 2004 the *gmina* authorities received 35.72% of the total revenues from personal income tax. In the following year, their share fell to 35.61%. In subsequent years, the portion of PIT revenues allocated to *gminas* grew steadily, to reach 37.42% in 2013.

It should be noted that within the meaning of Article 2(5) of the LLAR, revenues from personal income tax are tax payments received less tax refunds made. This means that the introduction of any new PIT relief affects the financial condition of local authorities in the following year. This is so because tax reliefs affect the amount of tax due as determined in the settlement of annual PIT returns, and thus the potential payable amount of refunds of advances overpaid by the PIT payers.

During the entire period in question, the structure of personal income tax collected on general principles, i.e. along the tax scale, varied significantly. The changes consisted in:

- introduction of, and then a significant increase in a tax-deductible child allowance, starting from 2007,
- replacing a three-bracket scale of personal income tax with a two-bracket one, with simultaneous introduction of new, lower tax rates since 2009 [1, s. 2; 2, s. 2; 3, s. 2-3; 4, s. 2-3; 5, s. 2-3; 6, s. 2-3; 7, s. 2-3; 8, s. 2-3; 9, s. 2-3; 10, s. 2-3].

A tax-deductible child allowance to support child maintenance was introduced by the Law of 16th November 2006, amending the Personal Income Tax Law and certain other laws (Dz. U. [Journal of Laws] No. 217, item 1588). Pursuant to Article 27(f) sec. 2, added at the time to the Personal Income Tax Law of 26 July 1991, the taxpayer was granted an annual tax-deductible child allowance, amounting to PLN 120 per each dependent child. This allowance has been substantially increased by the Law of 5 September 2007 amending the Personal Income Tax Law (Dz. U. [*Journal of Laws*] No. 191, item 1361).

A tax-deductible child allowance to support child maintenance was introduced by the Law of 16th November 2006, amending the Personal Income Tax Law and certain other laws (Dz. U. [Journal of Laws] No. 217, item 1588). Pursuant to Article 27(f) sec. 2, added at the time to the Personal Income Tax Law of 26 July 1991, the taxpayer was granted an annual tax-deductible child allowance, amounting to PLN 120 per each dependent child. This allowance has been substantially increased by the Law of 5 September 2007 amending the Personal Income Tax Law (Dz. U. [*Journal of Laws*] No. 191, item 1361).

This operation essentially meant integration of the two lower tax brackets into one. The tax bracket limit of PLN 85,528 remained unchanged in the years 2009-2013. Incomes below the limit were taxed at the rate of 18% and all the higher incomes at 32%. The depth and nature of changes that took place during the period in question in the structure

of personal income tax collected on general principles makes it necessary to estimate the financial consequences of these changes for the local authorities.

2. Method used to estimate the loss of income suffered by the local authorities as a result of changes in the structure of personal income tax collected on general principles

In order to estimate the loss of income suffered by the local authorities as a result of changes in the structure of personal income tax collected on general principles, we:

- analyzed the evolution of tax base (taxable incomes) within the period in question,
- analyzed the value of tax-deductible child allowances awarded during the period in question,
- adopted the necessary simplifying assumption of an unchanging structure of incomes before tax, remaining in line with the actual structure of taxpayers' incomes during the year preceding the shift from three-bracket to two-bracket scale of taxation, i.e. 2008,
- disregarded the impact on the local authorities' revenues of other changes in tax reliefs applicable to the personal income tax paid at the general scale and of tax exemptions granted individually under the Taxation Code (i.e. (Dz. U. [Journal of Laws] of 2012, item 749 as subsequently amended),
- estimated the impact of changes in the tax scale and rates of personal income tax by extrapolation;
    1. the first step was to identify the dynamics of taxable income;
    2. in the second step, using the springboard of the total amounts of both tax due and the tax-deductible child allowance for 2008 as well as the previously established dynamics of taxable income, we estimated the total amounts of both tax due and the tax-deductible child allowance for subsequent years;
    3. the third step was to estimate the 2009-2013 impact of changes in the tax scale and rates of personal income tax by reducing the said total amounts by the actual accumulated deductions of child allowance,

- estimated the size of loss of income suffered by the local authorities as a result of changes in the structure of personal income tax collected on general principles; the estimation being done in two variants:
    1. Variant 1, where the local authorities' share in the personal income tax revenues remains at the level of the year preceding the shift from three-bracket to two-bracket scale, i.e. 2008,
    2. Variant 2, where the local authorities' share in the personal income tax revenues was updated to the level actually existing in the years 2009-2013.

3. Estimated loss of income suffered by the local authorities as a result of changes in the structure of personal income tax collected on general principles

In the years 2006-2013, the total gross income (i.e. before deductions) of the taxpayers who were taxed on general principles increased from PLN 435,819.9 million to PLN 702.155.1 million. During this time, the taxable income – as reduced by the deductible contributions to social insurance – increased from PLN 389,600.5 million to PLN 645,346.7 million. However, from the point of view of the present study, the most important is the evolution of total personal income taxable on general principles. During the period in question, it increased from PLN 385,296 million to PLN 641,069.6 million [1, pp. 10-17, 28-34; 2, pp. 10-17, 28-34; 3, pp. 10-17, 28-34; 4, pp. 10-17, 28-34; 5, pp. 10-17, 29-34; 6, pp. 10-17, 28-34; 7, pp. 11-18, 30-37; 8, pp. 10-14, 23-28; 9, pp. 10-14, 23-29; 10, pp. 10-14, 22-29].

In the years 2007-2013, following the two changes in the structure of personal income tax levied at the general tax scale described in the first chapter, the amount of total loss of tax payable increased from PLN 5,431.9 million to PLN 11,853.6 million. The largest loss of revenue from personal income tax took place in 2010 and amounted to over PLN 13,946.1 million.

The consequences of this tendency affected the local authorities to a large extent. In 2007, the estimated loss of local authorities' income from their shares in the revenues from personal income tax slightly exceeded PLN 2,611.1 million. However, in the following year this figure climbed to PLN 2,921.4 million.

The highest estimated loss of local authorities' income from their shares in the revenues from personal income tax was seen in 2010. Depending on the estimation method used, it amounted to PLN 6,741.5 million (Variant 1) or PLN 6,804.3 million (Variant 2). Depending on the estimation method used, the local authorities' share in the 2013 revenues from personal income tax decreased by PLN 5,730 million (Variant 1) or PLN 5,840.3 million (Variant 2).

The estimated loss of income suffered by the local authorities as a result of changes in the structure of personal income tax varied depending on the authority level. In 2007, the *gminas*' estimated loss of income amounted to PLN 1,967.4 million. In the following year this figure climbed to nearly PLN 2,205.3 million. In 2009-2013, the scale of *gminas*' loss of income was much greater. The record loss of income occurred in 2010, when – again depending on the estimation method used – the *gminas*' share in revenues from personal income tax decreased by the amount of PLN 5,088.9 million (Variant 1) or nearly PLN 5,151.7 million (Variant 2). The *gminas'* share in the 2013 revenues from personal income tax decreased by another PLN 4,325.4 million to reach PLN 4,435.6 million.

With districts, the 2007 loss of income amounted to nearly PLN 556.8 million. In the following year, this figure went up to nearly PLN 619.5 million. In the years 2009-2013, the scale of districts' loss of income was much greater. The record loss of income occurred in 2010, when the districts' share in revenues from personal income tax decreased by the amount of nearly PLN 1,429.5 million. The districts' share in the 2013 revenues from personal income tax was lower than the potential one by PLN 1,215 million. As far as provinces are concerned, the 2007 decrease in their income amounted to PLN 86.9 million. In the following year, this figure went up to nearly PLN 96.7 million. In the years 2009-2013, the scale of provinces' loss of income was much greater. The record loss of income occurred in 2010, when the provinces' share in revenues from personal income tax decreased by the amount in excess of PLN 223.1 million. The provinces' share in the 2013 revenues from personal income tax was lower than the potential one by PLN 189.6 million.

Conclusion

The adverse changes in the revenues of local authorities as presented in this study have not been compensated by granting them access to other, fiscally efficient sources of income. Neither was these changes accompanied by a reduction of the scope of their respective responsibilities.

This might constitute a breach of the principle of adequacy of the local authorities' revenues to the tasks imposed on them, as stipulated in Article 167(1) of the Constitution of the Republic of Poland, which stipulates that '*local authorities shall be assured public funds adequate for the performance of the duties assigned to them*.' In the future, the system of supplying the local authorities with revenues should operate in compliance with this rule.

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ANALYSIS DRAWING OF GRANTS FROM REGIONAL OPERATIONAL PROGRAM IN TOURISM

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Keywords:
Subsidy – grant– tourism – regional support

Abstract:
This paper analysed subsidy from Regional Operational Program NUTS 2 Northeast, in the Czech Republic in terms of number of applications, amount of subsidy for allocation in the given region, accomplishment of monitoring indicators by the beneficiaries. Data was assessed in the previous program period 2007-2013. Descriptive methods and some statistic methods were used in the paper. Only projects focused on tourist industry development supported from ROP were analysed. Finally two time periods were compared in increasing of beds in tourism and results is 15% of increase from the beginning up to the end of program. Results presented in the paper shows fulfilling of monitoring indicators although all prepared finance allocation is not yet drawn.

Introduction

From the beginning of Czech membership in the European Union is the country part of the financial EU support from European Structural Fund, Cohesion Fund and European Regional Development Fund (ERDF). During first abridged programming period 2004-2006 the financial support was calculated on EUR 2.8 billion, during second regular programming period 2007-2013 the amount of provided funds was quantified to EUR 26.7 billion. [1]

This paper focuses on the ERDF and its objectives and impact directly in regions. The ERDF itself focuses on regional policy. It aims to strengthen economic and social cohesion in the European Union by correcting imbalances between its regions. Main objectives of the ERDF investments are in several key priorities. This paper focuses on the priority related to SMEs and its support. [3]

In the Czech Republic there has been ERDF implemented through several Regional Operational Programs (ROPs). These ROPs was managed by seven individual Regional Authorities and cohesion region governments on the level NUTS 2. In the previous programming period 2007-2013 the Regional Authorities prepared their own objectives, calls, program rules, participant guide and so on in order to adjust the priorities according to regional situation and regional target group. Total funding of ROPs in the Czech Republic exceeded EUR 4.66 billion; it is almost 18% of total allocation of structural funds in the Czech Republic. [1]

Because this is enormous amount of money that was transferred to Regional Authorities this paper aims to evaluate impact of expended resources from the ERDF in particular of ROP NUTS 2 Northeast with focus on SMEs support.

1. Methodology

Data in this paper were collected by using quasi experimental method. All collected data are in quantitative form. Results of this paper are based on empirical research. First step of the research was carried out on the ROP NUTS 2 Northeast documentation. In this documentation has been selected relevant data and information applicable for the paper´s purpose. ROP NUTS 2 Northeast as mentioned above is complex region support focused on different goals. For the paper´s purposes has been chosen only one priority axis – 3 Tourism and its goals and specific objectives has been analysed. Overall methodology of this paper has been used description and at the end explanation.

2. Results

2.1. Investigation of ROP goals

Firstly, paper presents information about what goals and following impact of this ROP support was set up by Regional Authorities. [5]

The **priority axis num. 3 – Tourism** has defined main goal: Increase efficiency of using nature and culture potential of region.

Region Northeast has an enormous potential in many interesting culture, nature and sport activities for developing the market. There are lot of touristic places but with not satisfied tourist infrastructure and its services. Description of the main goal sounds: Priority axis Tourism aims to increase importance of tourism in the site of regional

economic prosperity and employment through the better use of actual regional potentials and improvement of quality and range of tourist infrastructure and services.
Specific objectives of this axis are:

- Increase quality and enlarge range of infrastructure for tourist development
- Increase quality of tourist services and its effective coordination

Due to this specific objectives were set up two different areas of promotion which has been used in the coordination of finance and projects.

- 3.1 Development of essential infrastructure and accompanying activities of tourism
- 3.2 Marketing and coordination activities in tourism

In this distribution are analysed all the following quantitative data. For the evaluation of the supported projects has set up Regional Authorities monitoring indicators (see 2.3).

2.2. Investigation in assessment of project proposals and allocation

Evaluation of projects submitted for support from the ROP was conducted in 3 phases. The first phase is formal. Applicant has to fulfil specific formal requirements otherwise the submitted project will be rejected from farther evaluation. Second phase is acceptability. In this evaluation level project proposal has to follow defined supported activities set up by the ROP. Both phases were carried out by staff of the regional offices as there are very important for the company to communicate with the staff of ROP. [4] In the third stage substantive evaluation was carried out by the committee and by at least two mutually independent evaluators. Each evaluator received a table of evaluation criteria. The basis for the evaluation was the application for the grant and its annexes as well as the study of economic evaluation and requested budget. For the area of promotion, which was chosen as the reference (Priority axis 3 – Tourism) every project was evaluated in three criteria. Actual amount of points given to every criteria have depended on the discretion of the evaluator. Criteria for evaluation are described in following paragraphs.

a) Project as a whole.

b) The ability of the applicant, horizontal issues, fulfilment of indicators (40% weight of criteria).

c) The project value in the technical point of view (40% weight of criteria).

d) The necessity and relevance of the project (40% weight of criteria). [5]

TAB. 1: Success rate - project submitted ROP NE

Area of promotion		3.1	3.2
Number of applications		376	78
Rejected applications	formal reasons	18	0
	acceptability reasons	26	5
	ex ante controll	2	0
	total	46	5
Rejected from applicant		3	0
Number of evalutated applications		327	73
Approved applications		133	59
Success rate		35%	76%

Source: author´s calculation based on [6] (Regional Council NUTS 2 Northeast [online], 2014)

There are presented results under deep analyse in the table above. There is enormous difference between success rates of each area. This result could be predicated to high number of submitted applications in the 3.1. It might be eventually explained by the attractiveness of this area. There was finance support available for companies who tend to invest in construction and reconstructions of tourist infrastructure. This finance support is essential for developing their business. There has been also bigger budget prepared in 3.1 than in 3.2 area of promotion. It the next table there are summary of amount that has been allocated in examined areas of promotion. There has been requested three times more by the applicants in the area 3.1 than was prepared in the budget. Interesting fact is that requested money by approved projects exceeds allocation. Purpose of this might be experiences of the Regional Authorities in previous programs. Mostly applicants do not expend all the money requested in application. As seen in the table 2 amount paid off from allocation achieved only two thirds at the end of programming period. There is prolonged period for the Regional Authorities to expend and allocate rest of the attributed budget in ROP.

TAB. 2: Allocation for projects in ROP NE

Area	Allocation	Requested money in submitted projects	Requested money by approved projects	Paid off up to 31.12.2013
3.1	3 118 237 946 CZK	8 970 271 343 CZK	3 738 222 441 CZK	2 147 156 874 CZK
3.2	236 928 226 CZK	386 258 082 CZK	244 580 089 CZK	127 075 594 CZK

Source: author´s calculation based on [6] (Regional Council NUTS 2 Northeast [online], 2014)

2.3. Investigation in the outputs and impacts

Next step in the descriptive research focused on expected outputs from the supported projects and its impact in the regional tourist economy. As mentioned above projects in the priority axis num. 3 has been evaluated by several monitoring indicators which must be accomplished by the applicant in this time beneficiary. Total number of expected accomplished indicators has been set up by the Regional Authorities.

Table 3 shows situation of achievement of monitoring indicators separately by each areas up to the end of programming period. There are two problematic indicators where the expected numbers were not achieved yet. Others exceeded more than what was set up. Problematical is newly created jobs in tourism and reconstruction of historical building. Contrary length of cycle paths or routes has been accomplished more than 50% up. This situation might be justified with high popularity of sport activities in this region especially cycling. Both in lowland and mountains are the cycling paths and routes very coveted. In the lowland cities people use bike for transportation and in the mountains for sport activity. There is no concern about not achieving 100% of the indicators thanks to two more years to meet the objective.

TAB. 3: Accomplishment of monitoring indicators in ROP NE up to 31. 12. 2013

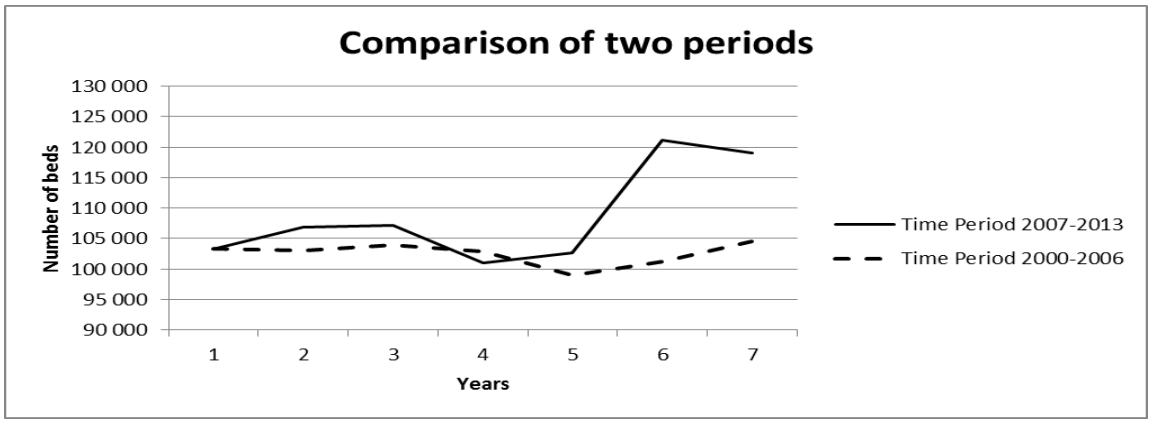
	Area of intervention	
Monitoring indicators in priority axis num. 3	**3.1**	**3.2**
Number of supported projects for tourism development	109%	127%
Number of newly created jobs in the framework of projects for tourism development	94%	93%
Length of newly constructed cycle paths and cycle routes	162%	-
Number of newly built or reconstructed beds	131%	-
Number of reconstructed historical buildings	85%	-

Source: author´s calculation based on [2] (Czech Statistical Office (CSO). Statistics [online], 2014)

In the farther research it was focused on the specific indicator that is connected with the tourist industry the most. Indicator **Number of newly built or reconstructed beds** was chosen as an exemplary. There has been evaluated impact of the granted projects on the total number of beds in the Northeast region and their changes. It has been compared two same long periods of time (7 years). The first was abbreviated programming period therefore projects were supported only in last 2 years. This fact is also visible on the figure 1. Number of beds increased in the last 2 years of first period.

In the second regular programming period is the change of increasing beds seen since last 3 years. Growth is rapid and represents 15% of increase in the second period compared to 1% of increase in the first period. This fact presents big impact of subsidy on overall regional results. Although only 12% of all newly built or reconstructed beds in region were financed from ROP it helped to develop continues investments in tourist sector. Subsidies allocated to few companies initiated farther investors and it has had multiple effects.

FIG. 1: Total number of beds in the region Northeast



Source: author´s calculation based on [2] (Czech Statistical Office (CSO). Statistics [online], 2014)

Discussion

I recommend farther research on impact of the ROP support in the region after all implementing projects are finished and subsidiary between ROP and beneficiaries are settled.

Conclusion

Although there are still plenty of not finished projects impact in the region is already visible in national statistics. Objectives and global goals of ROP have been met as obvious from monitoring indicators which are mostly fulfilled. There are still one third of ROP budget that has not been allocated yet. Impact of the support is obvious from comparison of the two time periods. There are evidence of rapidly increase newly built or reconstructed beds in the tourist industry in the region. 15% of increase of beds from the beginning up to the end of program period has been observed. Therefore finance support accomplished expected indicators and there are expectations from the rest of projects that will bring farther effects.

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GRADE OF FUNCTIONING OF CHOSEN PROCESSES WITHIN SME WITH FOCUS ON SOUTH BOHEMIAN REGION

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Keywords:
management – SME – processes

Abstract:
Processes and process management are an important part of a company management. This topic has been researched in the Faculty of Economics of University of South Bohemia for a long time. The article deals with comparisons in the field of chosen processes during 3 years of SME in South Bohemian Region. The first data were gathered within the grant GAJU 068/2010/S in 2010 and another group of data was gathered within grants GAJU 039/2013/S and GAJU 079/2013/S in 2013. The article focuses on comparing the following processes: Production, Human Resources Management, Marketing, Finance.

Introduction

SMEs are indispensable in all economies, can be described as a driving force of business, growth, innovation, competitiveness, and are also very important employers. In the Czech Republic 1,066,787 legal and natural persons who are placed in the category of small and medium-sized enterprises performed some business activity until 31th December 2012. The total number of active small and medium-sized enterprises which participated in 2012 is 99.84%. The share of employees in small and medium-sized enterprises amounted to 60.85% in relation to the employees of the Czech economy.

In small companies, due to a small number of employees and managers, many functions are accumulated within the competence of only a few workers, informal leadership is more common, oral communication is preferred to written, etc. However, a high degree of flexibility to adapt rapidly to changing SME factors determines the ability to face and

reduce the growing globalization tendencies associated with the onset of multinational corporations and chains [7,9,11]. But the principle of an important role of strategic management comes here in the force, too [8]. Strategic management, based on long-term forecasts, helps the company to anticipate future challenges and opportunities [3]. Strategic management gives clear goals and directions for the future of the company and its workers a sense of security [8]. Strategic management helps increase the quality of management, leads managers to improve their decision making [3]. Strategy is the basic tool to reach advantages in the market [9]. Strategic management should be flexible enough to be able to change conditions in the market [5]. The management should have a strategic plan and strategy [2]. The management of enterprises of different size and specialization is today under the press of advantages, challenges and problems connected with the function of worldwide markets. The different meaning of the term of management can be related as follows: people who wish to have careers as managers must study the discipline of management as means towards practising the process of management. The process consists of certain basic management functions [10]. Global competition involves an ever increasing set of demands by the customers. Better quality, more features, better delivery, performance and reduced costs – all become a part of the expectation of our customers [11]. Strategic management is the set of managerial decisions and actions that determine the long run performance of a corporation [12]. Strategy can be viewed as building defences against the competitive forces or as finding a position in an industry where the forces are weaker.

The central concept of strategic management is a strategy that is closely linked to the objectives it tracks. According to [4] strategies express the basic idea how the company goals will be achieved. There is not the only best way to manage say [13].

Company processes according to Burlton (2001) are "the production lines of the New economy" [1]. They can be regarded as the assets of the company, as well as the staff, facilities or information. The above mentioned continues in the statement of Howard Smith and Peter Fingar (2003): "The companies which have the ability to control their company processes will be able to serve their customers better and faster. They will be able to offer higher quality for lower price with higher savings in production, thus they

will increase their profitability. They will be able to react to new opportunities in the markets more promptly due to establishing or terminating entrepreneurial relations on the side of demand and supply. Despite complexity and intricacy of the real world of the company processes the process management will never be a choice: it is a critical need." [14]. To support the importance of the process management for company expansion a statement of a respected expert on Business Process Management Thomas H. Davenport (1995) can be used: " Any company which will ignore the processes or fail when improving them risks its future." [15].

1. Methodology

The research project used secondary data (financial statements of SMEs which took part in the research) and primary data which were obtained primarily through quantitative methods questionnaire supplemented by qualitative method of in-depth interviews.

Within the calculation we used zero hypothesis Ho meaning that the level of functioning of the chosen processes within the chosen companies did not change during the last 3 years and alternative hypothesis HA meaning that the level of functioning processes increased during the past 3 years. The first group of data was gathered in 2010 where the examined sample presented 189 SMEs in South Bohemian Region. Gathering data was carried out with the help of questionnaire survey and in-depth interviews in chosen companies. By the same method even the other group of data was gained. The effort was to address the same companies as in the first case. After having addressed all the companies which took part in the first round of gathering it was found out that some of the companies do not exist any more and some of them have changed the owner who is not willing to cooperate. For this reason our final collection contains only 124 companies from both monitored periods. The data were tested with the help of two-selection Wilcoxon test and its asymptotic variance. The results of the test exemplify the differences and the movements of the curves within the individual monitored periods.

2. Results

With the help of two-selection Wilcoxon test (Mann-Whitney U test) in the chosen level of importance $\alpha = 0,05$, where *X= data of 2013 and Y= data of 2010,*
the following hypotheses were tested:

$$H0 = x0{,}50 - y0{,}50 = 0 \qquad HA = x0{,}50 > y0{,}50 \qquad (1)$$

TAB. 1: Mann-Whitney U test focused on the main processes

Proces	U	Z	p-value
Marketing	25395.5	-1.5685	0.1167
Production	14936.5	8.5676	0.0000
Finance	27571	-0.1128	0.9102
Human Resources Management	24342	-2.2736	0.0230

Resource: Authors

As in table 1 it can be seen it was not possible to deny zero hypothesis in processes of marketing and finance, because p-value has the following value: p-value > α (0,1167 > 0,05 marketing), or (0,9102>0,05 finance). These results are also supported by picture 1 where the both medians are identical and the interval of data layout is very similar.

FIG. 1: Median and interval of data layout in processes of marketing and finance

Resource: Authors

As for above mentioned processes it cannot be said if the level of their functioning in the monitored period changed or did not changed. Nevertheless, picture 1 shows that the process of finance works in the monitored sample on the same level at present (2013) and also 3 years ago, even the medians of both the monitored periods are identical 80%. In the process of marketing the median is also identical in both monitored periods, it

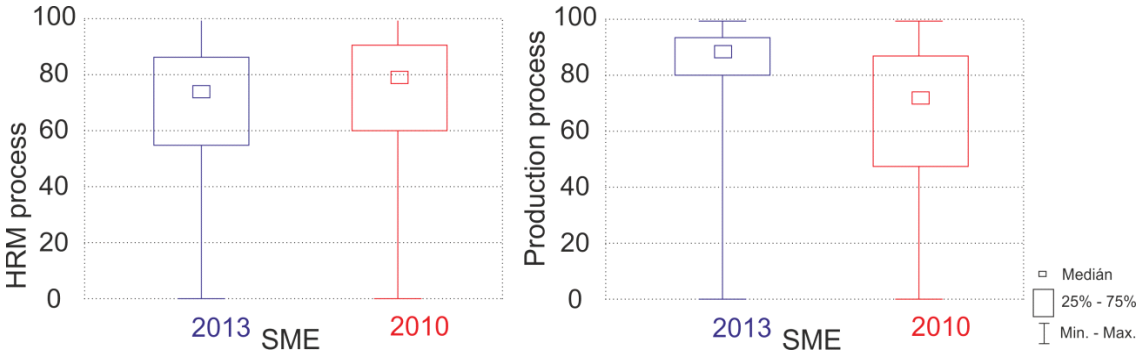
means 70%. Data in this process are slightly different, nevertheless, there are no radical changes.

In processes production and human resources management final p-value is close to zero and is lower than chosen α, that is why we deny zero hypothesis in the level of importance 0,05.

Production process	0,0000 < 0,05	p-value < α
Human resources management process	0,0230 < 0,05	p-value < α

At the same time in the process of production half of the p-value is still smaller than chosen α and that is why we can deny Ho in favour of HA which says that at present this process is working better than three years ago, as shown in picture 2. The level of functioning of the process changed quite significantly, in 2010 the median was 73% and in 2013 it is already 90%. Even the data in both the chosen periods are different, in 2010 from 25 to 75% respondents evaluated functioning of the process within 47 - 87% and in 2013 from 25 to 75 respondents evaluate functioning of the process within 80 - 92%. The range of evaluation narrowed and additionally moved to higher values in 2013. In the process of human resources management it was possible to deny Ho, but because of the existence of negative Z, HA cannot be proved as Z and p-value show that this process in the chosen sample worked better three years ago (median 80%) than now (median 75%), as picture 2 shows. Minimal and maximal values are always identical because there are always the companies which evaluate functioning of the processes up to 100% (faultlessly functioning process) or 0% (non-functional).

FIG. 2: Median and interval of data layout in processes of production and human resources management



Resource: Authors

Conclusion

From all the chosen processes within the research sample significant changes can be shown only in the processes of human resources management and production where improvement of functioning of the processes was achieved. Slight deterioration can be seen in the process of human resources where the average functioning of the process in 2010 was 80% and in 2013 74%. Nevertheless, all the monitored processes in the companies represented in the research sample are on a rather high level. The average functioning of the processes in 2013 is: Finance 80%, Production 81%, Human Resources Management 77%, Marketing 72%. The reason why in other two processes no change can be observed might be their stable and long term setting. At the same time it can be expected that the process of finance is stabilized after the first few years of business while the process of production keeps developing constantly. On the contrary the process of management is directly dependent on free financial resources of the company and its strategy, for that reason no change can be expected since in 2013 companies felt economic crisis, it can be assumed that the process will increase in the following 3 years.

The changes in the production can be caused by suffering from economical crisis where all companies needed to reduce production expenses and that is why production processes were inspected and optimized. The result in the process of human resources management is unusual, its functioning worsened from 80% in 2010 to 75% in 2013. This development can again be caused by the impact of the crisis when companies

reduced or abolished perquisites, did not hire new employees, laid off, lowered salaries etc. These unpopular measures could result in lowering of evaluation of processes, yet it is necessary to remind that in spite of the fact that within the process unpopular measures are being implemented it does not influence functioning of the process itself. Nevertheless, the evaluation of the processes proceeded from the subjective perception of the company managers that is why it can be expected that the influence of the present situation in the company can be important, unlike objective long term functioning of the processes.

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THE ADVANCED ROLE OF SCIENCE PARK IN THE VIRTUAL ENTERPRISE FORMATION PROCESS

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Keywords:
virtual enterprise – business incubator – start-up

Abstract:
The aim of the article is to examine science park added value in the virtual enterprise formation process. The research is aimed at the relationship between science park and its tenants in the virtual enterprise process. The results from the questionnaire amongst science park tenants and structured interviews with managers of the science parks are transformed into the proposal for virtual enterprise platform. The platform proposal is based on the results which state that start-up companies are opened to the idea of the close cooperation with another company in order to pursuit challenging business goal. However the current support from the side of the science parks is not sufficient.

Introduction

For the start-up companies it is challenging to address the customer demands which exceeded its core competencies. Therefore if companies want to adapt they have to acquire new modern organization structures – such as virtual enterprise. Virtual enterprise is temporary alliance of member enterprises that share the same business opportunities that can be achieved through integration of each member's core competence.

There are several challenges which members of the virtual enterprise have to face (such as identification suitable partner). Science parks according to their start-up support approach can play major role in the virtual enterprise formation process. The article examines the theoretical and practical impact on the virtual enterprise formation process as if it would be moderated by science park.

1. Virtual enterprises

In the current fast changing environment it is not easy for the companies to address the complex demand of the customers. Companies are focusing on their core competencies and the final value is made by sum of all companies involved in the value chain. Therefore the output is made by combination of several core competencies of the companies [12].

Rising customer demands force companies to establish new and dynamic organization structures such as virtual enterprises. "Virtual enterprises can be defined as temporary alliance of member enterprises (MEs) that share the same business opportunities that can be achieved through integration of each member's core competence" [7]. Other definition of virtual enterprise is given by Byrneas "a temporary network of independent companies, suppliers, customers – even rivals, linked by information technology to share costs, skills and access one another's markets" [1]. Virtual enterprises are characteristic by 4 main attributes – Core competencies, flexibility, trust and excellence [9].

There are several challenges which companies have to face in establishing the virtual enterprise. The major challenges are according to Kim et al. effective synchronization and integration of business components. Crispim and Sousa add another challenge in the selection of suitable partner as another major challenge [7, 11, 4].

2. Science parks

Carter defines four major methods how small and medium enterprises can be supported. It is by providing finance (grants and subsidies, cost effects of taxation and compliance), providing information, providing specialist advice and finally helping with training and personnel development [2].

Recently, the science and technology parks have become important part of regional development. According to the International Association of Science Parks (IASP), the science and technology parks can be defined as "an organization managed by specialized professionals, whose main aim is to increase the wealth of its community by

promoting the culture of innovation and the competitiveness of its associated businesses and knowledge-based institutions" [6].

Koh et al states that science parks "play an incubator role, nurturing the development and growth of new, small, high-tech firms, facilitating the transfer of university know-how to tenant companies, encouraging the development of faculty-based spinoffs and stimulating the development of innovative products and processes."[8]

Science parks in the Czech Republic are certified by the Science and Technology parks Association CR.[10]

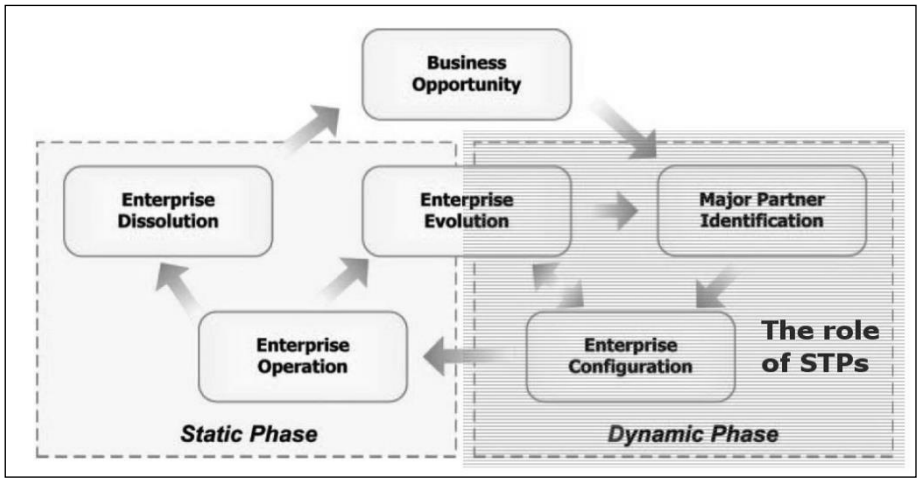
3. Research on virtual enterprises in the science parks

3.1. The adapted virtual enterprise models

The research made on the topic of virtual enterprises in the science parks adapted the life-cycle model of virtual enterprises [7]for the use in the science park environment (STPs) as seen in FIG 1. The main role of the science park in the virtual enterprise life-cycle is in the dynamic phase where science park can provide significant support for the successful identification of suitable partner[3]. It is because science parks mostly have sufficient information, facilities, skills and contacts which are often hardly reachable for start-up companies. Another part of the dynamic phase is formation of the virtual enterprise structure and cooperation. It is the part where science park should play major role. The main potential is in the experience which science park can provide to their tenants on the topic of virtual enterprise formation. Therefore the most common beginner mistakes could be avoided.

On the other hand the virtual enterprise operation should be mainly operated without the influence of science and technology parks. The same rule applies for enterprise dissolution. The enterprise evolution (which occurs in the case of change of market conditions) can be solved in both ways – with and without the participation of science and technology parks.

FIG. 1: Life-cycle model of the virtual enterprise



Source: [3]

3.2. The acceptability research

In order to gather view on the idea of the virtual enterprises within science parks, the acceptability research was made.

The methodology of the research was divided into two parts – questionnaire amongst twenty one science park tenants and the structured interview with two science park managers. The tenants weren't from the same science parks such as interviewed managers. Therefore they are independent from each other.

To receive the feedback from the science park tenant start-up companies about their view on the virtual enterprises, twenty one companies answered the following questions.

- *Have you experienced the cooperation similar to the virtual enterprise?*
- *Does your STP provide support to encourage cooperation between start-ups?*
- *Should your STP extend the idea of the close cooperation between start-ups?*

The answers showed at TAB 1 are convincing. It shows that majority of the companies have experience with close cooperation with another company similar to the virtual enterprise. Moreover majority of the start-ups wants from their science park to extend the idea of the close cooperation between start-up companies.

TAB. 1: Questionnaire questions

Question	Yes	No	I don't know
Have you experienced the cooperation similar to the virtual enterprise?	71%	29%	-
Does your STP provide support to encourage cooperation between start-ups?	48%	5%	47%
Should your STP extend the idea of the close cooperation between start-ups?	57%	29%	14%

Source: Author

The structured interview was made with manager of the science and technology park in Hradec Králové and the manager of the York Science Park. The answers were similar in the terms of main idea which was that virtual enterprises are not explicitly supported by the science park. However there were some examples of organic formation of companies trying by collective cooperation to reach the business goal. Interestingly according to the answers, external partners are not willing to establish close cooperation with tenant companies.

3.3. Virtual enterprise platform in the science park

According to the research made on the topic of the virtual enterprises, the paper proposes the idea of the virtual enterprise platform within the science park. The main idea is to create an environment where the start-up companies can identify suitable partner with which it can combine the core competencies for reaching the more challenging business goals. Moreover start-up companies are – in majority – prepared for the embrace of the virtual enterprise. However they are lacking the systematic approach from the science park management.

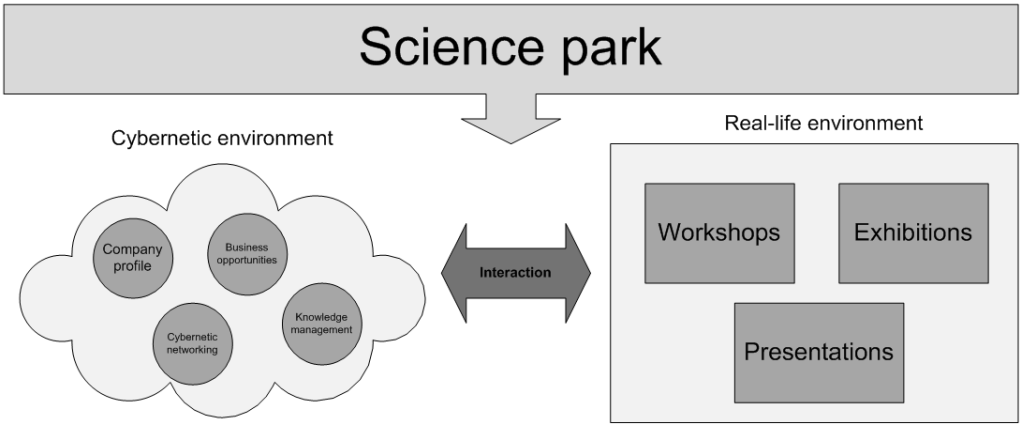
The platform is also designed to address the issues which concluded from the research – the unwillingness of the external companies to closely cooperate with tenant start-ups. By creating the common virtual enterprise platform the companies could more easily find their virtual enterprise partner either in another science park tenant or in the external company by showing closely the work, experience and direction of the company. The platform idea is demonstrated at the FIG 2. The model is divided into

two main environments. Firstly it is the cybernetic environment where companies could find valued information; present themselves; find contacts and business opportunities online without direct contact with other companies.

Secondly there are series of workshops, exhibitions and real life presentations of the current work where representative of the companies could directly create new contacts.

In other words the suggested platform should play the main role in the creation of the potential for the tenant companies within the science park. Furthermore the science park can provide certain level of assurance by its tenant companies in order to increase creditability of the tenant start-up companies.

FIG. 2: Virtual enterprise platform within science park



Source: Author

Conclusion

Virtual enterprise is efficient tool for pursuing the challenging business goal which exceeds the core competencies of one company. However the virtual enterprise formation process has several challenges which future members have to face. These challenges such as identification of the suitable partner could be challenging for the companies – especially for start-ups without sufficient financial sources and contacts.

Science park as the center of the innovation and business networking can provide certain level of support in terms of forming virtual enterprises. This support is

represented by proposal of virtual enterprise platform which is based on the results of the research. The platform is designed to provide all necessary information, knowledge, contacts and creditability to overcome the virtual enterprise formation issues.

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ECONOMY AND MANAGEMENT OF CZECH COHESION REGIONS - WHO IS AT BLAME?

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Keywords:
cohesion regions – ECS policy – budget responsibility

Abstract:
This paper is a contribution into a heated and often confused discussion about the economy and management of regions in the EU, especially cohesion regions created in the Czech Republic as NUTS II. The realization of the economic and social policies of the EU relies on cohesion regions. It is instructive to research, analyze and describe the setting and identify the key players and their roles and functions. A critical analysis reveals that there are a number of myths and that the Czech failure was due to a myriad of factors of a Czech as well as EU provenience, a combination of intent, negligence, misinformation and underestimation. A successful participation in programmes in 2014-2020 requires an improvement, and the black-and-white view, guilt shifting and poor status cannot be afforded by the Czech Republic, and even the EU.

Introduction

The economic and social cohesion policy of the EU ("ESC"), along with the Common Agricultural Policy ("CAP"), is the most important EU agenda and the EU spends over one third of its common budget on it [16]. The ESC policy aims to promote economic and social prosperity, while reducing disparity and considering as well other factors and principles, such as solidarity and sustainable development. Both structural funds, the European Regional Development Fund ("ERDF") and European Social Fund ("ESF"), and the Cohesion Fund are used to finance the ESC. There are many reports as well as scientific and academic literature discussing its legitimacy, fairness, effectiveness and efficiency. The common tenor clearly recognizes that the economy and management is inherently linked to it, and that the ESC has a massive impact. Often, it is suggested that

EU member states embrace different approaches to it and reach different results. The Czech Republic seems to be rather on the darker side, and definitely is not a model for the use of the Regional Operational Programmes ("ROP"). Unfortunately, this criticism is backed by solid data and evidence.

Each EU member state has developed its own system for the administration of regions and, for practical reasons, the European nomenclature of territorial units for statics ("NUTS") was developed almost three decades ago. The Czech Republic had a larger number of regions matching the criteria NUTS III. After it's accession to the EU, the Czech Republic moved to a restructuring toward regions NUTS II with the population between 800 000 and 3 000 000, and thus 8 Czech cohesion regions NUTS II were created covering 14 regions NUTS III. The allocation of resources from the EU funds to ECS policy objectives in 2007-2013 included predominantly the Convergence Objective, and marginally Regional Competitiveness and Employment Objective and European territorial co-operation Objective.

Thus, it seems that the setting and operation of the ESC is in both EU and Czech hands, while the setting is perhaps more done by the EU institutions and the operation more by Czech institutions. It is a complex system which functions properly only if all its pieces work hard towards the same and commonly set goal. However the 8 Czech NUTS III regions and their ultimate funding and support designators seem to deliver unsatisfactory outcomes, i.e. the entire machinery produces a problematic Czech output. Immediately, a question arises, whose fault is it? Should we punish the Czech end-user beneficiaries or Czech regional representation or Czech ministry (and which one of them) or the European Commission or European Court of Auditors or someone else?

1. Methods, literature overview

The distribution of competencies and the responsibility for their performances with the (re)distribution of funds are challenging issues, per se. This is even truer in the case of such a special and particular entity with a legal personality, as is the EU. There is an abundance of strong statements and conclusions which lack a proper scientific foundation and demonstrate a clear violation of basic principles of establishing and

sustaining arguments. It seems that many authorities and authors, sadly including academic scholars, seem to slip into the area of pre-judgments and hasty conclusions. In order to address properly and scientifically the complex issue of the responsibility in this context, we need to go to the very roots, and carefully explore the foundation of the current framework, both on the EU level and the domestic, Czech national level. Absolutely critical is the identification of the legislative sources and their interpretation following a teleologic and purpose recognizing approach, without contradicting a clear literal meaning. The analytical overview of these findings needs to be completed by sundry observations offered by the academic press, in order to get a colorful, three dimensional mosaic, worthy of critical assessment and further research.

Logically, the critical EU legislative documents to be considered are the Treaty on EU ("TEU") and the Treaty on the functioning of EU ("TFEU") plus a set of appropriate secondary sources of EU law, such as Regulations, and more strategic documents [3] dealing with the most practical issues such as innovation [8], e-business [12], and EU domains [13] . On the domestic Czech level, the Act No. 248/2000 Coll., on support of regional development, Act No. 250/2000 Coll., on budget rules for regions, and Act No. 320/2001 Coll., on financial control (audit) needs to be considered. The ESC policy is unanimously set by the European Council, and the European Commission prepares accordingly the appropriate EU legislation, i.e. drafts of Regulations defining the rules for utilizing resources from the EU budget via various funds. Naturally, adopting these Regulations requires a majority endorsement by the Council of the EU and the European Parliament. Once adopted, the Council of EU approves the Community Strategic Guidelines on Cohesion ("CSGC") setting priorities and suggesting national strategic frameworks and operational programs. It must be emphasized that it is the task of EU member states to prepare their own National Development Plan ("NDP") and National Strategic Referential Framework ("NSRF") about their plan for the use of funds. Thus, the Czech NSRF identifies the Operational Programmes ("OPs") which the Czech Republic intends to use it for. Member states submit their NDPs and NSFRs for approval to the Commission, which is responsible for ESC policy on the EU level. Thus, the European Commission does not draft them, instead only assesses their compliance with CSGC and EU laws and policies. After the European Commission

approves the NSRFs and OPs, EU member states can proceed relatively independently with their realization. Boldly, the plan is approved, the state acts accordingly, and the European Commission only monitors it and sends money from the EU funds as appropriate. During this process, the European Commission can ask for information, rectification and, in case of an illegitimate use of funds, the return of money to the EU budget.

Manifestly the economy and management of Czech regions pursuant to NSFR is in Czech, and not European, hands. Namely, four Czech basic institutions are involved. The National Coordination Authority (i) is a department of the Czech Ministry of Regional Development, NSRF Monitoring Committee - Management and Coordination Committee (ii), Paying and Certifying Authority - National Fund (iii) is a department of the Czech Ministry of Finance, Audit Authority - Central Harmonization Unit for Financial Control (iv) is again a department of the Czech Ministry of Finance. Thus, are the responsible key players, to be appreciated for a good operation and to be blamed for a poor operation of the ESC in the Czech Republic, the Czech Ministry of Regional Development and Czech Ministry of Finance? Or should we turn our attention to examine a higher level, perhaps on the Council of the EU, or even the European Council, or a lower level, at the cohesion regions themselves and their enterprises? The Socratic method can be instrumental in earning more insights.

The battery of selected academic articles to complete the information extracted and analyzed from legislative texts includes both theoretical studies of the nature of the responsibility in the budget process, plus more practical and case study oriented papers dealing with ESC policy, NSRFs, and OPs and assessing their effectiveness and efficiency. This mix of information will be projected on the situation of the Czech cohesion regions. This paper's objective is not to judge and acquit or condemn them, but to figure out who is doing what, so the potential criticism can be constructive and correctly targeted. The underlying hypothesis consists of the deep conviction of the authors of this paper that the situation is much more complex than it looks at first glace. In short, that several layers of competencies and responsibilities co-exist and perhaps the biggest issue is not in the setting or performance of these layers, but in their

insufficient co-operation and even misinformation, which is a tremendous breach, perhaps mortal sin, in the post-modern, information society with the global market.

2. Results

The positive, negative and side effects [18] of modern European integration and their consequences on the economy and management of regions [19] and SMEs [2], and vice versa [14] are at the center of legislative, as well as academic, documents and discussions. The ESC policy is definitely not an exception and the structural funds are the most intensively used instrument by the EU to support economic growth and convergence [6]. Since strategic planning of the economy and management of cohesion regions needs to be future oriented, a good analysis of all relevant factors should go first, and then policies can be developed [2] and implemented. The subjects are the EU, EU member states, cohesion regions [10], as well as individuals and enterprises, including Small and Medium-Sized Enterprises ("SMEs"), which generate a large part of the national income and creates more work places than large firms [7].

Statistically, the EU primary and secondary legislative setting can be explored in a systematical and satisfactory manner. Its internal as well as external operation, i.e. the dynamic side, is more problematic. The ESC policy implementation and operation of structural funds is, based on a set of deep empirical panel data analysis, not effective. [6]. This rather harsh assessment becomes even darker while looking on the national side, namely regarding the Czech Republic. According to annual reports of the European Court of Auditors [4], the most errors occur in relation to spent funding for regional policies, and sadly the highest error rate, 7%, goes for the area whose management is shared by the EU and member states, especially the Czech Republic. Pursuant to the euro-dotation audits, the Czech Republic is allegedly the worse EU member state, and this is due to depressingly long and varied reasons, starting with the non compliance of the Czech legislation with the EU law, followed by the chronic and well known lack of enforcement and ending with obvious, and 'miraculously' undetected, frauds [20]. Unfortunately, the criticism from the European Court of Auditors came late and with a weaker voice and strangely without a set of preceding actions to be taken by the Commission.

Thus, the EU institutions did not perform a perfect job. However, they did much better than the Czech Ministry of Finance along with the Czech legislature, the Senate and Assembly of Deputies. Sadly, errors at the EU level and at the Czech state level were aided and abetted by errors on the regional and individual level. Concurrently, the first subjects attempting to improve the deplorable situation were individuals and local groups forming the National Network of Local Action Groups in the Czech Republic [17] and following the well-known, successful bottom-up *Liason Entre Acitons de Développement de l´Economie Rurale (*"LEADER") as a local development method and one of the four axis of Rural Development Policy [5].

TAB. 1: Overview of key actors, their functions and legal basis

European Council, Council of EU, Parliament	Setting secondary EU law framework	TEU TFEU
European Commission	Preparing framework Management of Programmes Supervising, monitoring	Art. 17 TEU Art. 174 - 178 TFEU Art. 244-250 TFEU
European Court of Auditors.	EU´s audit	Art. 285-287 TFEU
Ministry of Finance of the Czech Republic	Financial Control Auditing	Act No. 248/2000 Coll. Act. No. 320/2001 Coll.
Ministry of Regional Development of the Czech Republic	Setting regions, coordination of activities	Act No. 248/2000 Coll.
Region administration	Analyze and support Preparation and Management of budget	Act No. 248/2000 Coll. Act No. 250/2000 Coll.
Individual and local enterprises	To comply with the law and to satisfy the project commitments	

Source: Authors.

3. Discussion

The current European integration and economy and management should reflect, or at least consider, opinions of the future stakeholders and likely decision makers, who will keep shaping it from the bottom up [11]. Definitely, more research is needed. Nevertheless, the above indicated results strongly suggest that the setting is not inherently wrong and that its complexity and byzantine layer dimension is not an insurmountable obstacle. A systematic and scientifically humble approach should be

embraced, and all players should truly study and recognize what is their competency and function. The exclusive and knowing-better attitude is not acceptable, although understandable considering the human factor.

An extremely interesting study of over six thousand instances of non-compliance of EU member states with the EC/EU law has generated empirical findings, showing that the combined model of the enforcement and the management approach turns out to have the highest explanatory potential [1]. According to resulting conclusions, politically strong member states are surprisingly the most likely to not comply, while the most complying are small member states with an efficient bureaucracy. The administrative capacity is a criterion, i.e. the (in) efficiency of bureaucracy and administration has a direct impact on the (lack of) compliance with the EU law, including management of EU funds, their spending and the related accounting [1]. Undeniably, the EU law and EU institutions are not perfect, but still their regime and function is operational as long as there is more willingness to co-operate than temptation to cheat. Manifestly, the Czech budgetary responsibility has legal as well as political dimension [9], and avoiding it by shifting the guilt for ESC policies problems in the Czech Republic on the EU, European Commission and reportedly bad EU bureaucrats is not acceptable.

Firstly, blaming others is not a positive and sustainable partnership method. Next, the ESC policy and the related funding is set by both the EU and EU member state's representatives, and perhaps the Czech negotiators are not in the best position and that the resulting Czech NSFR is more of a compromise than a Czech ideal. Thirdly, pragmatically we are where we are and we need to deal with it in a legal and reasonable manner, i.e. the Czech players need to identify themselves with the rules and play well the game, and not reluctantly gravitate around and succumb in temptation about circumventing the less desirable parameters. Fourthly, the responsibility does not mean only the risk of punishment, because the responsibility is about well-informed trust and honesty.

Conclusion

What is the future of the European integration, ESC policy and its Czech subpart? We do not know [15]. However, we understand that a game with sophisticated rules is played and we are players with a good chance to reach a win-win situation. The journey to it is not via shortcuts and outsmarting techniques, especially not of blaming others. The Czech top state administration, as well as public administration, on more local levels should work hard with Czech participants in ESC projects, and their goal should be enhancing reciprocal awareness and reliability. A legal analysis and court proceedings can end with a verdict charging perpetrators. Nevertheless, already now it is well known, regarding the EU funding issues, that the domino effect applies, and that one bad apple spoils the whole bunch. The European Commission has shown that it can and will act, and the negative impact can be felt by the entire country.

Who to blame is not the primary question. Instead, the question is what can we all do so that blaming is unnecessary. It appears that players on the lower edge of the hiearchy with their LEADER approach are more in compliance than their alleged models and supervisors on the Czech national level. David knows enough to be hardworking and responsible in EU matters and the allegedly pro-EU Goliath is a self-indulgent giant, coming years will show who will prevail, and there is too much at stake to indulge in the cyclic blaming and victim searching.

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TRANSFERS OF STATE ASSETS TO ENTERPRISES THROUGH THE INSTITUTIONAL AND CHRONOLOGICAL PERSPECTIVE

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Keywords:
institutional approach – institutional privatization – management practices – political capitalism – spontaneous privatization

Abstract:
Transfers of public assets to private owners of companies have been recognized as the important aspect of changes concerning management of enterprises. Adherents of institutional economics have argued that post-communist transformations should be seen through the perspective of formal rules and informal constraints. The article reviews the institutional conceptualization of early post-communist property changes to provide a framework for the adoption of more differentiated patterns regarding elucidation of interdependence between current privatization processes and structuring of management practices.

Introduction

Given the fact of several decades of evolution of the capitalist property rights system in Eastern and Central Europe, including former and current privatization processes, reformulation of research objectives related to the transfer of public assets to private hands and its importance for management enterprises is called for. [1, 78]

More concretely, over the last twenty years of post-communist development there have competed two distinctive and in many aspects opposite strands of perspectives concerning the transfer of public goods to private hands and they have also played an important role in governmental policies [5, 14]. The first one builds predominantly on a theory of neoclassical or liberal approach to capitalism, the other on the theory of institutional approach and its various forms.

While the liberal approach has dominated political scenes in many post-communist countries including the former Czechoslovakia, it has been very often criticized for negligence of property rights issues as well as transaction costs of the economic operations. Proponents of institutional economics have argued that post-communist privatizations were not symmetrical to communist nationalizations and that for this reason it was not possible to conceptualize economic reforms in terms of the *big bang* claimed by liberals; adherents of institutional economics have argued that post-communist transformations should be seen through the perspective of formal rules and informal constraints [7, 997].

While neoclassical economists do not differentiate between the early privatizations and the current ones concerning their importance for management practices, according to proponents of the institutional approach the current privatization processes in Eastern and Central Europe are more close to those that had been realized in Western European countries under consolidated capitalist conditions.

1. Methodology

This article builds on the notions of 'institutional privatizations' and 'spontaneous privatizations ' in order to differentiate between the early post-communist privatizations of former state enterprises and the current ones: it frames current privatization strategies as a result of globalization and a source of revival of economics. By defining the crucial elements of the institutional approach to property changes, the article arrives at a model facilitating a better understanding of the notion of property rights and privatizations regarding current property transfers of the state assets to private owners.

2. Results

Through the institutional perspective in almost all historical periods the property rights were executed only by the narrow elites and various interest groups; on the basis of their legislative power they made attempts to change the rules of game in their own interest and for the sake of maximizing their material wealth [8, 87].

While in the western European countries differentiated regulations concerning 'institutional privatizations' prohibited the merger of economic and political interests by

means of strict requirements for participation in respective privatization bodies, the deficiencies of the early Eastern and Central European privatizations were determined by several components.

'Institutional privatization' and 'spontaneous privatization' have been considered to be two crucial notions which could contribute to a deeper understanding of the continuities concerning everyday social routines and habits implied not only in the early East and Central European privatization processes but also in the current ones. 'Spontaneous privatizations' occurred in Eastern and Central Europe, as well as the wider developing world, and they refer to the specific property transfer of material assets from state structures into private hands that occurred after the fall of the communist regimes in Eastern and Central Europe, as well as in developing countries, and they were realized by the former *nomenklatura* cadres and operators [6, 14]. 'Institutional privatizations' occurred in the former Eastern and Central European countries, as well as in the Western ones, where their course was determined by respective privatization laws, decrees and regulations.

Despite the fact that certain authors have stressed the importance of the past for the current condition [3, 132], current consolidated market structures and transformation of elites call for the constitution of such a normative model that would not take into consideration only contradictions between rules of the game and informal constraints, but also advance an institutional framework under the consolidated market structures.

(1) Jurisprudence in the field of European law that would reflect upon the fact that frontiers between national and European regulations concerning transfers of state assets to private owners have been blurred: for example, national privatizations of telecommunication were interconnected with the continuous deregulation of the field.

(2) Conceptual differentiation of various transfers of public assets to private hands: privatizations (they do not automatically bring diminution of state importance in the economic system, See Figure 1), denationalizations (they are retroactive processes to formerly realized nationalizations and ignore concrete forms of ownership, See Figure

1) and reprivatizations (they fully or partially give back expropriated properties to original owners or to their inheritors, See Figure 1).

(3) Respective norms such as directives, decrees and laws which should pay sufficient attention to the legal past of assets to be transferred: assets which were always owned by state structures (See field 1 in the Figure 1), assets which were not nationalized and were transformed into cooperatives (See field 2 in the Figure 1), assets which had been owned by cooperatives and only later on were nationalized (See field 3 in the Figure 1), assets which were collectively owned by cooperatives (See field 4 in the Figure 1), assets which were denationalized and which are about to be transformed into cooperatives (See field 5 in the Figure 1).

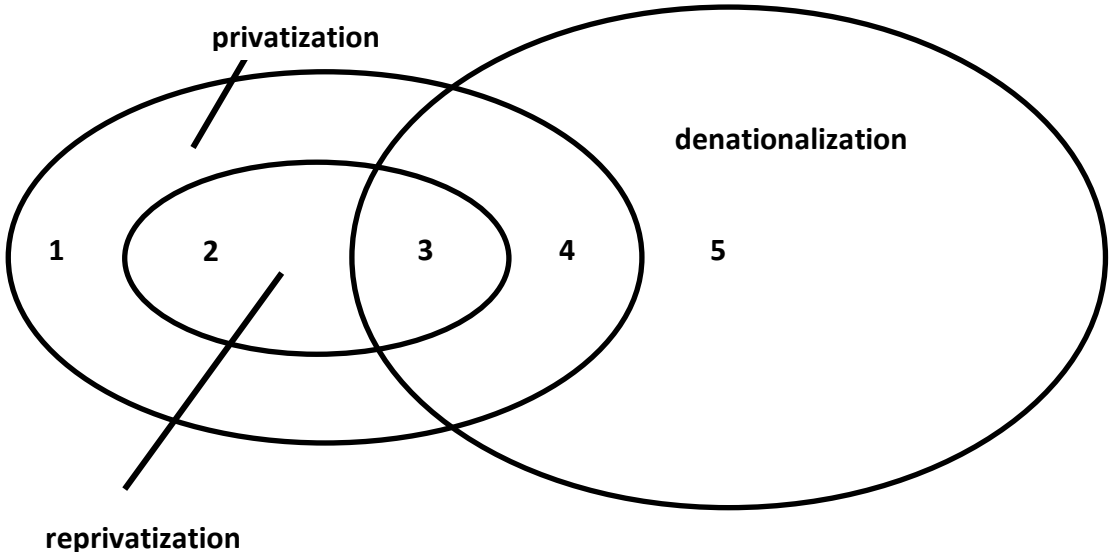
(4) Approach to concrete privatization waves including a schedule which would adopt a systematic approach to assets to be transferred: it could also imply the enumeration of concrete enterprises/agricultural cooperatives or classification of their importance in the national economy (positive experience of two waves of French privatization processes).

(5) Constitution of such a privatization committee, or committees, which would have an autonomous statute vis-à-vis state structures and which would be recruited from responsible experts who determine fixation of prices, schedule concerning state control in the enterprise to be transferred, etc. The committee, or committees, should be nominated for a concrete period of time and should be composed of exactly a limited number of experts on the basis of a strict selection procedure in order to prevent a conflict of personal interests concerning decision-making processes.

(6) Given the negative effects of cross-ownership which have maintained indirect influence on state structures and which are also the result of 'institutional' privatization processes, one should strictly define the conditions for the acquisition of privatized assets, privatization funds and certain operations of the capital market; the measures should prevent the emergence of cross ownership among financial institutions, among enterprises themselves as well as among financial institutions and enterprises.

(7) Implementation of transparent national regulations favourable for small investors in various economic sectors which would promote dispersed ownership and particularly increase the number of small shareholders: the broader citizens' participation could also be achieved by the dissemination of necessary information concerning accessibility of the capital market as well as by concrete possibilities of participation at transfers of public assets to private owners.

FIG. 1: Paths and Obstacles concerning Privatization of State Enterprises



Source: [2, 20]

(8) Consideration of specificities related to privatizations of the banking sector given the positive experience of 'more ancient member states of the European Union' concerning the interdependence between privatization processes of the banks and the advancement of transnational operations. Nevertheless, privatization processes of the banks should differentiate the importance of the bank for the national economy (the most important ones versus the local ones) and should be realized under the direct control of the Commission for Privatization, the Security Commission, etc.

(9) Adoption of measures which would reflect upon the internationalization of capital markets and respective institutions such as the International Organization of Securities Commission. National measures should strive for the participation of a well-informed

citizenry and prevent informational asymmetry (brought about by principal-agent reasons) which very often leads to the passive attitudes of shareholders towards their investments.

(10) Introduction of such regulations at the enterprise or cooperative level which would prevent the concentration of the enterprise ownership among managers and related economic elites: it is necessary to adopt such a privatization scheme that would induce employees of concrete enterprises or members of cooperatives to invest in shares of the enterprise where they have or had been working, to promote 'faithful' shareholders who have participated in several waves of privatization programs.

3. Discussion

According to the conception of 'political capitalism', notions of the dearticulation of means of production and divided ownership have had an explanatory force for transfers of the state assets into private hands that occurred in transitional economies. Nevertheless, current Eastern and Central European privatization processes in the housing sector and other sectors call for following institutional measures:

(1) To harmonize regulations in the field related to internationalization of financial institutions, banking sector and capital markets.

(2) To introduce such concrete measures in various fields, which would reflect upon the merger of national and European frameworks and constitute the double structure of regulations and respective bodies (commissions, etc.).

(3) To adopt such strict separation of institutional competences that would be transparent to broader public structures and would prevent corrupt elements and the spread of semi-legal phenomena like cross-ownership or monopolization of privatized assets by local economic elites/managers (or eventually appropriation of assets by actors in the shadow economy).

(4) To mobilize human potential at the national level as well as at the level of management practices by the adoption of such measures which would attract new shareholders and at the same time prevent a constitution of concentrated ownership as well as collective protestations against privatization processes.

(5) To mobilize human potential by means of management practices at the 'grassroot' level which would promote dispersed ownership at the enterprise level or eventually in the housing sector by means of employees' or tenants' local investments.

Summary and Conclusion

The processes of share issue privatizations, asset sale privatizations, voucher privatizations and privatizations from below are being realized in various countries in the world and enormous amount of sectors and enterprises has already been privatized, is being privatized or is being under the consideration; among others one can mention privatizations of electricity, telecommunications, prisons, aircraft, etc. At the European level in the countries with developed property systems - such as England, France, Germany and others - privatizations were implemented between the eighties and today. Post-communist privatizations merged with the introduction of the capitalist property system and property rights and they were influenced by decline of former communist regimes; regardless of omnipresent path dependency effect each former socialist country opted for different timing and scale of the processes.

TAB. 1: Principles that guarantee the rule of law regarding privatization processes

1) Publication of laws that would enable all parties concerned to become acquainted with laws that one should respect
2) Clarity and reliability of legal framework that would enable to parties concerned to identify laws concerning their situation and determine their concrete meaning
3) Predictability concerning legal rules that reduce risk related to changes concerning interpretation and application of laws
4) Principle of non-discrimination concerning application of legal rules demands imposition of equal obligations to all parties that are in the same situation
5) Provision of options concerning appeal on the basis of planned procedure that would guarantee access to independent mechanisms of appeal and solution of legal dispute

6) Stability of political and legal framework as well as decisions that would give investors security that state and government unilaterally and unfavourably won't change basic conditions that have become basis for their decisions concerning investments

Source: [4, 50: Translated from French to English by Lucie Cviklová]

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A NOTE ON THE MATRIX CASINO PROBLEM

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Keywords:
matrix casino – design of a matrix game – inverse optimization

Abstract:
The talk contributes to the following problem from the theory of matrix games: given a set of admissible payoff matrices and a number γ, find an admissible payoff matrix such that the value of the corresponding matrix game equals to γ or assert that none exist. (This problem was studied previously in the more general context of inverse linear programming.) We deal with a special case when the set of admissible payoff matrices is an interval matrix. We illustrate the geometry of the problem by an example. Then, we study an algorithm for finding an approximate solution, based on binary search, and give a polynomial estimate on its complexity. We also discuss some open problems: in particular, whether also an exact solution can be found in polynomial time, and under which conditions the binary search technique can be also used for other (convex) sets of admissible payoff matrices.

Introduction

Notation. For a payoff matrix A, let $\Gamma(A)$ denote the value of the matrix game determined by A. Recall that the *value* of the game is the payoff under Nash mixed strategies and that it can be determined by solving the linear programming problem

$$\Gamma(A) = \max_{\gamma,x}\{\, \gamma \in \mathbb{R} : \; Ax \geq \gamma e, \; e^T x = 1, \; x \geq 0\}, \qquad (1)$$

where e stands for the all-one vector.

Problem formulation. Imagine that you are a manager of a casino where matrix games are played. You face the following task: you are to introduce a new matrix game to be played. To *introduce* a game means the following: you are given

- a value $\gamma_0 \in \mathbb{R}$ and
- a set $\Theta \subseteq \mathbb{R}^{m\times n}$

and you are to find a matrix $A \in \Theta$ such that $\Gamma(A) = \gamma_0$ or assert that none exist.

Motivation for (a). When more games are played in the casino, it is reasonable that the average loss for a gambler (i.e., the average win for the casino) is similar for every game played in the casino. Otherwise, gamblers would systematically prefer the game with the highest game value. For example, consider that roulette is already played in the casino. Say, for simplicity, that the roulette has numbers 0, 1,…, 36 and gambler can bet only red or black; zero is green. The zero is a "win" for the casino. Due to the presence of zero, the average loss of a gambler is $-\frac{1}{37}$.

When a new matrix game with value γ_0 is to be introduced, it is reasonable to insist on $\gamma_0 = -\frac{1}{37}$. If $\gamma_0 > -\frac{1}{37}$, then gamblers would systematically prefer the new game and would not play roulette, while in case $\gamma_0 < -\frac{1}{37}$ gamblers would prefer roulette and would not play the new game. (This is an assumption of rationality of gamblers. Of course, in reality it is questionable whether something like "rationality of a gambler" makes sense at all. One could argue that if gamblers were truly "rational", no casinos would exist).

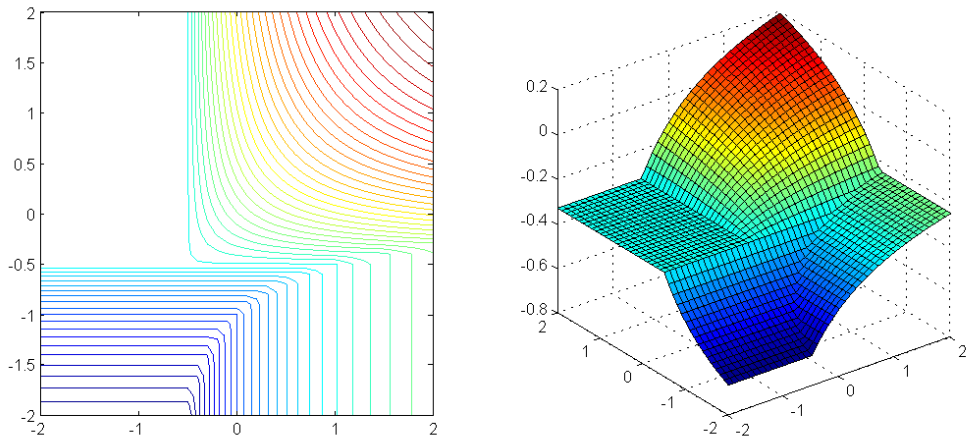
Motivation for (b). The new game must be in some sense "reasonable". The casino manager cannot choose the payoff matrix arbitrarily. This is formalized by the fact that a family $\Theta \subseteq \mathbb{R}^{m\times n}$ of "reasonable" or "admissible" payoff matrices is given and the manager must select one of them.

Remark. Of course, when Θ is finite, the problem is trivial. In this text we will consider a case when Θ is infinite but with a simple structure.

Remark. The Matrix Casino problem was initially formulated in [5] and a more general version of this problem was also presented in [1] within Hradec Economic Days 2014. Now we add another brick to understanding of this problem: using an idea of [3], we

estimate the efficiency of the algorithm of [5] and [1], utilizing particular properties of (1).

FIG. 1: Example of the game value function



1. Example and geometry of the problem

Consider the choice

$$\Theta = \{A(\alpha,\beta) : -2 \le \alpha \le 2, -2 \le \beta \le 2\}$$

with

$$A(\alpha,\beta) = \begin{pmatrix} 0 & \alpha & -1 \\ -1 & 0 & 1 \\ \beta & -1 & 0 \end{pmatrix},$$

which can be seen as an exotic version of the Rock-Paper-Scissors game. (We have selected an example with two parameters since then it is easy to plot a picture.) Now the game value function $\Gamma(A) = \Gamma\big(A(\alpha,\beta)\big)$ depends only on α, β. Its graph for $\alpha \in [-2,2]$ and $\beta \in [-2,2]$ is depicted in Fig. 1.

We can see

$$\min_{A\in\Theta} \Gamma(A) = \Gamma\big(A(-2,-2)\big) = -2/3,$$

$$\max_{A\in\Theta} \Gamma(A) = \Gamma\big(A(2,2)\big) = 0.1875.$$

Thus, the casino manager's problem has a solution only if $\gamma_0 \in [-2/3, 0.1875]$. For such a value γ_0, the task is to find a point on the contour line of Γ attaining γ_0. By convexity of Θ, we can search for such a point on the line segment with endpoints (−2, −2), (2, 2). This is what we will do in the next section. Before the analysis, we state our setup more generally.

2. The case when Θ is an interval matrix

From now on we assume that the manager can select the payoff matrix A from a given *interval matrix*

$$\Theta = \left[\underline{A}, \overline{A}\right] = \left\{A \in \mathbb{R}^{m\times n} : \underline{A} \le A \le \overline{A}\right\},$$

where $\underline{A}, \overline{A} \in \mathbb{R}^{m\times n}$ is a given pair of matrices. An inequality between matrices is understood entrywise.

Observe that the example of Section 2 is a special case with

$$\underline{A} = \begin{pmatrix} 0 & -2 & -1 \\ -1 & 0 & 1 \\ -2 & -1 & 0 \end{pmatrix}, \qquad \overline{A} = \begin{pmatrix} 0 & 2 & -1 \\ -1 & 0 & 1 \\ 2 & -1 & 0 \end{pmatrix}.$$

We make a pair of observations which have been illustrated by example in Section 2. Define

$$A_{min} = \min_{i,j} A_{ij}\ , \qquad A_{max} = \max_{i,j} A_{ij}\ .$$

Lemma 1. (a) *The function Γ is continuous and nondecreasing on* Θ,

(b) $\min_{A\in\Theta} \Gamma(A) = \Gamma\left(\underline{A}\right)$,

(c) $\max_{A\in\Theta} \Gamma(A) = \Gamma\left(\overline{A}\right)$,

(d) *for $A, A' \in \Theta$ such that $A \le A'$ we have*

$$\Gamma(A') - \Gamma(A) \le A'_{max} - A_{min};$$

in particular, for every $A \in \Theta$ we have $\underline{A}_{min} \le \Gamma(A) \le \overline{A}_{max}$.

Note that (d) is a kind of (a weak form of) the Lipschitz property.

Proof of Lemma 1. Item (a) was proved in a more general form in [5] using the results of [6]. Items (b) and (c) are corollaries of (a). Item (d) follows from the fact that for every payoff matrix A we have $A_{min} \le \Gamma(A) \le A_{max}$, which is easily proved using (1).

3. An efficient algorithm

A question. Now we ask the crucial question. *Given a pair of rational matrices* $\underline{A}, \overline{A}$ *and a rational number* γ_0*, is it possible to find* $A_0 \in \Theta = [\underline{A}, \overline{A}]$ *such that* $\Gamma(A_0) = \gamma_0$ *(or assert that none exists)?*

The first answer: Yes, but too slowly. The answer is positive: indeed, the matrix A_0 can be found by the parametric method of [5]. But, unfortunately, that algorithm is not known to run in polynomial time. Paper [5] does not give a complexity analysis. Currently we can prove only an exponential-time bound. One of the problems is that the parametric approach of [5] heavily relies on the simplex method; and recall that all known versions of the simplex method can be proved to be exponential in the worst case. (And the parametric approach has more aspects which can jeopardize computational efficiency in the worst case.)

The second answer: If an approximate solution is sufficient, then we can do it fast. Here we combine the ideas of [3] and [5] and show a weaker statement, showing that an ε-approximate solution can be found efficiently for every fixed $\varepsilon > 0$. To be more precise, we take the advantage of the observation from [3] that if Γ *satisfies a certain form of the Lipschitz condition, then we can do well*, which relies on the binary search approach from [5]. In the Matrix Casino problem, a kind of the Lipschitz condition is assured by Lemma 1(d). Summing up, we are ready to prove:

Theorem 1. *Let* $\varepsilon > 0$ *be fixed. A matrix* $A \in \Theta$ *such that* $|\Gamma(A) - \gamma_0| \le \varepsilon$ *can be found in time*

$$O\left(\log\left(\frac{\overline{A}_{max} - \underline{A}_{min}}{\varepsilon}\right) \cdot \mathrm{LP}(m,n)\right),$$

where $\mathrm{LP}(m,n)$ *is computation time necessary for solving an* $(m \times n)$*-sized linear program.*

Remark. Due to weak polynomiality of linear programming, we should be careful about $\mathrm{LP}(m,n)$ since the computation time depends not only on the number of variables and number of constraints, but also on the bit-sizes of rational numbers. Here we neglect this issue; however, it will be clear from the following proof that the algorithm is polynomial in the Turing model (for every fixed $\varepsilon > 0$). This follows from the fact that it is easy to find a polynomial bound on bit-sizes of rational numbers appearing in data of linear programs to be solved during the computation.

Proof of Theorem 1. We take the advantage of properties of Γ summarized in Lemma 1, together with the fact that evaluation of Γ amounts to solving one linear program. Recall that linear programming is a polynomial time problem.

Given $\gamma_0 \in \left[\Gamma(\underline{A}),\ \Gamma(\overline{A})\right]$, we run binary search over the line segment $L := \left\{(1-\lambda)\underline{A} + \lambda\overline{A} : 0 \leq \lambda \leq 1\right\}$. Correctness of the algorithm follows from

$$L \subseteq \Theta \tag{2}$$

by convexity of Θ and by continuity of Γ.

To describe the binary search procedure more precisely, we set initially $A^U := \overline{A}$ and $A^L := \underline{A}$. An iteration works as follows. We set $A' := \frac{1}{2}(A^L + A^U)$ and test whether

$$|\Gamma(A') - \gamma_0| \leq \varepsilon. \tag{3}$$

If successful, we are done. Otherwise, if $\Gamma(A') < \gamma_0$, we update $A^L := A'$. If $\Gamma(A') > \gamma_0$, we update $A^U := A'$. We iterate until (3) is satisfied.

Clearly, one iteration amounts to solving one linear program (the remaining operations are dominated by the computation time of linear programming).

In the ℓ-th iteration, we have $A^U_{max} - A^L_{min} \leq 2^{-\ell}\left(\overline{A}_{max} - \underline{A}_{min}\right)$, and thus by Lemma 1(d) we have $\Gamma(A^U) - \Gamma(A^L) \leq 2^{-\ell}\left(\overline{A}_{max} - \underline{A}_{min}\right)$. Let $A_0 \in [A^U, A^L]$ be such that $\Gamma(A_0) = \gamma_0$. Thus we can write

$$|\Gamma(A') - \gamma_0| = |\Gamma(A') - \Gamma(A_0)| \leq \Gamma(A^U) - \Gamma(A^L) \leq 2^{-\ell}\left(\overline{A}_{max} - \underline{A}_{min}\right) \leq \varepsilon,$$

where the last inequality holds in the iteration

$$\ell = \left\lceil \log_2 \frac{\overline{A}_{max} - \underline{A}_{min}}{\varepsilon} \right\rceil.$$

We can easily illustrate the efficiency of the method: with $\overline{A}_{max} = 10^{10}$, $\underline{A}_{min} = -10^{10}$ and numerical precision $\varepsilon = 10^{-20}$ we get the ε-solution by solving only $\lceil \log_2(2 \cdot 10^{30}) \rceil = 101$ linear programs.

4. Open problems, comments and conclusions

Problem 1. First, a tempting question is whether an *exact* solution A_0 can be found in polynomial time. The ε-solution, which can be found in polynomial time by Theorem 1, is often satisfactory. But we should be careful: the speed of growth of Γ cannot be nontrivially bounded from below in general (see Fig. 1), and thus it can happen that although we find a matrix $A \in \Theta$ such that $|\Gamma(A) - \gamma_0| \leq \varepsilon$ for a very small $\varepsilon > 0$, we still have a great difference between A and A_0 (here, $A_0 \in \Theta$ is such that $\Gamma(A_0) = \gamma_0$).

Problem 2. Second, the binary search technique of Theorem 1 works for every convex set Θ; recall that the crucial property is (2). When Θ is an interval matrix, it is easy to observe that $\arg min_{A \in \Theta} \Gamma(A) = \underline{A}$ and $\arg max_{A \in \Theta} \Gamma(A) = \overline{A}$, so we easily know how to start the binary search procedure. For a general convex set Θ, finding the argmin and/or argmax may be more complex; it might even turn out that finding the initial matrices $A^L, A^U \in \Theta$ such that $\Gamma(A^L) \leq \gamma_0 \leq \Gamma(A^U)$ is the main bottleneck.

Comment. Problem 1 is rather theoretical. But problem 2 opens a truly interesting question: given a convex set Θ, how to solve the optimization problems

$min_{A\in\Theta}\,\Gamma(A)$ and $max_{A\in\Theta}\,\Gamma(A)$? For which classes of sets Θ are these problems polynomial-time solvable, and for which classes are they NP-hard?

Some further general questions about the Matrix Casino problem (as a natural representative of a more general framework of inverse optimization), can be found in [3].

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NONLINEAR MODEL OF UNEMPLOYMENT IN THE EUROZONE

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Keywords:
macroeconomic modeling – monetary policy – unemployment – Taylor rule – Phillips curve

Abstract:
The aim of this paper is formulation as well as econometric estimation of a small macroeconomic model, the aim of which is to provide an understanding of the relationship between labor market in the Eurozone and the interest rate policy of the European Central Bank (ECB). The results from econometric estimation showed that unemployment rate influence interest rate policy dramatically. On the other hand, interest rate policy of the European Central Bank turned out to have only a very limited effect on unemployment in the Eurozone.

Introduction

The Eurozone is threatened by indebtedness and high unemployment. The existence of this monetary union depends to a great extent to the development of unemployment. For this reason, a standard presumption that European Central Bank (ECB) reacts to GDP is replaced by assumption that ECB sets its interest rate on the basis of the development of unemployment. This alternative hypothesis was discussed in the economic literature for example in [6], where it is shown that ECB reacted to unemployment even more strongly than to inflation.

The relation of the interest rate policy and labor market development is discussed in the theoretical literature on macroeconomic modeling as well. The important contribution is the article [4], where this relation is analyzed in the context of DSGE (Dynamic Stochastic General Equilibrium) models. The goal of this paper is to contribute to this discussion by formulation and econometric estimation of a small nonlinear macroeconomic model.

1. Methodology

The macroeconomic model presented in this paper was formulated by modifying famous Ball [2] model, which is very well known in the literature on monetary policy. The attention is in this model given to the relation between interest rate policy of the central bank, real and nominal economy. The model formulated by Ball was modified in this paper by replacing output gap with the unemployment rate. The basic model of unemployment was then upgraded by making some of the parameter endogenous in order to describe cyclical behavior of the real data more precisely. The model becomes nonlinear after this modification.

2. Model

2.1. Labor market

The model assumes that workers can be in either of the two states, employed or unemployed. The transition probabilities between these two states are as follows:

q ...job loosing probability,

p ...job finding probability.

The dynamics of the unemployment rate u_t is in the basic model described standardly by the equation:

$$u_t = (1 - p - q) \cdot u_{t-1} + q \,. \tag{1}$$

The stationary unemployment rate is given by:

$$\bar{u} = \frac{q}{p+q} \,. \tag{2}$$

It follows from previous two equations that:

$$\hat{u}_t = (1 - p - q) \cdot \hat{u}_{t-1} \,, \tag{3}$$

where $\hat{u}_t = u_t - \bar{u}_t$ is the cyclical component of the unemployment rate.

The basic relation (3) will be modified in this paper by the assumption that transition probabilities can evolve over time. Moreover, stochastic specification is performed in a standard way as follows:

$$\hat{u}_t = (1 - p_{t-1} - q_{t-1}) \cdot \hat{u}_{t-1} + \eta_t \ . \tag{4}$$

where η_t represents normally distributed i.i.d. random error.

The behavior of the variables p_t, q_t will be explained by cyclical component of the unemployment rate and by interest rate policy of the central bank:

$$p_t = p \cdot \left\{ 1 - \frac{2}{\pi} \cdot \arctan\left[a_u \cdot (\hat{u}_t - \hat{u}_{t-1}) + a_r \cdot \hat{r}_t \right] \right\}, \tag{5}$$

$$q_t = q \cdot \left\{ 1 + \frac{2}{\pi} \cdot \arctan\left[a_u \cdot (u_t - u_{t-1}) + a_r \cdot \hat{r}_t \right] \right\}. \tag{6}$$

where $\hat{r}$ is cyclical component of the real interest rate.

The variables $\hat{r}_t$, $(\hat{u}_t - \hat{u}_{t-1})$ fluctuate around zero. Therefore, transition probabilities fluctuate around the values p, q and unemployment rate around a stationary value a $\bar{u} = q/(p+q)$. The constant $\bar{u}$ will be measured as an arithmetic mean for a given time interval. Note that only the parameter p will be econometrically estimated. The second coefficient q will be calculated thereafter from the relation $q = p \cdot \bar{u} / (1 - \bar{u})$. For this reason, the equation (6) will be modified as follows:

$$q_t = p \cdot \frac{\bar{u}}{1 - \bar{u}} \left\{ 1 + \frac{2}{\pi} \cdot \arctan\left[a_u \cdot (\hat{u}_t - \hat{u}_{t-1}) + a_r \cdot \hat{r}_t \right] \right\}. \tag{7}$$

2.1. Inflation

The inflation is modeled by the Phillips curve in the form:

$$\hat{\pi}_t = b_\pi \cdot \hat{\pi}_{t-1} - b_u \cdot \hat{u}_{t-1} + \varepsilon_t \ , \ b_\pi \in [0,1], \tag{8}$$

where ε_t is normally distributed i.i.d. random error and the variable $\hat{\pi}_t$ represents deviation of the inflation rate from its mean value.

2.1. Interest rate rule

The interest rate policy is described by the Taylor rule in the form:

$$\hat{r}_t = -c_u \cdot \hat{u}_t + c_\pi \cdot \hat{\pi}_t + \nu_t, \quad (9)$$

where $\hat{r}_t$ is the cyclical component of the real interest rate, which is defined by $\hat{r}_t = \hat{i}_t - \hat{\pi}_t$, where $\hat{i}_t$ is the cyclical component of the nominal interest rate. The random error ν_t is assumed to be i.i.d. and normally distributed.

3. Data

Data for the Eurozone 18 were used for the purpose of econometric estimation. These are quarterly data from 1995 Q2 to 2008 Q4. Data after 2008 were not used in order to ensure consistency of the time series.

The interest rate policy is measured by Euribor 3-months. The yearly inflation rate was calculated from the GDP deflator. The performance of the labor market is measured by standardized unemployment rate. All the data used in this paper can be freely accessed in the database of the European Central Bank:

Unemployment rate:

http://sdw.ecb.europa.eu/quickview.do?SERIES_KEY=132.STS.Q.I6.S.UNEH.RTT000.4.000

GDP deflator:

http://sdw.ecb.europa.eu/quickview.do?SERIES_KEY=119.ESA.Q.I6.Y.0000.B1QG00.1000.TTTT.D.U.I

Euribor:
http://sdw.ecb.europa.eu/quickview.do?SERIES_KEY=143.FM.M.U2.EUR.4F.MM.EONIA.HSTA

4. Econometric estimation

Econometric estimation was performed using the state space form of a model, in which parameters are allowed to change over time. The outcomes from a Kalman filter algorithm were used to construct likelihood function, which was maximized in order to estimate parameters of the model. Technical details can be found in [5].

The results from econometric estimation are summarized in the following table 1:

TAB. 1: Econometric estimation of the parameters

	Labor market			Phillips curve		Taylor rule	
	p	a_u	a_r	b_π	b_u	c_u	c_π
Point estimate	0.04	2.26	0.18	0.09	0.07	0.09	0.00
t-statistic	5.15	3.96	1.48	0.70	2.64	2.05	0.00

Source: calculations of the author

5. Discussion

The estimates $a_u = 2.26$, $a_r = 0.18$ show that interest rate policy has much less effect on transition probabilities than the development of unemployment. The t-statistics for the coefficient a_r is less than standard critical value. This result can be interpreted that ECB has only very limited possibilities to influence the labor market development. There are, however, other empirical studies (e.g. [3]), whose conclusions are quite the opposite. For this reason, this topic should be yet analyzed before final conclusion is made.

The estimation of the parameter $b_u = 0.07$ indicates that unemployment has only a small effect on inflation. Nonetheless, this effect is statistically significant.

Very surprising is the zero value for the estimated coefficient c_π, which suggests that ECB ignores its primary goal of stabilizing inflation. Similar results are also found in [1], despite the fact that different econometric methodologies were used than that in this paper. On the other hand, the reaction of the ECB to the unemployment is statistically significant.

Conclusion

The aim of the article was to analyze the relation between labor market and interest rate policy of the ECB. The important result is that ECB did not react systematically to inflation despite the fact that stabilizing inflation should be its primary goal. It was shown that the interest rate policy of the ECB is determined mainly by the unemployment rate. It was also shown that the effect of the interest rate policy on

transition probabilities is rather small and not statistically significant. Such a conclusion is extremely important from a practical point of view. For this reason, this topic is a question for future research.

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IMPORTANCE AND FUNCTIONALITY OF KEY AREAS OF HUMAN RESOURCE MANAGEMENT PROCESS IN SME´S

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Keywords:
human resource management – small and medium-sized enterprises – importance – functionality

Abstract:
The aim of this paper is to analyse and create a strategy for the field of Human Resource Management, its importance and functionality according to the categorization of companies as micro enterprises, small enterprises and medium-sized enterprises. The primary data were collected by means of a questionnaire survey and interviews with managers and owners of small and medium-sized enterprises in the Region of South Bohemia in 2013 within the grant project GAJU 039/2013/S being called as follows: Human Resource Management of Small and Medium-sized Enterprises.

Introduction

Every company wants to improve the way it does business, produces goods and services as efficient as possible, and increases the net profit. Every manager knows that achieving these goals is a part of their job. The business process management (BPM) is something that companies do in order to improve and adapt processes that will help improve the way they do the business [5]. The competition between small and medium-sized enterprises is under a great pressure and therefore they try to achieve the competitive advantage and attract the customers. The creative strategies [3], knowledge of processes in SME's, especially staff processes, their measurement and their evaluation are the basis of successful management [8]. Human resource management can be defined according to [1] as a strategic and logically considered attitude towards managing the most precious commodity which an organization has – its employees – who contribute to company goals individually and collectively. According to [4] the

goal of human resource management is to achieve the maximum possible benefit of the work, skill and capacity of company employees (its human resources) and, at the same time, to ensure that employees gain material and psychological rewards for their work.

The impact of human resource management policies and practice of firm performance is an important topic in the fields of human resource management, industrial relations and industrial and organizational psychology [2], [6], [7].

1. Methodology

The primary data were obtained by means of a questionnaire survey of 300 respondents (owners and managers) of small and medium-sized enterprises in the Region of South Bohemia in the Czech Republic. The survey which took place in 2013 focused on the characteristic features of the surveyed enterprises and their human resource management strategies, evaluation of individual processes according to their importance and the functionality of the use. The function of human resource management utilized in each company was specific as a level of the indicators in human resource management.
The enterprises were categorized according to the number of employees in the following way:

- micro enterprises (1 – 9 employees),
- small enterprises (10 – 49 employees),
- medium enterprises (50 – 249 employees).

The following part of this paper deals with the introduction of human resource strategy where managers and owners answered whether forms already mentioned strategy. The evaluation of the human resource management process was considered, focusing on the importance and function of key areas in the selected group of enterprises, and the further analysis of this area, focusing on the categorization of companies considering them as micro, small and medium enterprises. The list of key processes was evaluated as follows:

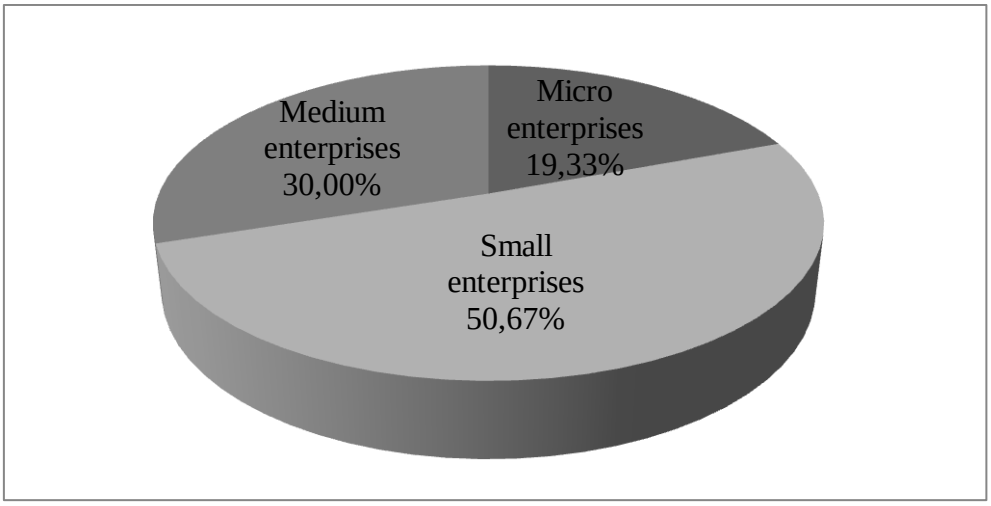
- Planning of employees.
- Recruitment.

- Development and education.
- Remuneration to employees.
- Employee evaluation.
- Communication with employees.
- Satisfaction of employees.
- Corporate culture.

2. Results

The questionnaire was completed by 300 small and medium-sized enterprises in the Region of South Bohemia in the Czech Republic. Fig. 1 shows that there is the highest number of small enterprises employing 10 to 49 people (50.67%), followed by medium-sized enterprises with the level of staff of 50 to 249 people (30%) and, finally, the micro enterprises employing 1 to 9 people (19.33%).

FIG. 1: Distribution of Enterprises by Number of Employees

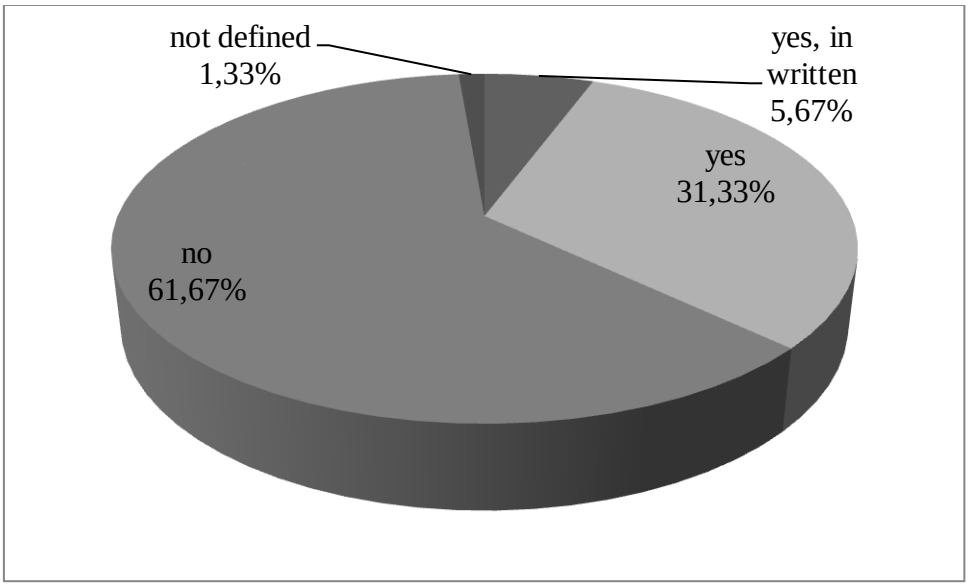


Source: own processing

Many authors claim that the human resource management strategy is one of the most important areas of the company; therefore the results are disturbing in Fig. 2 where we can see that only 5.67% (17 companies) of all companies are engaged in the strategy of human resource management in its written form. 31.33% (94 companies) argued that they dealt with this strategy, but not in the written form. 61.67% (185 companies)

reported that they did not deal with the creation of the human resource management strategy. The negligible number 1.33% (4 companies) did not indicate whether they dealt with this area or not.

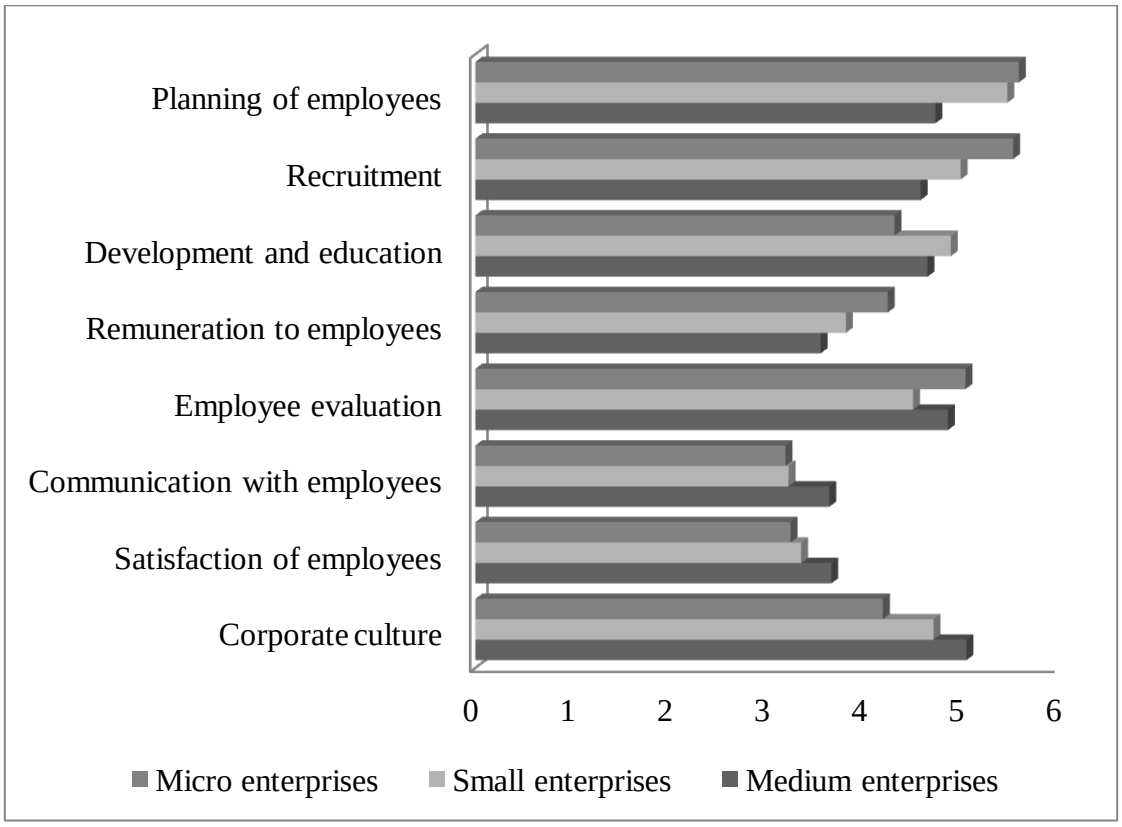
FIG. 2: Creation of Human Resource Management Strategy



Source: own processing

In the context of the importance of key areas of the human resource management process, each area is evaluated at levels 1 to 9 (integers), with the list of reviewed areas for each undertaking separately. The evaluation of importance by an enterprise as level 1 means the most important area in the company while the value of 8 is equal to the least important area, selected from the list of 8 evaluated areas. In practice, this meant that the owners and managers of enterprises compiled the importance of consecutive areas chronologically. Each area has its specific value, i.e. neither two areas are located on the same level of importance. Fig. 3 shows that the most important area for the entire sample of enterprises is Communication with employees (3.19 – 3.64) followed by the area of Satisfaction of employees (3.24 – 3.66) and the area of Remuneration to employees (3.55 – 4.24). The least important areas for the process of human resource management were Planning employees (4.73 – 5.59) followed by the area of Recruitment (4.58 – 5.53) and the area of Corporate culture (4.19 – 5.05).

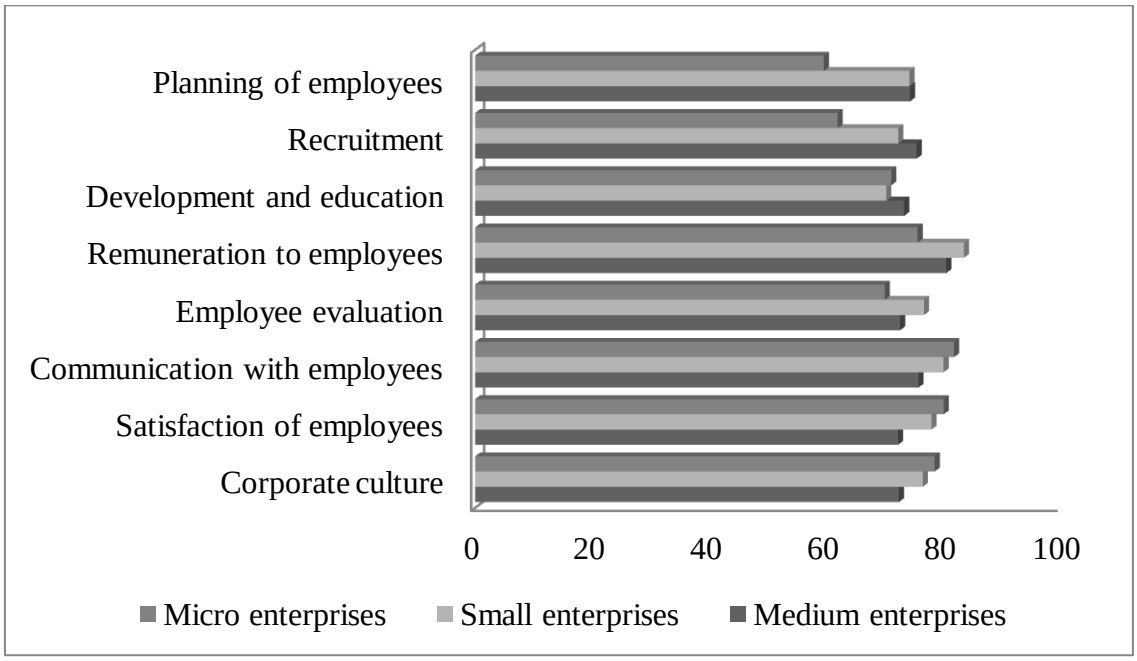
FIG. 3: Importance of Key Areas of Human Resource Management Process According to the Categorization of Enterprises



Source: own processing

After the importance of key areas of the human resource management process the functionality of these areas followed whereby business leaders evaluated the level at which these companies operated in the area. The level scale ranges from 0-100%, where 0% means a malfunction of process and amounts at 100 % error-free functioning of the area. Fig. 4 shows that the most functional area is Remuneration (75.55 – 83.45%), followed by the area of Communication with employees (75.69 – 81.77%) and the area of Satisfaction of employees (72.2 – 80%). The least functional areas of the human resource management process are obvious, the area of Recruitment (61.89 – 75.38 %), followed by the area of Planning of employees (59.53 – 74.24%) and the area of Development and education (70.18 – 73.24%).

FIG. 4: Evaluation of Functioning of Key Areas of Human Resource Management Process According to the Categorization of Enterprises



Source: own processing

3. Conclusion and Discussion

The questionnaire survey focused on the management was prepared to ask 300 respondents (manages and owners) of micro, small and medium-sized enterprises from the Region of South Bohemia. The companies were categorized according to the number of employees. The selection of enterprises was represented by 58 micro enterprises, 152 small enterprises and 90 medium-sized enterprises.

Human resource management is a strategic and coherent approach to the management of organization's most valued assets – the people working there who contribute to the achievement of its objectives either individually or collectively [1]. Therefore the paper is focused on individual areas in the human resource management process. Managers consider the communication with their employees to be the best evaluated area in the human resource management process. The worst rated area of the human resource management process is called planning of employees despite the planning of employees is necessary for companies. This area provides the employers with enough efficient and prospective employees who help reach the objectives of companies. This is connected with the area of recruitment which has the worst functionality in this process.

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UNIQUE COMPETENCES OF MANAGERS AS A RESPONSE TO THE REQUIREMENTS OF CONTEMPORARY LABOUR MARKET

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competences – labour market – work – managerial competences

Abstract:
Turbulent surrounding conditions and the rapidity of changes cause that entities are increasingly looking for more effective methods of operation. To succeed, companies use human resources as the pillars of their activity. Their aim is to build enterprises based on employee competences, in order to become more and more competitive. Therefore, among the staff valued most by economic entities are the key employees, including managerial staff and outstanding experts who have unique knowledge and creative potential. Their value results from their unrepeatable skills. In view of the above, the present article is devoted to work of managerial staff, presently focused on shaping the human resources as strategic assets of organisations, which enable effective competition on the hugely competitive market.

Introduction

Competences are related to the sphere of work and are defined as an ability to perform professional tasks in a good or effective manner, in accordance with the requirements for the specific positions, supported by skills, knowledge and physical and mental features. Thus, competences define a connection between individual abilities and personality and the characteristics required for efficient performance of professional task (Definition by the International Labour Organisation). Therefore, for example, the aim of higher education is to prepare graduates to satisfy the needs of the labour market, to be active citizens in a democratic society, to achieve personal development and to broaden knowledge (society and knowledge economy) [7]. As a result, employability, understood within the meaning of the definition by Hillage and Pollard [5], is

understood as a manifestation of individual's ability to gain initial employment and maintain suitable and sufficient employment, or as an ability to move independently throughout the labour market, use his or her potential and obtain permanent employment, or simply as a manifestation of potential. There are three main elements of employability: competences (knowledge, skills, grounds), presentation (marketing) and circumstances (context). The deliberations presented herein are thus focused on unique contemporary managerial competences in the context of employment on the labour market.

1. Competences vs. changes on the labour market

The significance of human resources for both employers and employees has changed. For instance, a comparison of the industrial revolution and the tiny value of the then employee with the present times, when the company's image is to a large extent built by the human factor, clearly shows the growth of the significance of employees on contemporary labour market. Development in engineering and technologies, including information and communication technologies, brought significant changes to living and working methods, extorting certain skills from humanity. Therefore, fearing the risk of unfavourable economic situation, high risk of unemployment, society aging and labour migration, the entrepreneurs and state ruling authorities need information on the changing labour markets and, in particular, on the qualifications and competences desired in the 21st century [6, 3].

For instance, the changes in Poland after 1989 resulted, among others, in transformations on the labour market, changed the position of individuals in the social structure and led to the emergence of new competences. The market economy system depreciated some competences in favour of others, revealed various forms of unemployment, divided the society into beneficiaries of the changes and the so called victims of social regulations (the excluded), introduced disproportions in remunerations, directed the activity of individuals towards adaptation to new conditions and redefined the competences necessary on the labour market. Yet another turning point, which implied changes in the perception of competences needed in order to become noticed on the labour market was Poland's accession to the European Union. When borders of

member's states were opened up, a large group of the Poles tried offering their skills to foreign employers. Learning new cultures and the specificity of work of other nations is crucial for the shaping of intercultural competences, including European ones, and of knowledge of international labour markets.

On the labour market, competences constitute valuable capital for both employers and employees. They serve as a bargaining card when it comes to access to prestigious assets and working positions. Competences are crucial on the competitive and diversified labour market. They are decisive when it comes to the labour sector where the individual will be located and the professional roles he or she will be offered. It should be added that today's labour market is characterised by duality – it is divided into two segments: the primary market and the secondary market, which explains why competences of an individual are so important. The primary segment encompasses jobs which ensure high social status, high wages, good working conditions and development opportunities, guarantee of employment as well as just and honest rules governing the jobs. The secondary employment market, on the other hand, encompasses jobs characterised by low salaries and low qualifications, poor working conditions or small chances for development and, as the case may be, arbitrary supervision [2, 165]. Therefore, aspiring to a specific working place is connected with analyses of the required competences and comparing them to the ones possessed. When fighting for access to the best jobs, individuals use various resources and talents, as high supply of jobs when compared to the demand discriminates some of the categories or groups[1] .

Competences imply the roles performed and define the individual's status and his or her position in the social structure.

2. Unique competences of a contemporary manager

Contemporary organisations need professionals with the ability to act independently, efficiently and effectively. In the context of a creative organisation, this professionalism

[1] E.g. women, whose competences are disavowed. When looking for and employing new staff, employers tend to follow sex stereotypes. They prefer men. Women, perceived as less effective, become unemployed much more often. As a result, they often take up less prestigious and worse paid jobs, disproportionate to their competences, which entail the phenomenon of depreciation of their competences, as they perform work below the level of their skills and ambitions.

requires not only perfection in the activities performed, but also certain predispositions, such as ability to perform different roles, versatility-oriented approach (both in terms of skills and experience), initiative based on entrepreneurship, flexibility and quick-mindedness, change-oriented approach or permanent development of competences and mobility.

In the opinion of P. Drucker [3] a manager is *any office worker who, due to his or her position or knowledge, is responsible for the share of work which has physical impact on the organisations' capacity for achievements*. The tasks of a contemporary manager are as follows: (a) to identify current and potential sources of success in the organisation; (b) to purposefully, continuously and dynamically motivate employees to work and create the climate of cooperation inside the entity; (c) to create organisational culture which favours cooperation; (d) to continuously train people and create the enterprise; (e) to effectively manage resources; (f) to create and use methods and tools for effective company management.

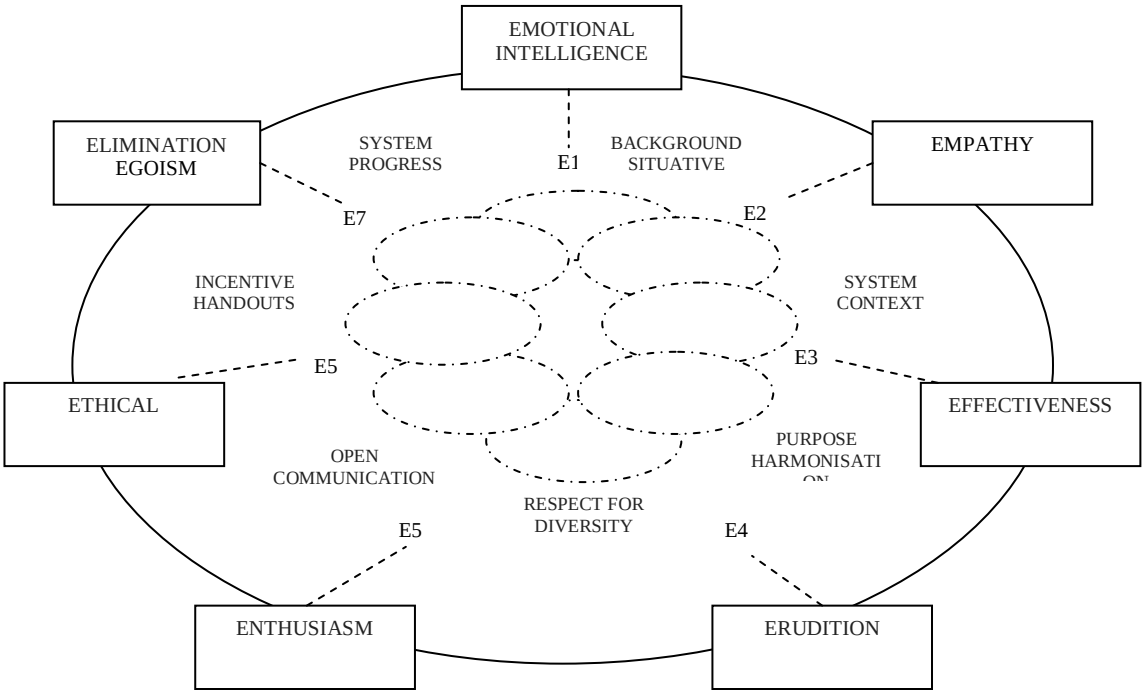
Competences constitute an important determinant of effectiveness and efficiency of the manager's performance and reflect the level of the professional tasks performed. Presently, they are characterised by variability in time, development and measurability. Today, knowledge and experience do not guarantee success of a manager – what counts the most is the ability to use organisation management skills in practice. Due to the above, managers should have the so called hard competences, that is, expert knowledge of the area and organisation and ability to analyse the competition, as well as soft competences, used for efficient employee management and enhancing their development.

It should be emphasised that contemporary mangers should stand out because of their conceptual, social and technical competences. Conceptual competences apply to the manager's mental ability to coordinate and channel the organisation. The social dimension of the manager's competences involves skilful wielding of direct influence on subordinated employees. These competences are the most difficult to master, as they require accounting for several personality variables, like temperament, attitude,

aspirations or motivation of each subordinate. The recognition of the aforementioned variables conditions the selection and effectiveness of management. When it comes to technical competences, they are equated with efficient use of the tools, methods, procedures and technology in the given field [8].

It should be noted that success is becoming increasingly dependent on proper self-management and skilful shaping of relations with others, which are all emotional competences [8]. An interesting proposal of a 7E model of competences was offered by M. Blašková [1]. The author presented in detail the peculiar managerial attributes which favour the development of human capital in a company (see Figure 1). They include: E1 – emotional intelligence; E2 – empathy; E3 – effectiveness; E4 – erudition; E5 – enthusiasm; E6 – ethicality; E7 – elimination of egoism.

FIG. 1: Model management 7E



Source: [1]

Emotional intelligence (E1) belongs to the more important managerial attributes, designated to manage a creative team. It is significant insofar as it enables getting to

know one's own emotions and managing them or recognizing emotions of other people and enhances self-motivation and proper management of interactions between people. As shown above, emotional intelligence includes a number of elements that might enhance professional organisation of own work and of the work performed by others.

The second element of the 7E model is empathy (E2). Owing to empathy, which includes building proper relations in a team and communication, a manager who wants to properly motivate his/her employees should identify their strong and weak points. Such actions are usually conducted in order to develop the skills of the employees and enhance their performance. Manager also needs empathy to resolve conflicts in a constructive manner, in such a way as to enhance the effectiveness of the team or organisation rather than hinder it [9]. Nevertheless, it needs to be mentioned that the manager's empathy level should be moderate. Too much empathy, which manifests itself in excessive focus on the employees' emotional status, might lead to disorganisation of work [10]. Moreover, management should be effective (E3), that is, purposeful, economical and educating. The effectiveness should manifest itself in the efficiency of work performed by teams. Erudition (E4) is yet another attribute of a contemporary manager. It is especially important in creative jobs, as it is connected with the manager's general knowledge and versatile knowledge of the organisation's business. With erudition, the manager can properly channel a team of employees in order to generate added value for the company. The next competence of a manager is enthusiasm (E5), often associated with passion, which should be linked to motivation. Enthusiasm is of particular importance in creative jobs, as it stimulates new ideas. Moreover, an enthusiastic manager, who is simultaneously driven by reasonability, can inspire other employees. The enthusiasm demonstrated by the manager in his or her work might be particularly valuable in crisis situations, when the team is unable to work out any solutions and becomes lethargic and disheartened. Then, a proper dose of motivation and enthusiasm might turn out really important for further effective performance of the team. Ethicality (E5) is another very important attribute of a contemporary manager. A manager faces moral problems and deals with fair play rules on a day-to-day basis. His or her response to difficult situations that might result from the problems have an effect on the ethical image of the entire organisation.

Additionally, employees perceive the organisation differently if the manager observes fundamental ethic principles. The final element rated among the emotional competences of a manager is the elimination of egoism (E7). When managing the employees or teams, the manager should demonstrate cooperation-oriented approach, including co-deciding. This is particularly important when working with creative teams, where the appropriate working atmosphere in some ways influences performance.

To sum up the previous deliberations, a creative manager should [8]:

- have high professional qualifications, psychological knowledge and organisational skills;
- have knowledge relevant to the development of the organisation;
- build culture and climate favouring the development of creativity in the organisation;
- build the organisation creativity management infrastructure;
- supervise works related to the creative process in teams and their achievements;
- get involved in expanding the organisational capacity of creative problem solving and obtaining knowledge;
- perform leadership functions, cooperate for the benefit of the organisation and its creative achievements;
- focus on proper employee motivation;
- be loyal to supervisors and subordinates;
- be creative and encourage subordinates;
- have the ability to communicate and understand people;
- be patient, relentless in the pursue of targets;
- create the atmosphere of trust, openness and kindness;
- improve his or her own professional qualifications;
- support subordinates in raising their qualifications;
- expand practical managerial skills;
- be able to take effective decisions;
- be flexible and understanding;
- have a vision of own professional career;

- understand the necessity to implement changes due to the dynamism of and turbulences in the organisation's surroundings;
- listen intently to subordinates' opinions;
- be able to act under external pressures, remain efficient in situations of frictions and be aware of the limits of own abilities (resistance to frustrations and stress, including mental stress);
- motivate subordinates to work effectively;
- have self-esteem, be self-confident, demonstrate entrepreneurial mindset, foresight, soft power, reconcile reasonability with intuition.

3. Discussion

Shaping competences that are proportionate to the contemporary labour market, social structure and entrepreneurs is highly important. Investments in the development of competences constitute a kind of "added value". Yet another important element of analyses, especially in Poland, is the regional differentiation of the level of competences and clear disproportions in this scope. In affluent regions, the supply of competences is high, while in less affluent ones, it is in deficit. Obviously, this favours competitiveness of companies, as the managerial staff is the creator of their development. In relation to the above, employees of companies from the creative sector in Pomeranian Voivodship were asked about the competences which a contemporary manager should demonstrate to generate creativity in the companies (including innovation) and to find employment.

The literature of a subject proposed the following classification of a discussed sector, which was used in a study. Creative activities of cultural nature should include type of activities, which have roots in human creativity, skills and talent, but at the same time, they only relate to manufacturing creative products (group 1). They include: literature, visual arts, film, video, music, scenic arts (theatre, dancing), photography. Industries, which are mainly manufacturing commercial products, were considered within creative actions of usable nature. The element, which differentiates products of creative activities of usable nature from products of cultural industries, is a course of commercialization process for these products. A significant part of cultural industries is

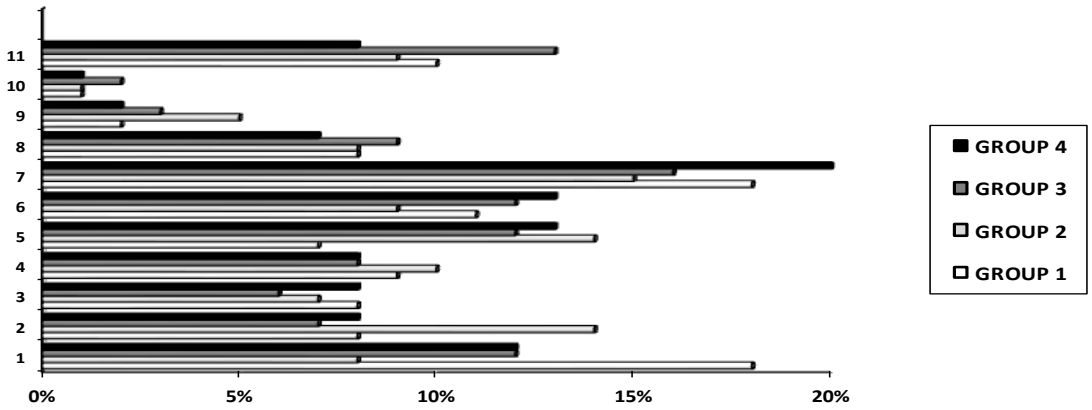
created in public sector, and their entry to the market is possible in many cases only thanks to support of various institutions and organizations. Creative actions of usable nature included (group 2): advertising; architecture, design and fashion design; publishing; radio and television; computer software (including interactive entertainment software). M. Grochowski, S. Dudek-Mańkowska, M. Fuhrmann, T. Zegar [4, p. 8-11] introduced group 3 including entities, which creative activity is based on knowledge. So, this category includes: production and services within information and communication technology (ICT) except for software; Research and development (R&D). Group 4 was also proposed by the authors listed below and it includes the following forms of economic activity within surroundings of the creative sector: cultural institutions; art and antiques trade; media; higher education: activities related to copyright exploitation.

In 2013, the group of 1- 500 employees participated in the study related to diagnosis of the creative capital and its influence on value of entities; in the group 2 – 250 employees were examined, the group 3 included 123 respondents and 36 persons from the group 4. Persons were randomly selected focusing on purpose of the studies. This study involved surveys, which included closed questions. Only 26% of respondents offered their services or products on domestic and foreign markets. Evaluated representatives of these companies were at 22-44 years of age, but with dominating number of young people at 22-35 years of age. Education of evaluated persons was diverse. Seniority in running private enterprise in an industry was short (up to 5-10 years) in majority of respondents, and only one person was involved in such type of operations for more than 15 years. Subjects in this group included persons from public creative sector, and these people, also in vast majority, were at 22 to 44 years of age. The same tendency related to nonprofit organization. Purpose for including age in a selected research group was crucial due to the level of creativity of persons, which decreases with age. This is a general rule and it does not always reflect individual predispositions of persons, although it shows aforementioned tendency in some percent. 57% of respondents were females. Among entities participating in the project, 33% were running business operations in an international scale, 53% were running business operations in a domestic scale in Poland, and only small group limits its operations to local market.

Purpose of the study included cognitive, theoretical and methodological discussion on conditions for development of the creative capital in the region of West Pomeranian Voivodship. The analysis used methods for document evaluation, as well as analogue and heuristic methods. This study was conducted based on qualitative as well as quantitative analysis of regional statistical data.

The employees surveyed were asked which competences, in their opinion, were ranked highest in the hierarchy both in terms of the employment opportunities for the manager and his or her work in the company. The answers obtained show that it is emotional competences that play the crucial role on the labour market (58%), followed by social skills (19%), conceptual skills (15%) and technical skills (8%).

FIG. 2: Competences of a contemporary manager, in the opinion of respondents



1. have high professional qualifications, psychological knowledge and organisational skills;
2. have knowledge relevant to the development of the organisation;
3. build culture and climate favouring the development of creativity in the organisation;
4. perform leadership functions, cooperate for the benefit of the organisation and its creative achievements;
5. focus on proper employee motivation;
6. be loyal to supervisors and subordinates;
7. have the ability to communicate and understand people;
8. be patient, relentless in the pursue of targets;
9. create the atmosphere of trust, openness and kindness;
10. support subordinates in raising their qualifications;
11. listen intently to subordinates' opinions.

Source: own research.

Then, the respondents were asked to arrange selected detailed components of the competences by importance, to define which ones are the most important to colleague employees. The responses are presented in Figure 2.

4. Conclusions

The survey results show that among the competences indicated by the respondents as crucial to feel good in the organisation are, first of all, the ones used in direct contact with the employee. The most important ones include: the ability to focus on proper motivation of employees, loyalty to superiors and subordinates, creativity and encouraging the subordinates, followed closely by: communication skills, understanding people, patience, and perseverance in pursue of goals, creating the atmosphere of trust, openness and kindness. Competences related to the creation of a proper organisational culture are ranked lower. It should be mentioned that people working in creative sectors find it important to have direct contact with the manager and value managers who have the ability to manage relations and skills in such a way as to get the best out of the employees and create working atmosphere in which such skills maximize the benefits of the companies.

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GAMIFYING KNOWLEDGE MANAGEMENT SYSTEMS

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Keywords:
gamification – KMS – knowledge management systems – knowledge management – management

Abstract:
Gamification is the use of game elements in non-game environments. In this paper I discuss the possibilities of using gamification in knowledge management systems (KMS) design. Gamifying KMS can lead to higher employee engagement, higher contribution rates and better attitudes towards KMS. First, the concept of gamification is introduced and defined. Next, particular elements of gamified application are described and possible psychological drivers of successful KMS gamification are briefly discussed. Lastly, some considerations are proposed and concluding remarks are provided.

Introduction

Experiences, knowledge and intellectual capital possessed by the employees are key organizational assets [6]. For some time now, companies have been realizing how important this asset is for good business performance, and they started to implement ways to use it more optimally. Knowledge, unlike some other company assets, provides the greatest value when it is shared [1].

One of the most basic forms of sharing knowledge in company is person-to-person, and this form has often been used particularly for complex and difficult to transfer information [2]. While this form of knowledge sharing provides immediate feedback and opportunities for instant clarification should the receiver have any troubles understanding, it also is time demanding, requires the bearer of the knowledge to be present in person, and is hardly scalable. To address this, organizations begun to

develop and implement knowledge management systems (KMS). Many companies came to disappointment however, finding that after implementing elaborated KMS employees simply do not use them [6].

Key problems that influence KMS usage listed by Brown, Dennis, Burley and Arling [1] include motivation to share, attitudes towards knowledge sharing, trust, KMS design elements and more. Even well-designed and thoroughly developed KMS becomes useless, when employees do not use it. Long time ago video game designers recognized how effective points, badges, leaderboards and other elements are in keeping players engaged in gaming for day. Nowadays, businesses too start to realize the potential available from gamifying their own processes. One way to increase employee engagement in KMS usage (be it sharing the knowledge, organizing or using it) is applying gamification. In this paper, I discuss what gamification is and what can it do for KMS engagement, what elements it consists of, what is the basic psychological background and whether or not it can be used with any group of users.

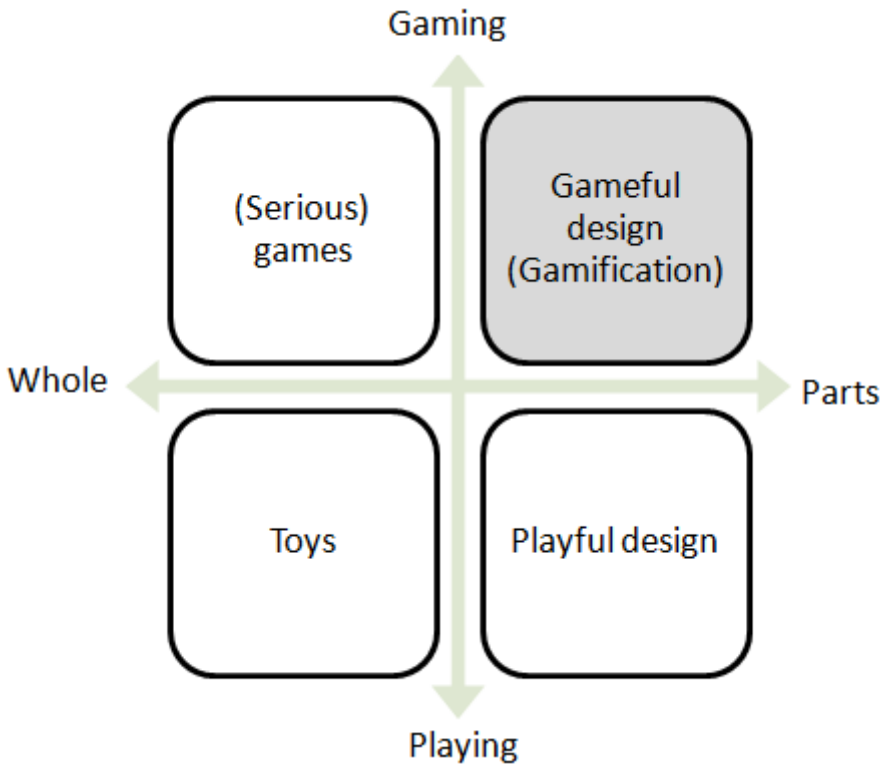
1. What is Gamification?

Gamification, as defined by Deterding, Dixon, Khaled and Nacke [4], is *the use of game elements in non-game contexts.* In our case, gamification would be enhancing KMS already running (or building a new one) with certain game elements (next chapter will provide closer look at these elements). These elements working in synergy with each other and designed with the consideration of employees' characteristics, local and corporate culture, help to render the experience of using KMS more enjoyable, more stimulating and more motivating.

Successful use of game elements in non-game contexts is not limited to KMS use or to processes inside of organization. Several companies, like Nike with their Nike+ campaign were able to significantly increase customer engagement, brand loyalty and sales using gamification [12]. Another example is TripAdvisor, web service that is in fact a large world-wide KMS for travelers, relying heavily on user-generated content such as reviews and tips. Users are encouraged to write reviews and share their travel experiences with various badges, milestones and points [16].

Gamification is not the same as using games to learn, nor is it turning work into play. Deterding et al. [4] provide the context in a diagram that separates gamification from related concepts. This diagram is replicated here in FIG. 1:

FIG. 1: Gamification in the context of game and play, whole and parts



Source: [4]

Games are meant to be played from the start to the end. In business setting there are "serious games" that teach participants certain skills – to acquire the skill, one has to experience the whole game, the story, from its beginning to its end [10]. Gamified application however can be experienced via bits and pieces – one interacts with corporate KMS in a meaningful way and is rewarded with points or reaches a new milestone.

As seen in the diagram, gamification is more "gaming" than "playing". Playing is defined as a free form, improvisational activity, while gaming follows certain rules and is aimed at reaching defined goals [4]. Still, in gamification having fun in the process is

encouraged and should be not left out when designing implementation of gamification in KMS [15].

2. Game elements

As noted before, there are several basic types of game elements that can be used when gamifying the experience of using company KMS. These elements adopted from videogames include [13]:

- Points
- Badges
- Contests and Challenges
- Awards and Prizes
- Rankings and Leaderboards

Points are fundamental part of gamifyied system. Employee can earn points for performing various actions, such as submitting useful tips into the database, editing a wiki article, posting to a blog, replying to a discussion forum question etc. [5, 13]. Although the points have no monetary value, they serve as a basic performance metric when it comes to assessing one's engagement and effectivity in using KMS [5, 11].
Badges are used to reward users for favorable pre-defined behaviors [5]. These behaviors include completing tasks, winning challenges, meeting activity thresholds and so on. When earned, badges can be displayed in user's profile or next to his avatar for other users to see [4]. This element of social comparison, manifested in taking pride in earning and showing off the badges, further fosters the engagement in active KMS usage.

Challenges and contests can be part of gamification strategy in enhancing KMS experience. These are typically limited in duration – employees have an hour, a day or a week to complete certain task [13]. For completing the task in time, of for the best performance among group of employees, one is rewarded with specific badge or certain sum of points.

Cumulative results of points collected, badges earned and challenges won can be represented in rankings and leaderboards, another element well known in computer and videogames. The potential to be ranked on the list of top performers may be sufficient motivation for employees to participate in KMS [13].

Many gamification strategies include extrinsic rewards for achieving certain level or status in the ranking. Rewards may be of monetary or tangible nature, such as gift cards, or more career-focused. These include opportunity to attend board meeting, face time with some leaders, additional training or attractive business trip [13].

3. The psychology of gamification

While gamification is a new phenomenon, elements of it are used by some companies for quite a sometime. Just think of the "Employee of the month" boards in many companies, points earned for performance in various multi-level marketing schemes or simply (non-virtual) badges girl scouts earn for selling cookies. Although gamified processes provide no extra monetary rewards for users, they do increase engagement and performance if used well. Why is this?

When consulting the psychological literature, we can come up with several brief explanations that include motivation, feedback, rivalry and social comparison.

Being successful in gamified application – i.e. earning lot of points and many badges – comes with sense of self-worth, creativity and recognition by others. These qualities correspond to the top two levels of Maslow's hierarchy of needs – esteem and self-actualization [9] – and are powerful drivers of human behavior.

Important aspect of gamified applications is immediate feedback provided by the points and badges awarded. Receiving points right after completion of the task is more likely to keep users engaged, than having the points calculated by the end of the month. Immediate feedback, progress tracking, sense of control, intrinsic motivation and the ability to succeed in challenges are qualities that are found also when one is having the experience of *flow* [3]. Although participating in gamified KMS is unlikely to induce flow experience in users, experiencing aforementioned qualities makes using gamified KMS is likely to increase their engagement and commitment to it.

Collecting points and badges also means competing with other users who are engaged in the same activity. As expected, the sense of rivalry and competition further motivates users to exert more effort and enhances individual performance [7].

As powerful as gamification may seem as a tool to increase KMS engagement with employees, we need to keep in mind that it is not a universal solution to all knowledge problems. First, people are different in their experiences, their background or psychological characteristics. A group of young employees, for example, may have grown up playing videogames and be familiar with game elements mentioned in this paper. These employees would be expected to be more responsive to gamification than others, who do not have so much gaming experience. Also, conscientiousness, neuroticism and openness to experience (dimensions of five-factor model of personality) were found to influence knowledge sharing in KMS [14]. When it comes to demographics, women were found to report greater benefits from the use of gamified application [8].

When proposing and developing a gamified KMS, it is also important to consider corporate culture and to try to deploy the new system in a way that helps users understand what gamification is about: collecting as many points as possible is not a priority, creating and sharing valuable content in KMS while having some fun collecting points for it is.

Conclusions

In this paper I briefly introduced gamification, explained what it is and what components it consists of. I outlined the possible benefits of gamifying organization's knowledge management system and provided some psychological background of why gamification is effective. In the end, I noted that however powerful tool gamification may be, it is not a one-size-fits-all solution and that individual and cultural differences exist that might hinder the desired outcomes.

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CAUSAL DEPENDENCY IN EXTREME RETURNS

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Abstract:
Modelling of extreme price movements is one of the greatest challenges to risk managers. Extreme Value Theory provides useful and natural tools to analyze a distribution of such events but they are unable to predict the future behavior of extreme returns and their consequences. On the other hand we know that the sequence of extrema behavior, similar to volatility, exhibits long term memory. We have found new property of that sequence on the capital markets, what could be useful in construction of a predictive model of extrema. We argue that in the blocks of returns shorter than quarterly, returns maxima cause minima but it is not a common inverse causal dependency.

1. Introduction

A lot of different calendar effects, interpreted as regularities of returns in specific calendar periods, were identified in financial markets (Schwert, 2002). They appear with certain regularity, though they do not occur in each following period and in each market. They are the antithesis of Efficient Market Hypothesis (Famma, 1970) which excludes achieving above-average returns while using active investment strategies. On the other hand investors realize that the assessment of financial instruments includes systematic and detectible errors and the existence of such effects makes believe that in some periods the investments are more profitable and less risky than in others. All the regularities can be valuable guidelines for the construction of models which enable to gain the advantage over other financial market participants.

Apart from the calendar effects connected with the time of the day, week or month, so-called stylized facts represent another significant group of time series properties. Among these properties the most recognizable and most often described are those which concern the existence of long-term correlation patterns in the variance of returns, known as volatility clustering e.g. (Liu et al., 1997); (Cizeau et al., 1997); (Tsy, 2002); (Danielsson, 2011).

In this paper we focus on the dependence in the return records known in Extreme Value Theory as block minima and maxima. Muchnik, Bunde and Havlin (2009) state that clustering of extremes is qualitatively different from volatility clustering and its analysis provides further insight into the market dynamics and might be used for risk estimation. For a block size less than five the authors observed strong anti-correlations between minima and maxima which disappear with increasing the block size and rise towards values close to 0,4. We then further investigate this phenomenon by the analysis of a causal dependence between weekly, biweekly, monthly and quarterly maxima and minima of twenty stock market indices. We indicate new interesting property of extremes of stock returns which for the first time was recognized on the futures market in Poland (Echaust, 2014).

The remainder of this paper is organized as follows. In section 1 the data used in empirical study are described. Section 2 examines cross-correlations between block minima and maxima. The main section 3 describes the causal dependency in the extrema time series. Concluding remarks are provided in the final section.

1. The data

Our research is performed for daily closing prices of twenty region leading equity market indices obtained for the period between 2007 and 2013. The period includes crisis times as well as booms on financial markets. The calculations are based on the percentage logarithmic returns $r_t = 100 \cdot \ln(p_t/p_{t-1})$. The Table 1 presents some relevant summary statistics.

The lowest spread between maxima and minima, standard deviations and excess kurtosis are observed for KOSPI and All Ordinaries indices indicating their relative stability. In all cases excess kurtosis shows too many realizations clustering at the tails of distributions relative to normal distribution. It is confirmed by the Jarque-Bera test (not presented here, but available from the author) which rejected normality for all indices. The lowest kurtosis and thus the thinnest tails of returns distribution is obtained for Polish WIG20. It can suggest that Polish Capital Market is characterized by the lowest extreme risk. Surprisingly, it is the index listed on the market which is classified as an emerging market and thus characterized by a high extreme risk.

TAB. 1: Descriptive statistics of the return series

Index	Nobs	Min	Max	Mean	Median	St.dev.	Skewness	Kurtosis
SP500	1760	-9.47	10.96	0.02	0.08	1.48	-0.302	8.492
NASDAQ	1761	-9.59	11.16	0.03	0.09	1.55	-0.245	6.237
TOPIX	1713	-10.01	12.86	-0.02	0.03	1.61	-0.36	6.88
BOVESPA	1729	-12.10	13.68	0.01	0.08	1.91	-0.017	6.362
BUENOS	1713	-12.95	10.43	0.05	0.10	2.01	-0.569	4.946
MEXICIPC	1762	-7.27	10.44	0.03	0.07	1.41	0.118	6.243
SASESLCT	1744	-7.17	11.80	0.02	0.06	1.18	0.056	9.722
ALL_ORD	1771	-8.554	5.360	0.00	0.05	1.23	-0.478	4.283
NIKKEI	1713	-12.11	13.23	0.00	0.05	1.74	-0.571	7.643
B-SHARES	1697	-9.73	9.37	0.04	0.13	2.14	-0.404	4.285
HANGSENG	1725	-13.58	13.41	0.01	0.06	1.83	0.067	7.294
KOSPI	1740	-8.55	5.36	0.00	0.05	1.23	-0.480	4.228
TAIEX	1728	-7.27	10.44	0.02	0.06	1.42	0.122	6.159
DAX	1780	-7.90	10.80	0.02	0.08	1.55	0.070	6.114
CAC40	1792	-9.47	10.59	-0.01	0.02	1.63	0.098	5.531
FTSE100	1774	-9.27	9.38	0.00	0.03	1.38	-0.115	6.737
SMI	1758	-8.11	10.79	0.00	0.04	1.28	0.043	7.081
EOE	1792	-9.59	10.03	-0.01	0.04	1.54	-0.143	7.578
BUX	1746	-12.65	13.18	-0.02	0.01	1.80	-0.027	6.766
WIG20	1751	-8.44	8.15	-0.02	0.02	1.65	-0.241	2.911

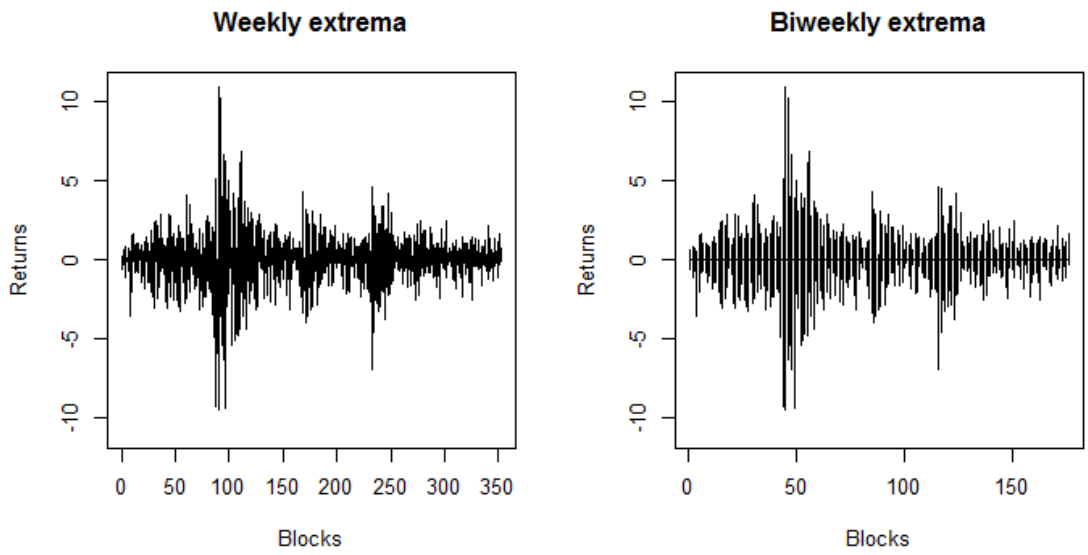
Source: own calculations.

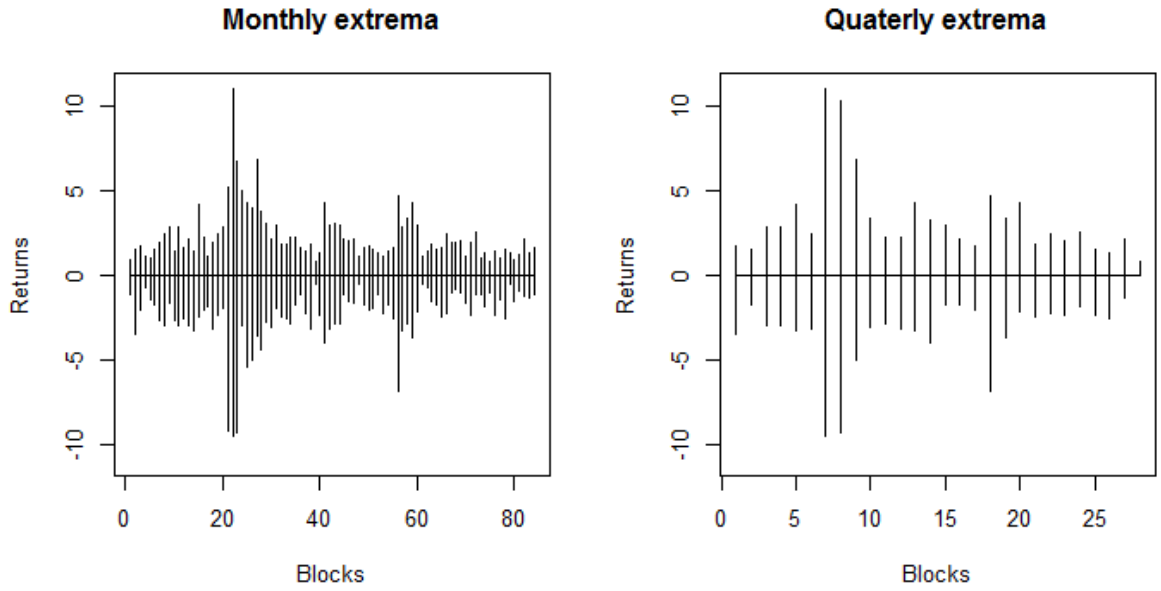
2. Cross-correlations between returns minima and maxima

The research is limited to the extrema which appear in the following blocks: weekly (5 days), biweekly (10 days), monthly (21 days) and quarterly (65 days). Figure 1 presents the minima and maxima time series of S&P500 in particular horizons.

The superior problem in the implementation of blocks of minima and maxima in financial modelling, especially in the Extreme Value Theory application, is the choice of the individual block size which is used to calculate minima and maxima. They should be chosen in such a way so that the extrema series is a sequence of independent and identically distributed (i.i.d.) variables. For instance Cotter (2006) uses the blocks of monthly, quarterly and half-yearly horizon to measure the risk calculated by Return Level. Also McNeil (1999) for the full analysis the author suggests using the blocks of various sizes and then comparing the obtained results. In turn Christoffersen, Diebold and Schuermann (1998) suggest using the blocks covering from 10 to 15 returns for achieving the observations which are i.i.d. Chavez-Demoulin, Embrechts and Roehrl (2002) implement monthly blocks and Bensalah (2000) uses blocks containing 90 observations to eliminate the phenomenon of volatility clustering in returns time series.

FIG. 1: Block minima and maxima time series of S&P500 daily log-returns in the horizon of 2007-2013





Source: own calculations.

In turn, in (McNeil, 1998) Block Maxima model is used to estimate the greatest stock exchange crash in history on "Black Monday". Block Maxima model with yearly blocks is indicated as natural analysis tool of such events. Finally, an optimum solution to this problem does not exist and a determination of a block size should depend on the specific nature of the research.

It is true that in the extrema series (exclusively maxima and minima), similarly as in the case of volatility series, there exist long-term dependencies (Muchnik, Bunde and Havlin, 2009). These dependencies are also present among maxima and minima.

The graphs presented by Figure 1 show clusters of extrema. High extreme values in individual blocks appear in series and likewise, low extreme returns follow low extremes which are similar to well-known volatility clusters phenomenon. The simplest way to analyse those dependencies is to use the cross-correlation function between block mimima and maxima:

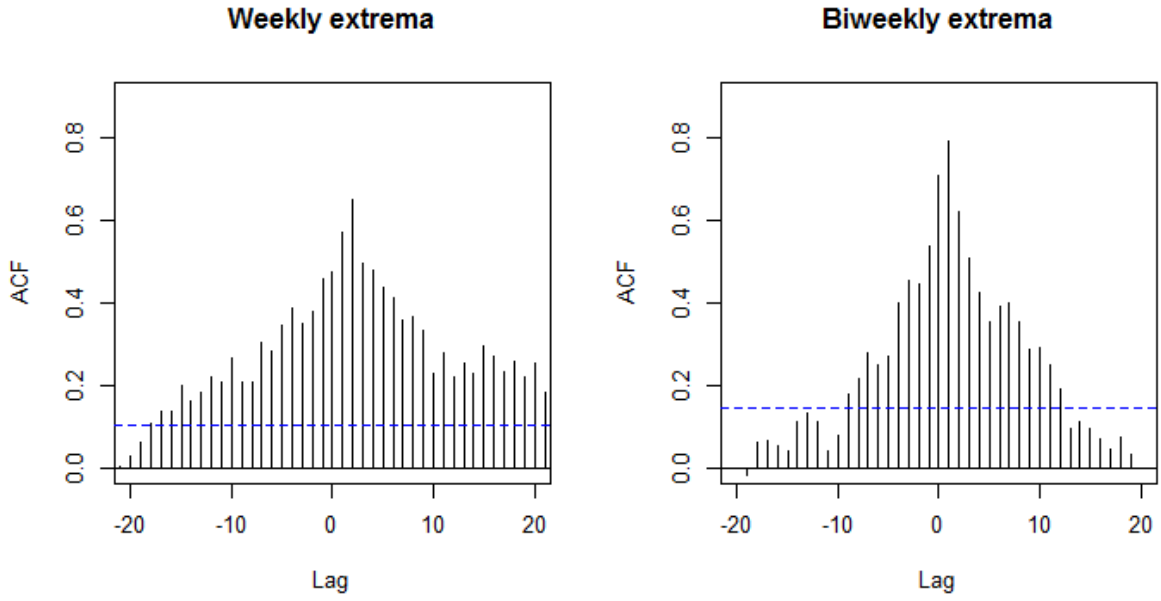
$$\rho_l = \frac{\mathrm{cov}(m_t, M_{t-l})}{\sigma(m_t)\sigma(M_{t-l})}, \tag{1}$$

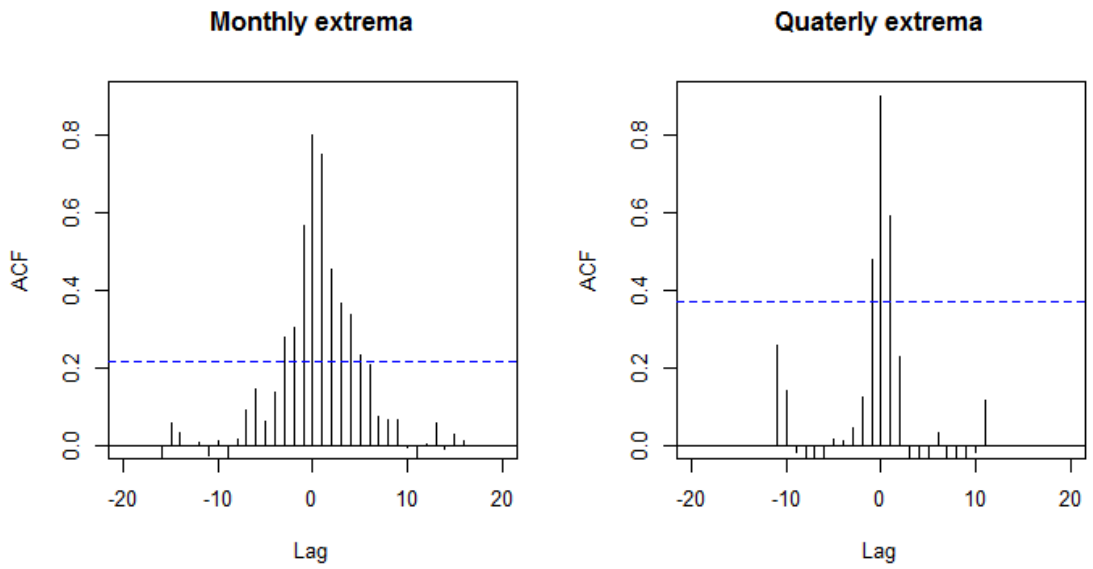
where m_t is a minimum at block t and M_{t-l} is a maximum at lagged block $t-l$.

For the convenience in the carried research instead of the minima we will continue to use minus minima. Figure 2 presents the graphs of the cross-correlation function of S&P500.

For the extremes calculated in shorter blocks the correlations disappear slower and are statistically significant even for large number of lags. However, if we compare the time of the dependencies' existence, we can conclude that it is very similar, no matter which method was used to calculate the extrema. Indeed, for the weekly-calculated blocks the cross-correlations sustain for approximately 20 blocks, for biweekly – approx. 10 blocks, for monthly – approx. 4-5 blocks and for quarterly – only one lag.

FIG. 2: Cross-correlation function between block minima and maxima of S&P500 daily log-returns in the horizon of 2007-2013





Source: own calculations.

3. Causal dependence between returns minima and maxima

Finding just the dependencies still does not explain whether among the analysed variables there are unilateral or bilateral causal dependencies. It does not indicate which variable is the cause and has the driving (causative) force and which is the effect. In our research we will try to explain the causative dependence direction between returns maxima and minima.

Most frequently the analysis of causal link uses the causal concept introduced by Granger (1969). The variable X is said to Granger-cause the variable Y, which we mark as $X \rightarrow Y$, if the present values of Y can be forecast with a greater accuracy when using past (lagged) values of X than without them, on the condition of accessibility of the same information. Granger-Causality Wald Test is the one most frequently used. It is the most powerful test of all Granger's tests. In this test there is a following set of hypotheses:

H_0: X does not Granger-cause Y ($\sim X \rightarrow Y$),

H_1: X Granger-causes Y ($X \rightarrow Y$).

This test is based on the comparison of an autoregressive model with the spread lags which includes autoregressive structure of X variable and the model with imposed

restrictions in which the lagged variables impact was deleted. Both of these equations are as follows:

$$y_t = \sum_{i=1}^{p} \alpha_i y_{t-i} + \sum_{i=1}^{q} \beta_i x_{t-i} + \eta_t, \tag{2}$$

$$y_t = \sum_{i=1}^{p} \alpha_i y_{t-i} + \varepsilon_t, \tag{3}$$

where:

y_t – value of *Y* variable in *t* period,

x_t – value of *X* variable in *t* period,

α_i, β_i – model parameters,

p, q – maximum lags,

η_t, ε_t– random terms.

Parameters of the models are estimated on the basis of ordinary least squares method (OLS). The test statistic is as follows:

$$W_G = \frac{n\left(S^2(\varepsilon_t) - S^2(\eta_t)\right)}{S^2(\eta_t)}, \tag{4}$$

where:

n – sample size,

S^2 – the estimator of appropriate residual variances in equations (2) and (3).

In fact the test checks if $\beta_i = 0,\ i = 1, \ldots, q,$ of the null hypothesis, against $\beta_i \neq 0$ of the alternative hypothesis. When the null hypothesis is true then the statistics (4) is characterised by an asymptotic distribution $\chi^2(q)$.

Values of Granger statistics with a lag that equals to 5 and the test *p*-values in parentheses are presented in Table 2. The print in bold indicates those cases which reject the null hypothesis of lack of dependencies at significance level of 5% which is associated with the existence of causal dependencies. The test results are rather uniform. For the extrema calculated for short blocks (5 days) in half of the considered cases there exist bilateral causal dependencies. The other half shows only unilateral dependencies

which mean that the changes of returns maxima significantly impact the changes of minima, however, the changes of minima do not affect the changes of maxima. In case of two-weekly blocks there are only unilateral dependencies (apart from four instances). The maxima are always the cause of minima and rarely the dependency exists the other way. Along with extending the blocks, the causal dependencies subside. For monthly blocks, in most cases the same unilateral causality can be still noted. However, blocks in a quarterly horizon, except occasional instances, show no causal dependencies.

Those results, in connection with the positive cross-correlation of maxima and minus minima, can be valuable guidelines for investors. They should attentively observe the changes of extreme values. The increases of positive records are the reason of appearance of high negative returns. After a big increase on the stock market the temptation occurs to achieve the profits which can lead to excessive sale of stocks and, as a consequence, to negative returns. It is different when it comes to observing the returns minima. The bad news cause a fall of prices which, due to the increasing risk premium, is intensified (Campbell and Hentschel, 1992). Consequently it is followed by farther stock sale. In a sense it can be understood through the prism of famous stock exchange saying: "Buy the rumour, sell the facts". The rises on capital markets do not always reflect actual data of real economy therefore after big increases frequently caused by so-called "herd behaviour", the investors are instantly willing to sell and gain profits. Meanwhile, the falls, especially those big ones, are mostly the result of the negative information flow into the market, therefore the consequence of the falls is usually the occurrence of other large negative returns. This phenomenon, in a way, is close to the concept of overreaction which was documented in behavioural finance e.g. (De Bondt and Thaler, 1987); (Chopra, Lakonishok and Ritter, 1992); (Chui, Titman and Wei, 2000). Investors react disproportionally to new information which considers individual companies and it results in a radical change of stock prices and a divergence between the stock price and their internal value. The result of excessive growths in price is the sale of overestimated stocks. However, in general this phenomenon considers the excessive growth as well as falls on the financial markets.

TAB. 2: Granger causality test for block minima and maxima (p-values in parentheses)

	~ Min→Max	~ Max→Min	~ Min→Max	~ Max→Min
Index	Weekly extrema		Biweekly extrema	
SP500	**2.522 (0.029)**	**31.159 (0.000)**	0.979 (0.432)	**20.099 (0.000)**
NASDAQ	1.812 (0.110)	**27.451 (0.000)**	1.750 (0.126)	**16.267 (0.000)**
TOPIX	0.744 (0.591)	**13.347 (0.000)**	1.183 (0.312)	**4.727 (0.000)**
BOVESPA	**5.862 (0.000)**	**20.738 (0.000)**	**2.850 (0.017)**	**11.487 (0.000)**
BUENOS	**2.970 (0.012)**	**7.481 (0.000)**	1.131 (0.346)	**3.217 (0.009)**
MEXICIPC	**3.194 (0.008)**	**23.761 (0.000)**	**2.283 (0.049)**	**12.419 (0.000)**
SASESLCT	1.651 (0.146)	**17.241 (0.000)**	**3.435 (0.006)**	**13.056 (0.000)**
ALL_ORD	1.588 (0.163)	**16.910 (0.000)**	1.818 (0.112)	**14.118 (0.000)**
NIKKEI	1.692 (0.136)	**17.064 (0.000)**	2.001 (0.081)	**4.229 (0.001)**
B-SHARES	**2.832 (0.016)**	**9.007 (0.000)**	1.318 (0.259)	**3.597 (0.004)**
HANGSENG	5.289 (0.000)	**14.743 (0.000)**	4.323 (0.001)	**5.524 (0.000)**
KOSPI	1.485 (0.194)	**16.422 (0.000)**	1.664 (0.146)	**13.510 (0.000)**
TAIEX	**3.072 (0.010)**	**23.188 (0.000)**	2.237 (0.053)	**11.951 (0.000)**
DAX	0.426 (0.831)	**19.452 (0.000)**	0.442 (0.818)	**10.902 (0.000)**
CAC	**3.719 (0.003)**	**22.440 (0.000)**	1.502 (0.192)	**16.746 (0.000)**
FTSE100	**2.330 (0.042)**	**26.377 (0.000)**	**4.008 (0.002)**	**16.089 (0.000)**
SMI	1.094 (0.364)	**23.192 (0.000)**	1.311 (0.262)	**10.403 (0.000)**
EOE	**4.149 (0.001)**	**24.150 (0.000)**	1.807 (0.114)	**19.743 (0.000)**
BUX	1.987 (0.080)	**5.922 (0.000)**	0.959 (0.445)	**6.975 (0.000)**
WIG20	**2.850 (0.016)**	**13.375 (0.000)**	0.491 (0.782)	**8.448 (0.000)**
Index	Monthly extrema		Quarterly extrema	
SP500	1.946 (0.098)	**7.766 (0.000)**	0.549 (0.737)	0.469 (0.792)
NASDAQ	1.414 (0.231)	**7.367 (0.000)**	0.315 (0.895)	0.146 (0.977)
TOPIX	0.559 (0.731)	**3.057 (0.015)**	0.732 (0.615)	0.525 (0.753)
BOVESPA	0.699 (0.626)	**6.141 (0.000)**	0.290 (0.909)	0.574 (0.720)
BUENOS	0.346 (0.883)	2.266 (0.058)	0.214 (0.949)	0.118 (0.986)
SASESLCT	0.684 (0.637)	**3.078 (0.015)**	0.498 (0.772)	1.884 (0.177)
MEXICIPC	0.914 (0.478)	**7.030 (0.000)**	0.834 (0.550)	0.598 (0.703)
ALL_ORD	0.605 (0.696)	**4.518 (0.001)**	3.052 (0.053)	**3.439 (0.037)**
NIKKEI	1.210 (0.314)	**3.254 (0.011)**	1.233 (0.357)	1.021 (0.451)
B-SHARES	1.265 (0.290)	1.778 (0.130)	0.552 (0.735)	1.362 (0.310)
HANGSENG	0.529 (0.753)	**2.577 (0.034)**	**4.627 (0.016)**	**8.590 (0.002)**
KOSPI	0.517 (0.762)	**4.361 (0.002)**	**3.471 (0.040)**	3.155 (0.052)
TAIEX	0.988 (0.432)	**6.878 (0.000)**	1.021 (0.451)	0.860 (0.537)
DAX	0.969 (0.443)	**0.359 (0.875)**	0.156 (0.974)	1.138 (0.393)
CAC	1.152 (0.342)	1.177 (0.329)	1.299 (0.327)	2.165 (0.127)
FTSE100	**2.925 (0.019)**	1.601 (0.171)	0.784 (0.581)	1.885 (0.171)
SMI	1.078 (0.390)	**3.701 (0.005)**	0.564 (0.726)	1.599 (0.234)
EOE	**3.522 (0.007)**	1.354 (0.252)	1.634 (0.225)	2.525 (0.088)
BUX	0.916 (0.476)	2.261 (0.058)	0.569 (0.723)	1.358 (0.312)
WIG20	1.124 (0.356)	**7.716 (0.000)**	0.840 (0.549)	0.683 (0.646)

Source: own calculations.

4. Conclusions

In the present paper we have studied the causal dependency between block minima and maxima of stock indices returns. We have found new properties of extreme returns which are understood as a returns minima or maxima in the fixed time interval. Performed Granger causality test between returns maxima and minima allows to state that changes in returns maxima cause changes in minima. Such evidence is clear in weekly, biweekly block extrema. When we consider monthly extrema this property is still present but not for all indices and disappears in longer, quarterly blocks of returns. Meantime minima usually do not affect the maxima. While in the case of weekly extrema causality is observed in the half considered cases, for longer blocks that property does not exist with few exceptions only.

Minima and maxima behavior have a different nature. Minima can be a consequence of market reaction to bad news or crashes as well as a propensity of investors to take profits after large increases. Maxima, in turn, appear rather independently from past minima. Current values of return minima can be predicted with greater accuracy using past values of return maxima than without their use. Such property can motivate a construction of a predictive model of extreme returns in the further studies.

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COORDINATION IN DYNAMIC SUPPLY NETWORKS BY STELLA SOFTWARE

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supply chain management – supply networks – system dynamics – coordination

Abstract:
Supply chain management is more and more affected by network and dynamic business environment. In supply network behaviour are inefficiencies. Coordination and cooperation can significantly improve the efficiency of supply networks. There are some approaches to model and analyse the supply dynamics. Important features of this environment are established in the proposed approach. The combination of network structure modelling and simulation of dynamic behaviour of units in supply network can be a powerful instrument for coordination in dynamic supply networks.

Introduction

The globalization and technology improvement has changed the business environment. It became more complex and dynamics, one consequence is that organizations are making efforts to deal with the increasing challenges and to keep competitive. Production will need to find a new role in an extended form with supply and distribution networks. It is necessary to redefine the boundaries of manufacturing and production management. Supply chain management is a philosophy that provides the tools and techniques enabling organizations to develop strategic focus and achieve sustainable competitive advantage. It presents management with a new focus and way of thinking about how their organization exists and operates within the wider business environment.

1. Dynamic supply networks

Supply chain management has generated a substantial amount of interest both by managers and by researchers. Supply chain management is now seen as a governing

element in strategy and as an effective way of creating value for customers. There are many concepts and strategies applied in designing and managing supply chains (see [7]). The expanding importance of supply chain integration presents a challenge to research to focus more attention on supply chain modelling (see [9]). Supply chain management is more and more affected by network and dynamic business environment. The overall business environment is becoming increasingly dynamic. Supply chains operate in network environment as supply networks.

Supply networks are dynamic multilevel systems with sets of suppliers, manufacturers, distributors, retailers and customers. The multiple decision-makers are interconnected with dynamic structures and dynamic linkages by material, financial, information flows and decision flows. Most supply networks are composed of independent units with individual preferences. Each unit will attempt to optimize his own preference. Behaviour that is locally efficient can be inefficient from a global point of view. In supply network behaviour are inefficiencies. An increasing number of companies in the world subscribe to the idea that developing long-term coordination and cooperation can significantly improve the efficiency of supply networks and provide a way to ensure competitive advantage. Once traditionally driven by pure competition, the supply network for many successful firms has matured from an adversarial relationship to one of supply network partnership (see [5]).

2. System Dynamics

System dynamics is concerned with problem solving in living systems (see [3]). It links together hard control theory with soft system theory. System dynamics needs relevant tools from both ends of the systems spectrum. If the possible causal factors are identified and their respective contribution to the overall dynamics are quantitatively measured and benchmarked, then it would be conducive to performance improvement by eliminating or reducing the relevant dynamics. Systems of information feedback control are fundamental to all systems. Feedback theory explains how decisions, delays and predictions can produce either good control or dramatically unstable operation.

The supply network dynamics (see [1], [8]) lead to the increase in the cost of the units and the whole network. A feedback control system causes a decision, which in turn affects the original environment. In supply networks, orders and inventory levels lead to manufacturing decisions that fill orders and correct inventories. As a consequence of using system dynamics in supply network redesign, we are able to generate added insight into system dynamic behaviour and particularly into underlying causal relationships.

3. Bullwhip effect

The so-called bullwhip effect (see [4]), describing growing variation upstream in a supply chain, is probably the most famous demonstration of system dynamics in supply chains. The basic phenomenon is not new and has been recognized by Forrester. There are some known causes of the bullwhip effect: information asymmetry, demand forecasting, lead-times, batch ordering, supply shortages and price variations. Information sharing of customer demand has a very important impact on the bullwhip effect (see [2]).

The analyses of causes and suggestions for reducing the bullwhip effect in supply chains are challenges to modelling techniques. We consider a *k*-stages supply chain. The customer demands are independent and identically distributed random variables. The last stage observes customer demand *D* and places an order *q* to previous stage. All stages place orders to the previous stage in the chain. The orders are received with lead-times L_i between stages i and $i+1$. The stages use the moving average forecast model with p observations. To quantify increase in variability, it is necessary to determine the variance of orders q^k relative to the variance of demands D.

In the case of decentralized information the variance increase is multiplicative at each stage of the supply chain

$$\frac{Var(q^k)}{Var(D)} \geq (1 + \frac{2L_i}{p} + \frac{2L_i^2}{p^2}).$$

In the case of centralized information, i.e. the last stage provides every stage with complete information on customer demand, the variance increase is additive:

$$\frac{Var(q^k)}{Var(D)} \geq 1 + \frac{2(\sum_{i=1}^{k} L_i)}{p} + \frac{2(\sum_{i=1}^{k} L_i)^2}{p^2}$$

The centralized solution can be used as a benchmark, but the bullwhip effect is not completely eliminated.

4. STELLA software

The STELLA software is one of several computer applications created to implement concepts of system dynamics (see [6]). It combines together the strengths of an iconographic programming style and the speed and versatility of computers. The instrument is very appropriate to proposed modelling framework for dynamic multilevel supply network.

The approach enables to solve a broad class of dynamic problems. Differantial equation can be used for modelling of system dynamics. STELLA software offers the numerical techniques (Eller's method, Runge-Kutta-2 and Runge-Kutta-4 methods) to solve the model equations.

STELLA software contains many built-in functions that can facilitate dynamic modelling of supply networks. There are some examples of instruments for proposed modelling approach:

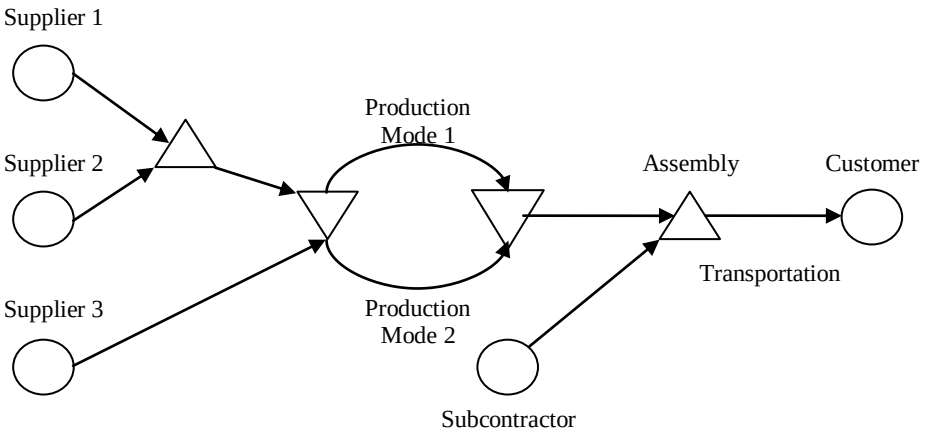
- AND/OR to modelling of AND/OR network environment,
- DELAY to modelling of led-times,
- DT time step,
- FORCST forecasts demand in stages of supply network,
- RANDOM generates random customer demand.

5. Proposed approach for modelling and coordination

The structure of supply networks and relations among units can be modelled by different types of networks. AND/OR networks can be applied for modelling flexible and dynamic supply networks (see [10]). The approach follows an activity on arc representation where each arc corresponds to a particular supply network activity. Each activity has multiple performance criteria. Nodes represent completion of activities and establish precedent constraints among activities. The initial suppliers without predecessors and end customers without successors are represented by nodes displayed as circles. Two types of nodes are defined to specifying prior activities. AND nodes (displayed as triangles △) are nodes for which all the activities must be accomplished before the outgoing activities can begin. OR nodes (triangles ▽) require at least one of the incoming activities must be finished before the outgoing activities can begin.

As an example of dynamic problem, a stochastic inventory problem can be analysed with the finite time horizon. AND/OR supply network consists of a structure of suppliers, different production modes, an assembly of components and production of an end product to a customer. Fig. 1 illustrates a AND/OR supply network consists of a structure of suppliers, different production modes, an assembly of components and production of an end product to a customer.

FIG. 1: AND/OR supply network



Source: Authors

A stochastic inventory problem with the finite time horizon can be analysed as an example of dynamic problem. We can describe the behaviour of the network decision-makers and propose a dynamic system that captures the adjustments of the commodity shipments and the prices over space and time. We illustrate using of STELLA software on a simple supply network model. The AND/OR network from Fig. 1 can be modelled by STELLA software (see Fig.2).

FIG. 2: Supply network by STELLA software

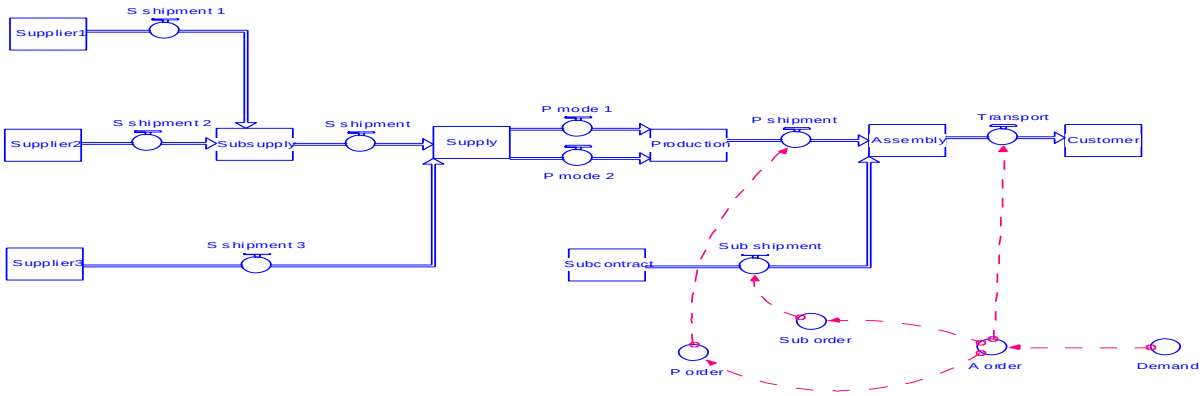


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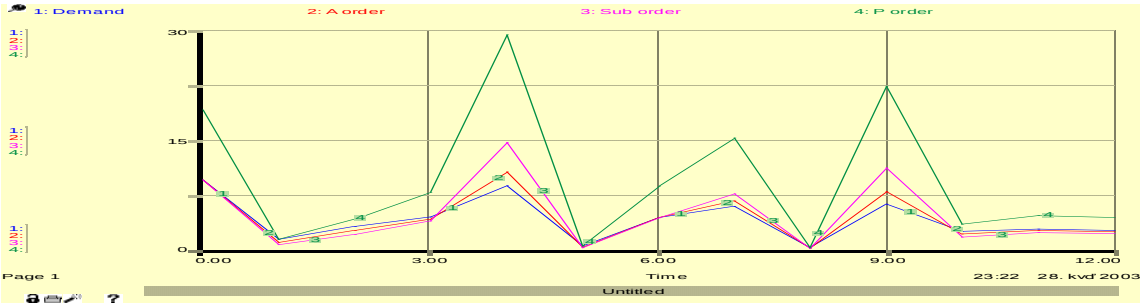
Fig. 3 demonstrates the bullwhip effect by comparison of random customer demand (Demand) and orders in different stages of the supply network (A order, Sub order and P order) by decentralized information. Centralized information of customer demand can reduce the bullwhip effect.

FIG. 3: Bullwhip effect



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Conclusions

Coordination of decisions in supply networks is a key issue. The combination of network structure modelling and simulation of dynamic behaviour of units in supply network can be a powerful instrument of coordination in dynamic supply networks. Dynamic supply networks are modelled by AND/OR networks. Simulation approach by STELLA software is an appropriate tool for coordination and prediction of real supply network situation.

Acknowledgement:

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ECONOMIC CONDITIONS OF THE FUNCTIONING OF THE FOOD INDUSTRY COMPANIES IN POLAND

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Keywords:
economic conditions – competitive advantage – the food industry – innovation

Abstract:
The present article examines the extent to which the processes taking place in the economy, and closer to the business environment of the food industry in Poland affect their performance and competitiveness. The study was conducted on a representative sample of 267 enterprises of the food industry in the years 2012 and 2013. The research noted that: enterprises of the food industry operate in a highly competitive market, the Polish membership in the European Union has influenced a major change in the methods, ways and standards of production and the market pressure applied to the implementation of innovations that changed the image of Polish food industry. It was also found that in the area of determining the degree of impact on processes in the areas close to the surveyed enterprises, their function to the greatest extend was affected by: the level of competition between companies, the bargaining power of buyers and bargaining power of suppliers.

Introduction

Previous research in the area of competitiveness of food industry companies indicate that the main source of competitive advantages are mainly cost and price advantage, which over time will decrease [9], and it can be found certainly in the general environment in which businesses operate, usually called its surroundings. Setting the company in a market economy in the literature is referred to a set of external phenomena, processes, institutions and forces that directly or indirectly affect the growth potential of the company, its strengths and weaknesses and contacts with contractors. Basically surrounding of the company is divided into closer and further. The closer setting is usually called by the company the competitive environment or

microenvironment. It is the most common entities classified to it directly interact with the company; by which each create their existence. It's the most important relationship with the environment, is the interaction between the company and the elements of the environment, which usually can be regarded as competitive. The proper response to signals from the environment is a prerequisite for the implementation of properly planned strategy. Extremely important missions to fulfil are employees of senior management in companies who are investigating and trying to determine the make optional continuation of interactions and apply them in practice. The ability of the company to influence the competitive environment varies and is determined mainly by its competitive position, and the relationship between elements of the microenvironment which constitute the structure of the industry in which company operates [5]. Components of the enterprise environment are competitors who are present locally, regionally and throughout the country; producers of substitute and complementary goods; customers and recipients; suppliers and partners; all kinds of financial institutions, banking, insurance, etc.; trade unions and other social organizations; companies performing services for the enterprise [3]. To make the determination of the detailed position of the company on the market, the most common is the use of analysis of the competitive environment, which recommends G. Gierszewska and M. Romanowska. According to the authors, this type of analysis helps to pave and indicate the best conditions for the functioning and development of the company in a given sector and a given geographic market. It also provides many of the necessary information to determine the appropriate processing opportunities and risks arising from the dynamics of the sector development, but also the activities of suppliers and customers, as well as indicate the unpredictable reactions of competitors. Using the results of the analysis of enterprise managers in the planning stage can adapt and build their resources so that they can be used for the purposes of the implemented strategy. Most often recommended, as well as practical methods of micro-analysis are: the concept of Porter's 5 forces; economic profile of the sector; point evaluation of the attractiveness of the sector; map of strategic groups; experience curve [2].

The further environment of the company determines the set of factors from outside of the company, which determine its function without its participation, and an example of

this might be a change of government, regulations or cycles. Further setting otherwise might be called the general environment, because it directly shapes determining the objectives and principles of the company, and its detailed observation and analysis allow the formulation of objectives and long-term plans, which are a reflection of the development strategy [6]. When analysing the further environment we have to face a much more difficult study, than we performed in the case of micro-analysis. In this case, we do not have a pre-established research method, as the weight of research in different areas is different and the value of a given factor may have a different meaning for those in the study, depending on e.g.: sector in which the company operates [4], size of the enterprise, the importance of the company for the economy, the state's economic priorities, etc. Constructing a definition of the further environment, R. Griffin listed the following dimensions as the main elements:

1. The economic dimension - as being about the condition of the economic system, under which the company operates. The most significant of its features include: interest rates, unemployment, inflation and demand.
2. The socio-cultural dimension - it consists of items such as: customs, values, habits, and demographic characteristics of the population. It is widely recognized that reflect the fashion trends and governing in a given space, which determines the volume of sales.
3. The technical dimension - shows the access to modern technology , enabling them to transform resources into goods or services. To a large extent is dependent on the level of development of the country and the policy for the funding of research and innovation.
4. The political and legal dimension - is responsible for state regulation of economic activity and the prevailing relations between the state and the economy [3].
5. The international dimension – these are all kinds of interactions with political and legal dimension, where the chosen factor affects the functioning of state enterprises globally [8].

1. Aim, field of study and research methodology

The purpose of this article was to present the extent to which the processes occurring in the economy and in areas close to food industry companies in Poland affect their performance and competitiveness. Polish food industry in 2014 is still one of the major producers of food in the European Union, and the one that forms part of the wider frame of agribusiness and is one of the most important parts of the economy with a view to ensuring food security for the population, because the food in each country must be treated as a strategic commodity [1].

Planned and laid out a research sampling generally comprised of food industry companies in Poland. A complete list of units of study population included companies registered REGON on the day 30.10.2012 r., which, according to Polish Classification of Economic Activities (NACE 2007) have been included in Section C. Manufacturing, Unit 10. Production food, Unit 11. Manufacture of beverages and Division 12 Manufacture of tobacco products. In order to obtain a representative sample of population units a probabilistic (random) sample selection technique was used, and survey questionnaires were used as a research tool. Using the formula for the minimum sample size it was determined that for the test there must be 267 companies surveyed (with a population of 33 662 entities) [1].

2. Research results

Bearing in mind that all companies operate in more or less for themselves familiar surroundings, each of those managers, must take into consideration the conditions in respect of the impact on their operations and efficiency. In the case of the food industry is all the more important because this production is characterized by such features as the seasonality of production, shelf-life, custom storage conditions of raw materials and products, high standards and quality standards, and many other requirements that do not apply or are required at lower levels than in other branches of production. In this study, we presented to respondents, representing different levels of management in the enterprises of the food industry, the processes taking place in the economy, for which they had to respond. Each of them had pointed processes that most or least impact on the activities of the company according to a predetermined scale. The average

assessment of the impact of economic processes on the operation of enterprises of the food industry is shown in Fig. 1. Number of respondents choosing response data is presented in Table 1 and the percentage for each of them in Table 2.

TAB. 1: Effect of economic processes on the operation of enterprises of the food industry - the number of respondents choosing answer

Processes:	answer								Total	mean	median	1 quartile	3 quartile
	0	1	2	3	4	5	6	other					
Globalization	29	30	38	79	55	21	15	0	267	2,8	3,0	2,0	4,0
Membership in the EU	26	19	30	45	71	50	25	1	267	3,4	4,0	2,0	5,0
The growing competition	2	3	5	14	67	72	104	0	267	4,9	5,0	4,0	6,0
Emphasis on innovation	8	14	36	48	63	64	34	0	267	3,8	4,0	3,0	5,0
The development of information and communication technologies	18	30	42	70	57	40	10	0	267	3,0	3,0	2,0	4,0
Other	7	1	0	0	0	0	3	0	11	1,7	0,0	0,0	3,5

Source: own study.

The research found that the most important factor indicated by respondents as affecting the operation of the company is intensifying market competition, as indicated by 91.1% of the respondents. This was confirmed by A. Kowalski, who points out that we have the most modern food industry in Europe, but the problem is the scale and it destroys Polish-Polish competition. I. Szczepaniak also devotes a lot of attention to the issue of the competitiveness of food producers, highlighting therein that competition is one of the most important mechanisms of modern social and economic life, and until recently it concerned mainly regional or national markets, while international competition was limited by geographical factors and institutional barriers created by individual countries or groups [7]. Another factor chosen by respondents was the emphasis on the

implementation of innovations, which indicated in 60.3% of cases. Respondents said that the implementation of innovation is an expensive process for them, and above all, require a high level of knowledge, as well as perseverance and patience on the part of the entrepreneurs themselves. In interviews also highlighted the very modest state aid for entrepreneurs wishing to implement processes and innovative products, which does not encourage them to this kind of behaviour. The respondents, although only 55.1% indicated the Polish membership in the European Union, however, every time emphasized the importance of this step in changing the approach to the business and operation of their business. The need to adapt to new legal and organizational rules, taking into account the EU directives and the need to meet the required standards, often forced businesses to change the production profile or locate their production in another sector. Like a lot of controversy raised the question of the impact of globalization processes (36.3%) and the development of IT technology (33.6%). Although they were not selected as the most important and highest degree of conditioning the operation of

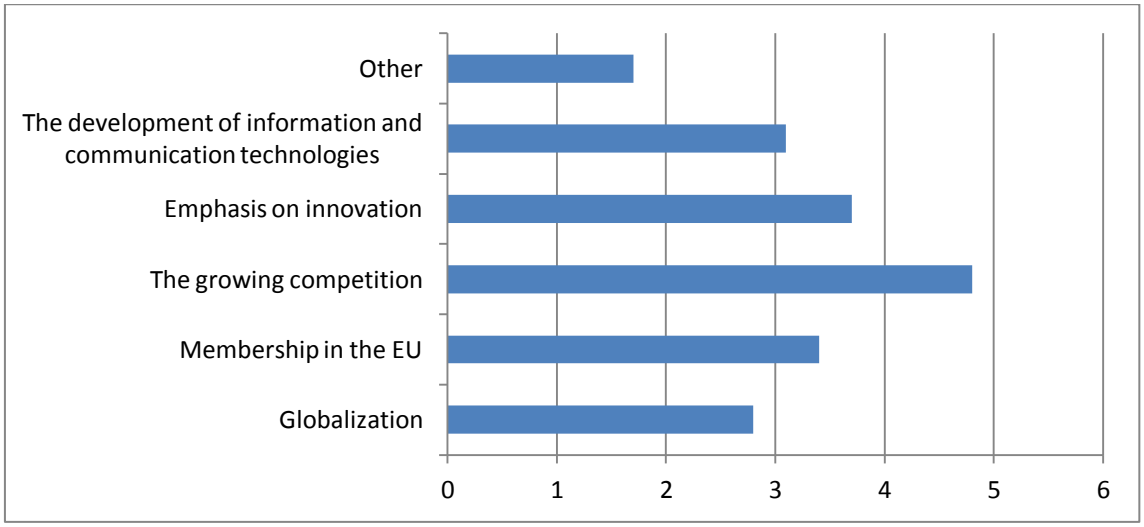
TAB. 2: Impact of economic processes on the operation of enterprises of the food industry - the percentage of respondents choosing answers

Processes:	answer								The most frequent		
	0	1	2	3	4	5	6	other	answer	answers	%
Globalization	10,9	11,2	14,2	29,6	20,6	7,9	5,6	0,0	No opinion	79	29,6
Membership in the EU	9,7	7,1	11,2	16,9	26,6	18,7	9,4	0,4	Rather yes	71	26,6
The growing competition	0,7	1,1	1,9	5,2	25,1	27,0	39,0	0,0	Definitely yes	104	39,0
Emphasis on innovation	3,0	5,2	13,5	18,0	23,6	24,0	12,7	0,0	yes	64	24,0
The development of ICT	6,7	11,2	15,7	26,2	21,3	15,0	3,7	0,0	No opinion	70	26,2
other	63,6	9,1	0,0	0,0	0,0	0,0	27,3	0,0	0	7	63,6

Source: own study.

enterprises, entrepreneurs noticed their impact, mostly in a positive sense. The responses could be seen even admiration for the other competing businesses, able to respond flexibly to the ongoing global change, but also those who have surplus funds and spend them on permanent technological development of their companies. They saw the future of the farm advisory systems implementation, even in the field of: supervision, auditing of quality management systems such as HACCP, BRC and IFS.

FIG. 1: Estimated impact of economic processes on the functioning of the food industry enterprises.



Source: own study

Another very important step in the audit was to determine the extent to which the processes occurring in areas close to the surveyed companies interact with their functioning. The number of respondents choosing answers is presented in Table 1, and the percentage of each of them in Table 2. The largest group of respondents pointed to the rivalry between the companies (there were up 85.8%) as the second most important process listed bargaining power of buyers (76 8%), and third place went to the bargaining power of suppliers (73.8%). Indication of respondents of intensified competitive rivalry in the case of the food industry turns out not to be coincidental. Degree of impact processes in the areas close to the surveyed companies on their functioning is shown in Fig. 2.

The large number of competitors in the food markets, as well as its division into a large number of smaller competitors promotes the development of a much more intense competition than in the case of industries dominated by a few companies holding

TAB. 3: The degree of impact processes in the areas close to the surveyed companies on their functioning. The number of respondents choosing answers.

Processes	answers								Answers in total	mean	median	1 quartile	3 quartile	modal
	0	1	2	3	4	5	6	other						
Competition	7	3	12	16	60	65	104	0	267	4,7	5	4	6	6
New producers	9	12	27	34	53	76	56	0	267	4,1	4	3	5	5
Provider strength	7	3	21	39	97	68	31	1	267	4,1	4	3	5	4
Buyer strength	4	3	14	41	96	66	43	0	267	4,2	4	4	5	4
Substitute	27	24	53	67	43	38	15	0	267	2,9	3	2	4	3

Source: own study.

TAB. 4: The degree of impact processes in the areas close to the surveyed companies on their functioning. Percentage of respondents choosing answers

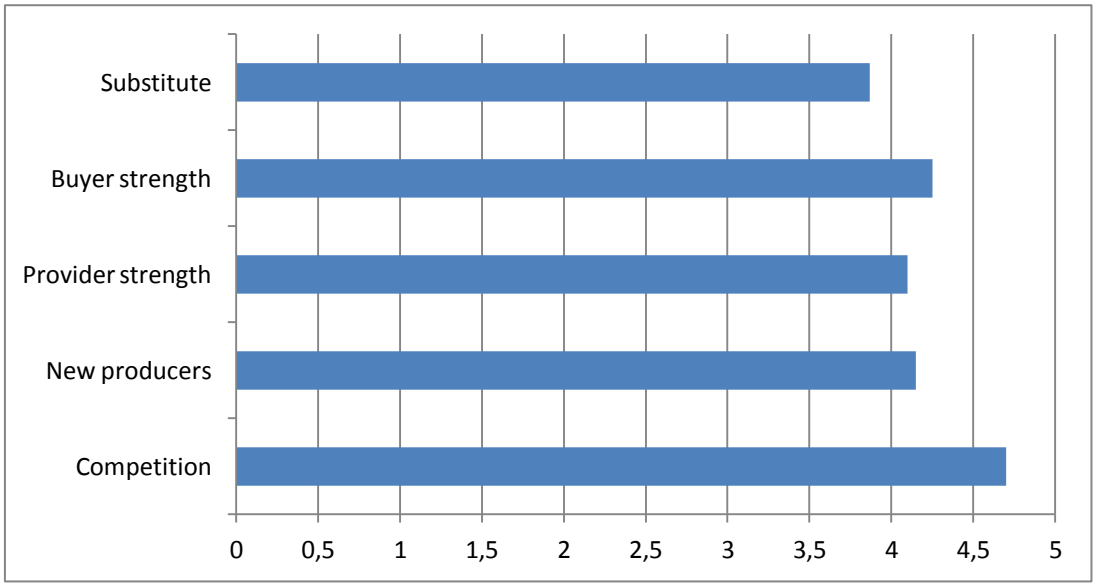
Processes	answer								Most frequent		
	0	1	2	3	4	5	6	other	answer	answers	%
Competition	2,6	1,1	4,5	6,0	22,5	24,3	39,0	0,0	Definitely yes	104	39,0%
New producers	3,4	4,5	10,1	12,7	19,9	28,5	21,0	0,0	yes	76	28,5%
Provider strength	2,6	1,1	7,9	14,6	36,3	25,5	11,6	0,4	Rather yes	97	36,3%
Buyer strength	1,5	1,1	5,2	15,4	36,0	24,7	16,1	0,0	Rather yes	96	36,0%
Substitute	10,1	9,0	19,9	25,1	16,1	14,2	5,6	0,0	No opinion	67	25,1%

Source: own study.

significant market share. The second of these processes, that is, the bargaining power of buyers since the accession of Poland to the EU structures is still growing, which guarantees to provide the sales of manufactured products.

Respondents often stressed the importance of correct relations and wealth of clients, who are in fact the main source of their income, which confirms that they are one of the most important elements of the enterprise environment. Still difficult to determine however is a market research, determining the ratio of manufacturers of the same food product, relative to the number of potential buyers. None of the surveyed companies did not dare to assess the current situation regarding the lead bargaining power in the line supplier - buyer. The respondents are of the opinion that the food market consists of the large number of suppliers, so their bargaining power is low. In such a situation, some of the entrepreneurs are looking for their chance in the application of specific components, semi-finished products put on the market for food and attempt to input all kinds of product innovations. Of serious significance may also be formed associations between the trader and supplier, which certainly lead to mutual integration.

FIG. 2: The degree of impact processes in the areas close to the surveyed enterprises of the food industry for their functioning



Source: own study.

At the opposite extreme was the emergence of the threat of substitutes (39%), as well as the threat of the emergence of new producers (18.5%), which, moreover, was emphasized in the statements of the respondents. The threat of the emergence of substitutes for food products may be frequent or very rare. It is hard to replace, for example, milk as a raw material to other similar drink, because it can only be varied due to certain parameters that we consider. On the other hand, if we take into account the products processed by the food industry, for example: range of soft drinks is in the range you will find a variety of products fulfilling similar functions, as an eloquent example is Coca-Cola, Pepsi-Cola, Hop-Cola and a number of other. It follows that the processed products usually have, or in the near future would bring them their substitutes. Adulteration of food product usually does not cause major problems, unless the recipe is heavily protected by law or classified. In the case of food products is taken into account by manufacturers of consumer willingness to purchase substitutes, their price and the degree of substitutability, as well as switching costs.

The second of these elements, namely the risk of entry of new (manufacturers) competitors has been less evaluated as threatening. Nevertheless, it was indicated that often the emergence of new players decide about market barriers, although the situation on the food market does not happen too often. As the most important of these entrepreneurs enumerated: the high cost of inputs, know-how, patents, access to the market, monopolization of the sector and the obstacles of a legal and legislative nature.

Summary

Our study attempted to assess the degree of impact of economic processes, which in closer business environment affect their performance and competitiveness. In the conceptualization phase of the research the general classification of these processes has been estimated, and their selection to the final form to get responses as to the degree of their impact, and their views on the most important processes. In a study, to determine the effect of economic processes on the operation of enterprises of the food industry and the impact of one sequence of processes occurring in areas close to it, we used the presentation of the number and percentage of respondents choosing answers.

In assessing the impact of economic processes on the operation of enterprises of the food industry based on the research, the following conclusions may be drawn:

1. Food industry companies operate in a highly competitive market, where competition is concerning all functioning organizational units present in all areas of production and trade, proposed is the best product, which is associated with its improvement. It was pointed out that in the food industry especially important is the total process of preparation of the product, which every moment is associated with the improvement, ranging from methods of production, sales, through all kinds of marketing activities, e.g. advertising, distribution, pricing.
2. Polish membership in the European Union has had an influence on a major change in the methods, ways and production standards in the Polish food industry. In particular, there was an increase in domestic demand for food and beverages, accelerated development of domestic food production, the development of foreign trade in food, or changes in production levels, its structure and pricing of agro-food products.
3. On the market there was pressure on the implementation of innovations that changed the image of Polish food industry. Due to the necessity of adapting national processing companies to EU standards, the level and dynamics of investments in enterprises of the food industry increased. There have been foreign investments, new sources of funding and hitherto unknown forms of cooperation which has supported public assistance, including funding from the European Union budget, which reinforce the processes of evolution of the food sector.

In the area of determining the degree of impact processes in the areas close to the surveyed enterprises of the food industry for their operation, the following conclusions were formed:

1. The most important process occurring in the competitive food market is the level of competition occurring between companies, which in the food most commonly affected by factors such as the nearly 40-hundred-million domestic and over 505 millionth European consumer market, a high level of product differentiation, the high possibility of increase in production capacity , strong barriers to entry. As significant factors were considered: the growth rate of the sector, fixed costs,

storage and changes in provider rates and a high level strategic stake in the sector.

2. An important process turned out to be the bargaining power of buyers, because especially in the food market, there are many organized groups, and the special place occupied large retail chains, contracting production after receipt of predetermined prices, which significantly affects the functioning of the market. Major market players often dictate the price level significantly sacrificing margin on sales, which leads to the elimination from the market of small businesses. Tying agricultural producer groups turned out to be a positive example, opposition to agricultural producers in the agribusiness sector pressure groups affiliated purchasers, acting under the banner of one company.
3. Last, as an important process indicated by the respondents are the bargaining power of suppliers, which in the food industry turns out to be small. A large number of suppliers lead to the occurrence of high competition between them. Often there are a direct sales and omissions of intermediaries, resulting in sales of food products directly to the consumer. At the food market with low switching costs, so the search for another does not cause trouble. Moreover, it occurs at many particulate suppliers and their products are mostly uniform, and there are many substitutes.

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CUSTOMER RELATIONSHIP MANAGEMENT IN SERVICE ORIENTED ORGANIZATIONS

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Keywords:
customer relationship management – Czech Republic – Germany – competitiveness

Abstract:
This paper deals with the customer relationship management in the Czech Republic and Germany. The research showed that due to its high economic benefits service oriented organizations in these countries in general shall increase the use of operative CRM. The results of the research were compared to other studies and researches and presented reasons why it is necessary to investigate and improve the correct implementation of CRM which shall be aligned well with the business strategy and the influencing factors.

Introduction

Customers are the main purpose of business and the main source of revenues for companies. In this respect, the Customer Relationship Management (CRM) is one of the most important instruments that companies have been engaging in past few decades. The today's focus of CRM is customer management which encompasses two important aspects: customer focus and gathering large amount of data. [8] From the year 1997 to 2007, the annual sales of CRM software had multiplied more than eighteen times from $762 million to $14 billion. In spite of this boom, high costs of CRM software still remain an issue for many companies. [7] This paper will study the up-to-date requirements, pitfalls, and driving forces of the CRM in the Czech Republic and Germany so that it contributes to a better competitive advantage of the organizations conducting business on the area of the EU.

1. Methods, literature overview

Empirical research was launched via an online questionnaire to acquire primary data. The empirical research was conducted from March till April 2014 among 52 respondents in total - 27 Czech respondents and 25 German respondents - who were suitable for providing answers. The research focused on service oriented organizations of arbitrary size but of the following limited characteristics: companies high in credence qualities, professional services, legal counselling/legal services, accounting services, tax/audit counselling/services, translation services, architectural services, marketing services/multimedia consulting, companies providing consulting, training, coaching, mentoring, and other kinds of professional consulting or seminars. The collected data from the empirical re-search are statistically interpreted and examined via the program STATISTICA applying nonparametric testing, in particular Wilcoxon test (Mann-Whitney U Test) with the level of significance α=0.05. This test is used in order to find out the differences between two independent group samples (the chosen EU countries Germany and the Czech Republic using abbreviation DE and CZ consecutively) without normal distribution.

2. Results

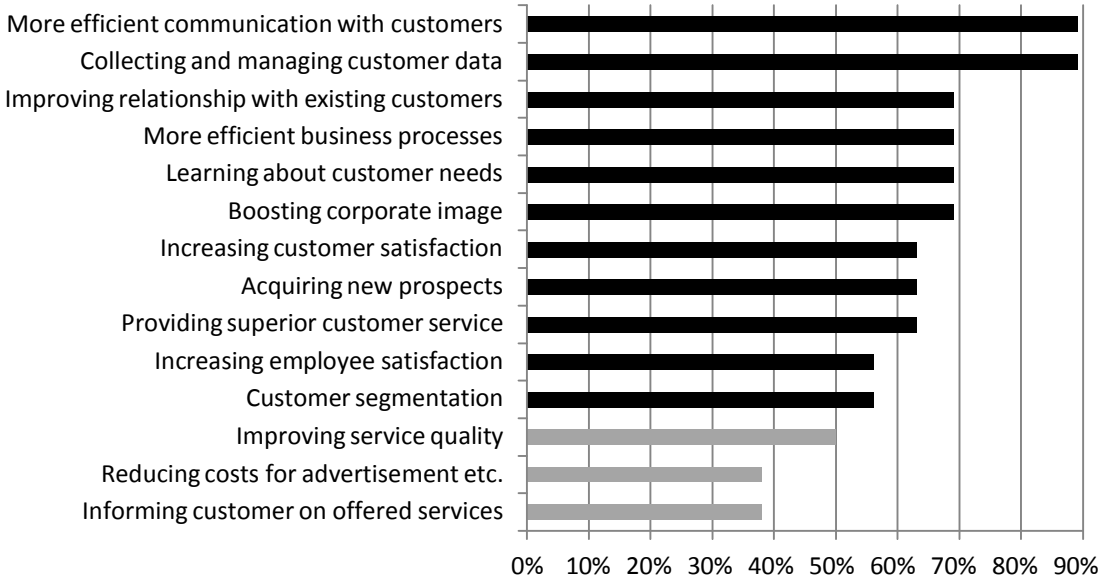
"CRM can be understood as a business philosophy, a business strategy, a business process, or a technological tool." [4] Some kind of CRM software is used in 64% of the queried German organizations. In comparison to that, nearly 78% of the queried Czech firms use some kind of CRM software. The 40% of German firms bought the CRM system from a CRM software provider. It is more than twice as much than it is in the Czech queried firms. In the Czech Republic, 22% of companies outsource the CRM software from an external service provider in contrast to the German firms where none of the respondents stated this option. The most common reasons why some German firms do not use CRM software are concerns about privacy and data security, the fact that it does not fulfil company's needs, and poor knowledge, information or technological infrastructure. The other less significant reasons are lack of competences, difficult implementation, and high costs. Similarly, the foremost reasons for not using CRM systems in Czech firms are its difficult implementation, lack of competences in

using CRM software, and non-fulfilment of company's needs. The rest of reasons are poor department integration, privacy and data security concerns, and high costs. The other query examined purposes of CRM systems in the German and Czech firms. More than 50% of the German respondents opted for almost three times more purposes of CRM in their enterprise than the Czech respondents. The German firms using CRM software stated as the most crucial purpose of their CRM system more efficient communication with customers and collecting and managing customer data. Similarly, the most important purpose of the CRM system in the Czech firms is collection and management of data about customers. (see FIG. 1 and FIG. 2)

Regarding the importance of CRM software as opposed to all other strategic tools in the firms of the German respondents, the 75% consider CRM as an important tool as compared to the other strategic (IT) systems but only 25% stated that it is the most important tool in the firm. In case of the Czech firms, the 81% of respondents similarly rated their CRM software as important as opposed to other IT systems but only 10% of the Czech respondents consider it as the most important tool in the firm.

Based on these results, the increase of awareness of the importance of CRM and its more effective potential utilization can be envisaged.

FIG. 1: Purposes of CRM systems in German Firms [in %]



Source: own research

FIG. 2: Purposes of CRM systems in Czech Firms [in %]

Source: own research

The selection and implementation of CRM software is mostly undertaken by the management personnel (81% in the German and 71% in the Czech firms). In 69% of German enterprises, it is the involvement of a marketing department but in the Czech firms it is merely 24% which compared to Germany is an alarming percentage. Customer service and frontline employees who are actually in daily contact with customers are only involved in about 35% of cases in case of German users and alarmingly not at all in the Czech firms. Therefore, it is recommendable for enterprises in both countries especially for Czech enterprises that firstly it is important that CRM strategies are initiated by the management department and secondly shared through other crucial departments especially IT department and marketing and sales departments. Furthermore, cooperation with customer care and frontline employees is very crucial both to ensure effective implementation of CRM systems and unbiased feedback from customers as these are employees with whom most of the face-to-face communication with customers happens. For Czech enterprises in particular, it is advisable to increase the involvement of marketing and contact employment into CRM processes. Almost all the German and Czech CRM system users (95%) appear to be somehow satisfied with their CRM software. Only 5% of Czech respondents were rather dissatisfied, one reasoning that their CRM system is not well arranged. Despite of the overall satisfaction with CRM systems, all German and Czech respondents stated that

something could be improved on their CRM system. As performance measurement of CRM systems, both German and Czech firms use the basic indicator of profit calculated as the difference between revenues and costs (50% of German and 43% of Czech CRM system users). The other applied performance measurement indicator is ROI (25% of German and 19% of Czech firms). The rest of measurement indicators are either very rarely used or not used at all. In 25% of the queried Czech firms, the performance of CRM system or customer satisfaction is not even measured at all. More than half of all respondents of companies using CRM software stated that measuring of profit since the CRM software establishment has been difficult or hardly achievable. Hence, with the increasing complexity of CRM systems and its implementation using the right performance indicators or other strategic tools can be recommended in order to measure the economic benefits of CRM systems for an enterprise over time.

Most of the users of CRM in both German (63%) and Czech (81%) firms think that their CRM software is fairly integrated throughout their departments. Generally, adequately enough communication regarding the right implementation of CRM software throughout all key departments shall be performed. More than 50% of German and Czech queried users of CRM solutions provide their employees training on CRM system implementation. However, only few of the users provide trainings on communication, IT, marketing, soft skills and/or no trainings relevant to CRM at all. Therefore, both countries shall increase the frequency of or incorporate trainings relevant to the CRM software implementation that are missing in their program to support the employees with enough knowledge and competences for using CRM solutions so that the CRM strategies are effectively implemented.

3. Discussion

Only the correct CRM implementation itself does not suffice in the today's economic environment. According to Diana-Aderina and Nela, S. [1], it is important to understand that CRM only facilitates the process of automation of the client relationship management. To prosper and stay competitive over a long time, a philosophy and a clear business strategy compliant with CRM must be developed and followed. Furthermore, the study of Němeček [5] proved that the selected Czech companies which

used CRM had significantly better sales revenue during and after the economic crisis than the firms without CRM. The study of Chung [2] examined correlations between business strategy types, use of information technology, organizational culture, implementation level of CRM activities, and business performance in a hi-tech industry. The paper revealed that the implementation of CRM activities is positively and significantly influenced by different types of business strategy (marketing or innovative differentiation) and by the higher information technology involvement. Furthermore, the higher implementation level of CRM activities significantly and positively uplifts business performance. The other study of Jamalzadeh [3] which focused on service-based companies similarly pointed out the importance of CRM strategy implementation in order to increase competitive advantage of an organization in today's dynamic environment. It revealed that the successful e-business strategy implementation is strongly and positively influenced by process, people, and technology factors (respectively from the strongest to the weakest factor). All these studies showed reasons why it is necessary to investigate and improve the correct implementation of CRM which shall be aligned well with the business strategy and the influencing factors. According to the research of Quintana [6], a big today's challenge for CRM developers and users is to prevent ambiguity, difficult implementation of CRM systems, poor applicability, and serious privacy and data security concerns. This has also been an apparent outcome of the empirical research. Both in Germany and in the Czech Republic, firms have been facing ambiguities or difficulties in the CRM implementation both due to its complex and difficult implementation and concerns about data and privacy issues. Therefore, these aspects are some of the key elements firms should pay attention to.

Conclusion

The research showed that due to its high economic benefits companies in the EU in general shall increase the use of operative CRM. One of the reasons for not using CRM software in the organization in the European Union is its high costs. However, the costs for losing a customer can result in higher expenditures and lower economic profits as a consequence of not using CRM systems. In other words, using CRM software can be profitable if implemented in the right way.

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THE KUZNETS INVERTED-U HYPOTHESIS

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Keywords:
Kuznets inverted-U hypothesis – panel data – inequality – economic growth – Gini coefficient

Abstract:
In this paper we examine the relationship between income inequality and economic development according to the Kuznets inverted-U hypothesis. The data used are collected from 146 countries, they cover period 1970 – 2011 and are obtained from the World Bank database, the OECD database and Penn World Table. We used three different datasets – time series for Argentina and Brazil, cross-country data and panel data for the whole world. We found evidence of inverted-U shape curve in all estimations.

Introduction

The Kuznets *inverted-U hypothesis* tells us about relationship between income inequality and economic growth. It suggests that when country develops, first, the income inequality rises and then it declines. Simon Kuznets discovered this relationship in his paper Economic Growth and Income Inequality in year 1955. He had very limited dataset, hence his empirical evidence is not strong enough to claim any statement. What matters from his work is a very good observation of income distribution and intuition, how these two variables should being connected.

Kuznets suggested that economic progress, measured by GDP per capita, is initially accompanied by rising inequality, but these disparities ultimately disappear as the benefits of development spread more widely. If we make a graph, where GDP per capita is on the *x*-axis and a measure of inequality is on the *y*-axis, then the shape of curve

connecting points should plot an inverted-U shape, hence the name *inverted-U hypothesis*. (Ray, 1998)

Why is this observation so important? Firstly, it shows that these two variables somehow connected, even though it does not say which variable influences the other one. Hence, if we are interested in the development of the country, it is important to study this relationship for two reasons. Firstly, the development can bring high inequality, or the different distributional politics forming the income inequality in the country can cause slower or faster development of the country.

Secondly, there are philosophical and ethical grounds to focus also on the movement in the inequality. According to the Kuznets curve, the development of the country brings along the change in the inequality. "*There is no reason why individuals should be treated differently in terms of their access to lifetime economic resources.*", says Debraj Ray in his book Development Economics (page 169). Nevertheless if it is possible or not, we can get toward a society with tolerable levels of inequality in everyday life, while the country develops.

1. Model and Data

The aim of the paper is to test the Kuznets inverted-U hypothesis. We use three different datasets – time series, cross-section data and panel data. The ideal way to test this hypothesis is to use time series. On the time series, we can see how the inequality changes while the country develops. Unfortunately, we often do not have the access to these data of inequality in the countries, which have just finished the "inverted-U" path of development. We run regression on data for Argentina and Brazil.

The second method is to use the cross-section data. We collect the data from states basically, which are at different stages of development. This is a great advantage opposite to use of the time series – we are able obtain data for widely different stages of development. We use data for 144 countries where the range of the annual GDP per capita is 255$ to 107 772$.

Our last dataset is a combination of the previous two – the panel data. We used shorter time series for 146 countries.

1.1. Model

We run the regression:

$$INEQ_{it} = \alpha + \beta \ln Y_{it} + \gamma (\ln Y_{it})^2 + \varepsilon_{it} \qquad (1),$$

where $INEQ_{it}$ measures the level of inequality in the country. The variable $\ln Y_{it}$ represents the level of economic development and it is a logarithm of the real gross domestic product per capita, ε_{it} represents an error term. Indices i,t refer to the country and the year. The Kuznets hypothesis implies $\beta > 0$ and $\gamma < 0$ so the entire estimated curve has the "inverted-U" shape. (Thornton, 1999)

1.2. Data and measurement of inequality

The data used are collected for 146 countries, they cover period 1970 – 2011 and are obtained from Penn World Table, World Bank database and the OECD database. For the measurement of inequality, we chose three different variables. In our model, we use Gini coefficient and Income share held by the highest 20 % and by the poorest 20 % of the population. It is important to mention that when we use the Income share by the poorest 20 %, then the parameters should have the opposite signs: $\beta < 0, \gamma > 0$.

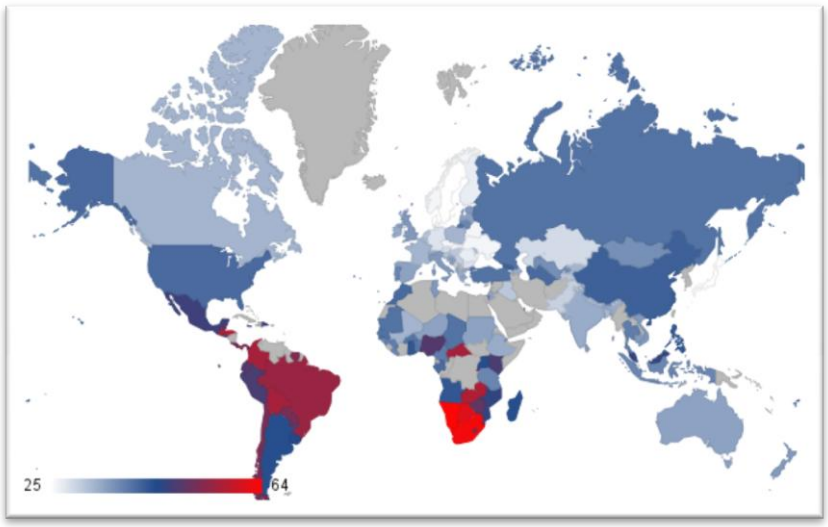
Figure 1 shows the income inequality measured by Gini coefficient. The highest inequality observe in the South Africa and America (marked with the red color); on the other hand, the lowest income inequality is in Europe.

2. Results

2.1. Time series

Firstly, we run the regression for model (1) in the form of time series. Time series are the best way to test the inverted-U hypothesis, however because of lack of data for income inequality we test the model only for two countries Brazil and Argentina.

FIG. 1: Inequality over the world, Gini coefficient



Source: authors' processing, World Bank database. The dataset consists of the latest available Gini coefficients from 144 countries for years 1994 – 2011. (Grey color - NA)

Table 1 shows the results for these two countries. In all regressions the standard errors are robust to the heteroskedasticity. The results for Brazil are not statistically significant at conventional levels. On the other hand, the parameters for Argentina are statistically significant at level of 5% and 1% and have correct sign. When measured by Gini coefficient and by the Income share of richest 20% parameter β is positive (third column) and parameter γ is negative (fourth column). Similarly, when we use the Income share of poorest 20% $\beta < 0, \gamma > 0$, as we assumed. These results confirm the Kuznets hypothesis of inverted U-shape curve, at least for Argentina.

TAB. 1: Kuznets inverted-U hypothesis, Time series, Brazil and Argentina

State	*INEQ*	*const*	$ln\, Y_{it}$	$(ln\, Y_{it})^2$	R^2	*Years*
Brazil	*Gini coefficient*	-1100.79 (0.345)	265.34 (0.322)	-15.171 (0.325)	0.051 (0.438)	T = 29 (1981-2009)
	Income Share of highest 20%	-973.30 (0.373)	238.01 (0.344)	-13.662 (0.344)	0.059 (0.624)	T = 29 (1981-2009)
	Income Share of poorest 20%	260.47 (0.145)	-58.62 (0.153)	3.33 (0.158)	0.168 (0.026)	T = 29 (1981-2009)
Argentina	*Gini*	-2219.73 (0.023)**	499.63 (0.021)**	-27.49 (0.022)**	0.359 (0.025)**	T = 20 (1991-2010)
	Income Share of highest 20%	-1772.16 (0.031)**	403.22 (0.028)**	-22.25 (0.029)**	0.316 (0.064)**	T = 20 (1991-2010)
	Income Share of poorest 20%	555.22 (0.004)***	-120.68 (0.005)***	6.59 (0.006)***	0.549 (<0.001)***	T = 20 (1991-2010)

Source: Authors' calculations, data obtained from the World Bank database; *p*-values in the brackets

2.2. Cross-section data

Data for cross-country regression consist of the latest available Gini coefficients for 144 countries in years 1994 – 2011. We always choose the value of the GDP from the same year as we obtain the Gini coefficient. In this case, we obtain widely different stages of development and corresponding measures of inequality for many countries.

Table 2 presents the results of estimation of equation (1) with cross-section data. Again, the parameters have correct sign and for Gini coefficient are statistically significant. The results for Income shares are not so robust. However, we must be careful with interpretation of the results. The reason could be that by pooling different countries and running the regression, we are assuming that all countries have the same relationship between income inequality and GDP. (Ray, 1998)

TAB. 2: Kuznets inverted-U hypothesis, Cross-section data, 144 countries

INEQ	*const*	$ln\,Y_{it}$	$(ln\,Y_{it})^2$	R^2	*Number of countries*
Gini coefficient	-11.62 (0.710)	14.71 (0.0520)*	-0.99 (0.027)**	0.144 (<0.001)***	I = 144
Income Share of highest 20%	12.00 (0.673)	10.32 (0.135)	-0.71 (0.082)*	0.133 (<0.000)***	I = 144
Income Share of poorest 20%	12.77 (0.115)	-1.87 (0.339)	0.13 (0.2687)	0.055 (0.036)**	I = 144

Source: Regression (1), data obtained from the World Bank database; *p*-values in the brackets

2.3. Panel data

In the last estimation, we use panel data for 146 countries. There are different lengths of time series across the countries, hence for our regressions we had 849 and 852 observations.

Table 3 presents the results. Again, the parameters have expected signs and are statistically significant even at 1% level. Thus the results support the Kuznets hypothesis. However, the R^2 is quite low which might be caused by omitting other variables that can have influence for the inequality. This elaboration is a topic for further research.

TAB. 3: Kuznets inverted-U hypothesis, Panel data, 146 countries

INEQ	*const*	$ln\,Y_{it}$	$(ln\,Y_{it})^2$	R^2	*Number of countries*
Gini coefficient	-72.90 (0.048)**	29.84 (0.001)***	-1.90 (<0.001)***	0.065 (<0.001)***	Observations 849 I=146
Income Share of highest 20%	-41.58 (0.174)	23.51 (0.002)***	-1.50 (0.001)***	0.064 (<0.000)***	Observations 852 I=146
Income Share of poorest 20%	30.70 (0.001)***	-6.22 (0.006)***	0.39 (0.004)***	0.044 (<0.000)***	Observations 852 I=146

Source: Regression (1), data obtained from the World Bank database; *p*-values in the brackets

Conclusion

In this paper, we examined relationship between inequality and economic development. We used three different methods: estimation within time series, cross-sectional data and panel data approach. In all models, we have found some evidence, which supports the Kuznets inverted-U hypothesis: with higher GDP per capita the inequality initially growths and then it declines.

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DETERMINANTS OF ECONOMIC GROWTH

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Keywords:
economic growth – **i**nstitutions – cross-sectional data

Abstract:
This paper analyses determinants of world-wide economic growth. The data used are collected for 142 countries, they cover period 1980 – 2010. The goal of the paper is to find out which variables explain economic growth (in terms of GDP per capita) the best. Because of potential endogeneity, we use method of instrumental variables for cross-sectional data. The explanatory variables includes typical economic indicators but also many institutional indicators. These are e.g. government stability, internal conflicts, corruption, bureaucratic efficiency, religious tensions etc. We also carried out sensitivity analysis of the regression model with respect to geographical position of the countries. In conclusion, we are able to identify what economic, social and political forces influence economic growth.

Introduction

Economic growth is one of the most observed economic indicators. What are the causes of economic growth is still open question. Recent research suggests that especially institutions play important role in explaining long-run economic growth (see Acemoglu [1]). The goal of the paper is to find out which variables explain economic growth (in terms of GDP per capita) the best. Besides usual explaining variables such as physical or human capital, population growth or international trade we focus on the effects of different institutional indicators. The variables that describe institutional quality are e.g. government stability, internal and external conflicts, corruption, investing profile and religious tensions. This paper closely follows Barro and Sala-i-Martin [2] but uses up-to-date data and broader set of explanatory variables.

We also test the robustness of the regression model with respect to geographical position. We will look at four models which differ according to the choice of countries. Together we use data from 142 countries from the whole world. In the models we divide the whole sample of countries according to continents. Because of different geographical position and political history, we expect greater variation in the results between the continents. The data are obtained from the databases: Penn World Table [4], World Bank [9], Barro and Lee [3] and International Country Risk Guide database [8]. The last database is quite unique and measures institutions by specific risk indices from three categories – political, financial, and economic. The data are annual and cover period 1980 to 2010. We use data as cross-sectional by averaging over years 1985 to 2010. Because of potential endogeneity we use method of instrumental variables. The instruments are lagged values of explanatory variables and are aggregated from period 1980 to 1985.

The results show that determinants of economic growth are inflation rate, hare of investment, price of exports or differences in education. Also some institutional factors appeared significant for several continents such as democratic accountability and investment profile, however they were not robust and even differed in the sign. Thus their influence for growth is questionable.

1. Regression according to continents

In this section we present results for next four models. We divide the countries into four groups according to continents – Africa, America, Asia and Europe. Because of diversity of geographical position and political history, we would expect greater variation of the results between the continents. Table 1 presents the results from these four regressions. The estimation procedure was the same as in the previous case. Sequential elimination method left only statistically significant variables (at the level of significance of 1 %, 5 % and in one case of 10 %). Number of observations and R-squared are shown at the bottom of the table. According to R-squared the explanatory power for all four subsamples is higher than for the whole world (see Appendix [5]). The highest value of R-squared is for America (0.76), the lowest for Africa (0.55). We can also see high variability of significant variables between the subsamples. The most

statistically significant variables has model for Asia and Europe. Let us look at them closer.

1.1. Results

The variable *GDP per capita of year 1985* is statistically significant in three subsamples (Africa, America and Asia) and is negative, although very close to zero. This is evidence of conditional beta convergence. Countries with low initial GDP per capita grow faster, because they are further from their steady state. However, the conditional convergence is not present in the subsample for Europe.

TAB. 1: Cross-sectional regression divided by continents

Explanatory variable	Africa	America	Asia	Europe
const	0.0122	-0.0117	0.1772	0.0861
	(0.8438)	(0.6263)	(0.0182) **	(0.3158)
GDP per capita of year 1985	-0.0000	-0.0000	-0.0000	
	(0.0452) **	(0.0002) ***	(0.0019) ***	
Population Growth		-0.3515		
		(0.0145) **		
Capital stock			0.0000	0.0000
			(<0.0001) ***	(0.0030) ***
Inflation rate (deflator GDP)		-0.2475	-0.9008	-0.6032
		(0.0051) ***	(<0.0001) ***	(<0.0001) ***
Difference in Education	-0.0153			-0.0207
	(0.0207) **			(0.0143) **
Share of Investment	0.0962		0.1875	0.2434
	(0.0020) ***		(0.0009) ***	(0.0003) ***
Price of Exports	-0.2354	0.0811		0.2346
	(0.0042) ***	(0.0470) **		(0.0074) ***
Price of Imports	0.2369		-0.2369	-0.3862
	(0.0020) ***		(0.0436) **	(0.0031) ***
Life expectancy			-0.0004	-0.0005
			(0.0016) ***	(0.0093) ***
Government Stability	0.0806			-0.1838
	(0.0443) **			(0.0004) ***
Investment Profile	-0.0633		0.0445	0.0397
	(<0.0001) ***		(0.0126) **	(0.0109) **
Socioeconomic Conditions		0.0218		
		(0.0161) **		
Law and Order		0.0147		
		(0.0007) ***		
External Conflicts				-0.0414
				(0.0112) **
Internal conflict		-0.0379	0.0864	
		(0.0070) ***	(0.0041) ***	
Military in Politics				0.0472
				(0.0044) ***
Democratic Accountability	0.0256	0.0142	-0.0217	
	(0.0067) ***	(<0.0001) ***	(0.0067) ***	

Ethnic Tensions		0.0168		
		(<0.0001) ***		
Religious tensions	0.0055		-0.0114	
	(0.0535) *		(0.0004) ***	
Corruption		-0.0057	0.0235	-0.0225
		(0.0572) *	(0.0134) **	(0.0080) ***
Bureaucracy Quality			0.0726	0.0962
			(0.0077) ***	(0.0047) ***
Number of observations	32	48	44	40
R-squared	0.5548	0.7628	0.6514	0.7373
Adjusted R-squared	0.4493	0.6498	0.5165	0.6060

Population growth is statistical significant only for America, it has negative sign which again corresponds to interpretation according to neoclassical growth models. *Capital stock* is statistically significant for Asia and Europe. Both of the coefficients are positive but again very small, similarly to the regression for the whole world (see Appendix, [5]). It again confirms the theory of the Solow model.

Inflation rate calculated as growth rate of GDP deflator is statistically significant in subsamples for America, Asia and Europe. In all cases it has negative sign. Therefore, the countries that experienced high inflation exhibit lower economic growth. This measure probably mirrors problems in financial sector or bad monetary policy which can deteriorate the whole economic environment.

Difference in Education is calculated from the dataset of Barro and Lee [3]. It is the difference between average number of years of total schooling of men and women. Larger number means stronger inequality between men and women in terms of education. As can be seen in Table 2, the variable is statistically significant in Africa and Europe with negative coefficients -0.0153 and -0.0207. That means if there is a difference of one year of schooling between the men and women, the country will growth slower by approximately 1.5 % in Africa and by 2 % in Europe. This finding suggests that promotion of education of women and/or enforcement of equality in education offers some potential for economic growth.

Share of Investment is highly significant and positive in three subsamples: Africa (0.0962), Asia (0.1875) and Europe (0.2434). It coincides to the value from our first regression for the whole world and again confirms the theory of the Solow model.

Price of exports is statistically significant in three subsamples, but once it has negative sign and twice positive. Explanation was given above – higher price of exports lowers international competitiveness and thus economic growth. Negative value for Africa is weird. The results for price of imports are similar but opposite – once it has positive sign and twice negative. Interpretation of negative values is intuitive. Higher *prices of imports* – especially of minerals and oil – increase price of production and can have negative impact on growth. Africa is again exception.

Life expectancy (at birth) is statistically significant in the model for Asia and Europe and in both cases it has negative sign and similar value (0.0004 and 0.0005). Thus countries with higher life expectancy should have lower economic growth. This result is puzzling and we do not have any reasonable explanation.

Now we turn to the *institutional indicators*. Compared to the first regression, there are more statistical significant indicators. However, we can also see differences in signs of the coefficients across subsamples. It indicates that the results are not very robust and the interpretation is difficult. Let us examine them.

Government Stability is an assessment both of the government's ability to carry out its declared programs and its ability to stay in office. This variable is 0 when there is very high risk and as the risk decreases the values rise. The coefficient is positive in Africa, 0.0806, which means that stable government contributes to higher economic growth. However, the coefficient turned out negative for Europe which contradicts intuition.

Investment profile is significant in subsample for Asia and Europe with correct sign, while it is negative (and significant) in Africa. Note, that negative value was also found in the whole sample.

Socioeconomic Conditions and Law and Order: These two variables are significant only for America and have positive sign which corresponds to the intuition. It again coincides with results in the full sample.

Measure of the risk of E*xternal conflicts* is significant only for Europe and has negative sign. Lower risk is connected with higher economic growth. Intuition behind this finding could be following: Countries in Europe gradually entered European Union which served as guarantor of international stability and peace, but it also created larger market which promoted economic growth. Variable "*Internal conflicts*" is similar to the former but relates to political violence in the country and its actual or potential impact on governance. It is significant in America and Asia, but the coefficients have opposite signs. Higher risk of riots in American countries is connected with lower economic growth while in Asian countries it is related to higher growth. Indicator *Military in Politics* measures threat that government exploits armed forces for propagation of its own interests. Usually dictatorships use army in politics which can have negative influence for market economy and thus economic growth. This variable is significant and positive for Europe which is quite strange and hard to interpret.

Democratic Accountability measures of how responsive government is to its people. The less responsive it is, the more likely the government will fall, peacefully in a democratic society, but possibly violently in a non-democratic one. This variable is statistically significant in three continents at the level of significance of 1%. In Africa and America the coefficients have positive influence on economic growth. But in Asia there is a negative correlation. The explanation is in the political history of this continent. Strong non-democratic institutions and hierarchy in the society had always important position but they evidently also promoted economic growth.

Ethnic tension component is an assessment of the degree of tension within a country attributable to racial, nationality, or language divisions. Lower ratings are given to countries where racial and nationality tensions are high because opposing groups are intolerant and unwilling to compromise. Higher ratings are given to countries where tensions are minimal, even though such differences may still exist. This variable is statistically significant only in America, which is the continent with the highest number of immigrants and mixed races. The coefficient 0.0167 shows the positive correlation between "Ethnic Tensions" and the economic growth. So countries with minimal tensions have higher economic growth. "*Religious tensions*" is similar measure but

relates to risk of conflicts between worshipers of different religions. For Africa it is positive and significant at 10 % level, for Asia it is negative and significant at 1 % level. This indicates that peaceful coexistence of worshipers of different religions in African countries is connected with higher economic growth, while the opposite is true in Asian countries.

Indicator "*Corruption*" measures perception of corruption at all levels of state and local government and also in private sector. It is significant and negative for America (-0.0057) and Europe (-0.0225) and positive for Asia (0.0235). It means that higher corruption is connected with lower economic growth but only in America and Europe. Variable "*Bureaucracy Quality*" quantifies the quality of state administration. It also measure how easy is to get licences or permission for entrepreneurship. This indicator is significant for Asia and Europe with positive signs. It corresponds to common wisdom that higher quality of bureaucracy is connected with higher economic growth.

Conclusion

In this paper we tried to find out which economic and institutional factors explain long-run economic growth. We divided the sample of countries into continents. We found greater variation of results between continents. We found evidence of conditional convergence and negative influence of high inflation and inequality in education on economic growth. Also the list of significant institutional indicators expanded. Unfortunately, the results are not robust. Several indicators have opposite signs in different continents. This suggests that measures of institutions could be flawed, the data for some countries could be biased or there are some other deep characteristics connected to every continent. The robust indicators were only few. To mention some, "Bureaucracy Quality" appears to have positive influence on growth in Asia and Europe, "Democratic Accountability" is important for growth in Africa and America and "Corruption" deteriorates growth in America and Europe. Further research will be focused on panel data approach with aim to find out, if there are variations in economic growth during time and what their possible determinants are.

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CONTRIBUTION OF MATHS EDUCATION TO ECONOMIC DEVELOPMENT

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Keywords:
economic growth – education – knowledge – learning outcomes – mathematical methods

Abstract:
The contribution deals with the role of education, especially education in math, for economic development. Concepts, methods and tools of special value in mathematical education of students for economics and management are emphasized; the role of math education for personal development is treated. The contribution concentrates on specific education methods, especially those involving learning outcomes into teaching/learning, with their impact in the chain of factors leading to economic development.

Education is not a product: mark, diploma, job, money – in that order; it is a process, a never-ending one.

Bella „Bel" Kaufman (May 10, 1911 – July 25, 2014), an American teacher/author

Introduction: mathematics, its role and its acceptance in the society

How to answer frequent questions of faculty students (of management, economics branches): *why to learn mathematics? And why such a lot of maths, and which maths?* The instructor's replies are closely connected with his/her way of the proper motivation to the study in the concrete branch (undoubtly) requiring the maths input. The mission of mathematics in the society follows from its function as the precise language for formulating problems, the tool for their solution, the way of interpretation and the feed-back. Maths possesses a transfer property between different sciences and practice branches; in education, it is an internationalised subject. There is a wide acceptance of mathemathics reasonings and skills as they provide the possibility to well understanding of the world: *mathematics* is *an important subject and knowledge of it enhances a person's reasoning, problem-solving skills, and in general, the ability to think* (Rajesh

Shri). The substance of maths is two-folded: first, maths as a science – second, maths as an universal tool. The first one is based on the subject of the research – the world of generally very abstract notions; maths is treated as an abstract science with its inner content and the scale of the very often specific and historically long created research topics. This face of maths, known to specialists, produces a barrier in acceptance by society; it generates a feeling as maths is something beyond one's reach. But, after overhelming this barrier, one meets its second face: maths as a tool, even a game, a method how to solve even daily problems – or a whole-life programme for gaining the practical knowledge and useful skills. Concerning maths in economic, as in other sciences, *economists use mathematics not to formulate, not to theorise, but essentially to describe their world. They thereby invoke all the security and certainty that is embedded in popular conceptions of mathematics but with no axiomatic basis and little predictability. Yet by, the use of mathematics as a language of 'the market' so mathematics has become entwined and identified with market economics* (Woodrow [20]). Here are ideeas for the learning of maths of prof. Greg Mankiw (chairman of the economics department at Harvard University, the teacher of introductory economics, taken from his blog):

- Every economist needs to have a solid foundation in the basics of economic theory and econometrics, even not being either a theorist or an econometrician; one cannot get this solid foundation without understanding the language of mathematics that these fields use.
- Occasionally, you will need math in your job. In particular, even as a policy economist, you need to be able to read the academic literature to figure out what research ideas have policy relevance. That literature uses a lot of math, so you will need to be equipped with mathematical tools to read it intelligently.
- Maths is good training for the mind. It makes you a more rigorous thinker.
- Math courses are one long IQ test. We use math courses to figure out who is really smart.

The ways of use of maths differ. Neilson [14] states: in economics, there are two primary ways one can justify an assertion: either using empirical evidence (econometrics or experimental work), or mathematical arguments. Both of these

techniques require math, and one purpose of a course is to provide mathematical tools needed to make and understand economic arguments. A second goal, though, is to teach to speak mathematics as a second language, that is, to make comfortable talking about economics using the shorthand of mathematics. Teaching maths for economic students reflects those requirements and goals. Even the very elementary maths notions and tools are appropriate for describing principles of market, characterize company‘s costs, revenue, profit, customer’s behavior; they are basic ones tools for accounting. Advanced mathematical tools as the theory of chaos have been used to mapping trends and forecasts of market; they possess concepts dealing with the dynamics of processes. Statistics, probability theory, applications as queuing theory, time-series analysis, linear programming all are widely used in business and economics.

The contribution emphasizes the role of education, especially in math, for economic development. It deals with tools which are of special value in mathematical education of students for economics and management. Next, it concentrates on education methods in general, and presents contributions of maths to areas of economic development.

1. Economic development: what does it mean, how to measure it?

Due to the standard definition, the economic growth means an increase in the ability to produce goods and services per head of the population over a period of time. It is measured as the percent rate of increase in real gross domestic product (real GDP), or also the growth of the ratio of GDP to population (GDP per capita). Advantages of economic growth consist in higher living standards and employment effects, with ways how to quantify both; it leads to a higher life quality (here measures are often outside of quantifying modes). Next, out of pure economic activities, there is a common opinion that *creativity* holds the key to the growth. Could education contribute to the creativity (a dangerous question since there is a large discussion on how schools kill the creativity …)? Still, education has long been viewed as an important determinant of economic well-being (Hanushek and Wößmann [9]). The growth theory emphasizes at least three mechanisms how education may affect economic growth:

- first, education can increase the human capital inherent in the labor force, which increases labor productivity and thus transitional growth toward a higher equilibrium level of output (as in augmented neoclassical growth theories),
- second, education can increase the innovative capacity of the economy, and the new knowledge on new technologies, products, and processes promotes growth (as in theories of endogenous growth),
- third, education can facilitate the diffusion and transmission of knowledge needed to understand and process new information and to successfully implement new technologies devised by others, which again promotes economic growth.

Despite these theoretical predictions, the empirical evidence on the impact of education on economic growth has long been mixed. In large part, this seems to reflect measurement problems. Most people would acknowledge that a year of schooling does not produce the same cognitive skills everywhere. They would also agree that families and peers contribute to education. Health and nutrition further impact cognitive skills. Yet, until recently, research on the economic impact of education – largely due to expedience – has almost uniformly ignored these aspects. Recent research shows that ignoring differences in the quality of education significantly distorts the picture of how educational and economic outcomes are related (Hanushek and Wößmann [9]). But the problem consists also in metrics: how to measure the impact of education on economic growth? Several recent studies suggest that education is important both as an investment into human capital and in facilitating research and development and the diffusion of technologies, with initial phases of education more important for imitation and higher education for innovation. It is worthy to mention that an additional education which follows and is forced from economic activity produces a significant impact on economic growth as well.

The initial problem, therefore, tends to a related question: how to measure the education quality. The idea is that education is a simple average of the mathematics and science scores over international tests, interpreted as a proxy for the average educational performance of the whole labor force. This measure encompasses overall cognitive

skills, not just those developed in schools. Research on association with an average annual growth rate in GDP per capita has been done for various periods, based on PISA tests (across OECD countries), and the relationship between TIMMS results [18] - TIMSS 2011 was the fifth assessment in the framework of the IEA The Trends in the International Mathematics and Science Study and economic performance, assessed student achievement in maths and science at the 4th and 8th grades (Robinson [17]). However, the effect of educational quality is statistically significantly larger in low-income countries than in high-income countries (cf. Hanushek and Wößmann [9]); among the developing countries, the conclusion is that once there is a high-quality school system, it pays to keep children in school longer – but it does not pay if the school system does not produce skills. In general, the society does not accepts tests results as the only and fully valid determinants of economic performance; the recommendation is to look for additional messages of those tests as well (e.g. outputs on literacy skills). Home and school environment are significantly supportive for educational attainment.

2. The contribution of (maths) education to personal development

The personal and professional success is one of the most desirable targets of a man; the development toward success gaining success includes the spiritual, mental and physical aspects of life. The most important factor of the personal development is *the personal openess to learning.*

The personal development through math education starts at early children age; due to TIMMS 2011 findings, there is a strong positive association between students' achievement in the fourth grade and their early learning experiences. Achievements forms the base on which the positive attitude to learning (and learning of maths as well) is formatted; notably, substantially fewer students reported positive attitudes toward learning mathematics and science at the 8th grade than at the 4th grade. Personal development includes activities that improve awareness and identity, develop talents and potential, build human capital and facilitate employability, enhance quality of life and contribute to the realization of dreams and aspirations. The concept is not limited to

self-help but includes formal and informal activities for developing others in a variety of roles. Personal development enables to become associated with ideas, plans, life preferences, activities, or to be included into a society or into its part.

Dealing with a personal development in the frame of an institution, it means that it runs in methods, programmes, managing tools and specific techniques, with assessing in the final phase. The education process brings him/her to the first base of self-development: training as an education activity, independently on the study branch, is just the acquisition of knowledge, skills, and competencies.

Let us provide learning methods appliable in maths. First, due to the existence of the qualification frame for tertiary education in Czech Republic (the output of the national project QRAM in 2009 - 2012), HEIs meet the challenge to implement learning/teaching methods involving Learning Outcomes (LO) into programmes, branches and single subjects or even their modules as well. LO are based on the SOLO taxonomy (SOLO as **S**tructure of **O**bserved **L**earning **O**utcomes). The concept of LO turns the education strategy out from a teacher to a learner, and tends the orientation of education on its outputs as the education purpose (Kennedy, Hyland and Ryan [11], Adam [1], Gehmlich [7]):

Learning Outcomes mean statements of what a learner knows, understands and is able to do on completion of a learning process and are defined in terms of knowledge, skills and competence (Gosling and Moon [8]).

Here LO as *knowledge, skills and competences* are (Adam [1] in his „Prague lecture“):

- *knowledge* is the ability to aquire, to process and to use information, and it is the outcome of the assimilation of information through learning; it consists of facts, principles, theories and practices that are related to a study branche/subject,
- *skill* means the ability to apply the aquired knowledge and perform it, using appropriate tools, in an appropriate way for solving appropriate problems,
- competence means the ability to use knowledge and skills; such ability has to be proven.

The crucial agreement sounds: *LO enable to make a shift from the surface approach to the learning to the deep approach,* that is, from

- *surface level learning*: fact memorisation to,
- *deep level learning*: understanding underpinning theory and concepts.

(Marton and Säljö [13]). Studies more recently have shown that deeper approaches to learning are related to higher quality LO (Ramsden [16], Prosser and Millar [15], Trigwell, Prosser and Waterhouse [19]). Deep and surface levels are two approaches to study (Marton and Säljö [13], Ramsden [16], Biggs [3], [4], [5] and others). Comparing is due to Atherton [2]:

TAB. 1: Comparing of deep and surface approach

Deep approach	**Surface approach**
Focus is on "what is signified"	Focus is on the "signs" (or on the learning as a signifier of something else)
Relates previous knowledge to new knowledge	Focus on unrelated parts of the task
Relates knowledge from different courses	Information for assessment is memorised
Relates theoretical ideas to everyday experience	Facts, concepts are associated unreflectively
Relates and distinguishes evidence and argument	Principles are not distinguished from examples
Organises and structures content into coherent whole	Task is treated as an external imposition
Emphasis is internal, from within the student	Emphasis is external, from demands of assessment

Source: Ramsden [16]

There is a third form, known as the "achieving" or strategic approach, which can be summarised as a very well-organised form of surface approach (the motivation: to get good marks). The exercise of learning is constructed as a game, so that acquisition of technique improves performance. Still the concept of "learning" is assumed in different ways. Säljö [13] classified this concept by five categories:

- Learning as a quantitative increase in knowledge: acquiring information or "knowing a lot".
- Learning as memorising. Learning is storing information that can be reproduced.
- Learning as acquiring facts, skills and methods that can be retained and used as necessary.

- Learning as making sense or abstracting meaning. Learning involves relating parts of the subject matter to each other and to the real world.
- Learning as interpreting and understanding reality in a different way. Learning involves comprehending the world by re-interpreting knowledge.

There is a qualitative shift between the third and fourth conception: first three are views which underpin surface learning strategies, while the last two ones relate to deep learning.

Returning to LO, after being involved, teachers are expected to be able to show how:

- the educational outcomes for a programme and LO for a module are being achieved,
- the assessment methods are appropriate to test the achievement of the intended LO,
- the criteria used to judge achievement are aligned to the intended LO.

In maths (Kahn and Kyle [10], Krantz [12]), start from *l*earning objectives: having taken this subject, students should have:

- knowledge of the subject matter, terminology, techniques and conventions covered in the subject, as well as understanding of the underlying principles,
- the ability to solve problems involving understanding of the concepts.

There is a common agreement on the learning objectives in maths (SEFI [6], Curricula):

- *thinking mathematically,*
- *reasoning mathematically,*
- *posing and solving mathematical problems,*
- *modelling mathematically,*
- *representing mathematical entities,*
- *handling mathematical symbols and formalism,*
- *communicating in, with, and about mathematics,*
- *making use of aids and tools.*

Hence, LO in maths, independently on a programme/subject/module level, mean: *upon completion of the programme/subject/module students should be able:*

KNOWLEDGE *(what does it mean)*	*to acquire knowledge on mathematical concepts, on their substance, structure, properties and importance; to gain knowledge on methods applicable in the corresponding branch, and on specific theories*
SKILLS *(how does it work)*	*to demonstrate an appropriate level of problem-solving skills using analytical reasoning; to manipulate with concepts/objects in an effective and consistent way, applying corresponding formal mathematical procedures (rules, methods, operations), including possible technological or software means – to demonstrate proficiency with various technological tools; the ability to justify the procedure due to its mathematical substance, and the ability to recognize correct/incorrect steps; to recognize the range of applicability of the procedure(s) used*
COMPETENCE *(the purpose and how to apply it for the purpose)*	*to express a simple problem in the form of a mathematical model, using mathematical symbols for concepts, objects, relations and operations – to provide a transition from concrete to abstract thinking; the ability to decide the use of appropriate mathematical tools for solving the problem and apply them; using logical argumentation, the ability to interpret its solution, or provide reasons for the non-existence of a solution; the ability to formulate statements in the formal (mathematical) language*

The majority of learners comes to university with predominantly *procedural knowledge:* they know how to apply a procedure to a set of variables and constants and obtain a result, but with only a little understanding of what the result implies or means. They do not seem to possess the conceptual knowledge necessary to be able to make assumptions or an informed judgement as to how sensible their result is or indeed be able to interpret the outcome.

Provide here other learning methods: *Problem Based Learning (PBL)* is defined as the learning for professional action, and it combines a learning methodology, knowledge construction and scientific approach. It defines knowledge as „know-how“, learning is for the workplace, real life problems serve to undertake practical action. A derived question arises: how are knowledge/skills organised within the human cognitive system? The possible answer is based on the idea of building up and applying *schemata* in order to acquire problem solving language. A schema is defined to be how thought

processes and the relationship between them are organized: an arithmetic schema would involve a lexicon (the symbols) and a grammar (the rules) and how they interact. In maths, schemata are created for coping arithmetic, fundamental algebra, solving equations etc.; they enable to create math concepts and then to provide mathematical procedures. It is vital at any stage the fundamental aspects of mathematics are correctly learnt since it is extremely difficult to „unlearn" a schema at a higher level; maths has the cummulative character. Next, thinking abilities allow to compose or to bind schemata even from different domains; in maths, to create „a schema of schemata" as steps to abstract thinking on higher and higher level. The understanding and coping the hierarchical nature of maths is the key to be more powerful in learning in general, and it is an important step out of math as well in the personal development, creating thinking levels. Principles of another method of *Cognitive Load Theory (CLT)* are: 1) the information store principle, 2) the borrowing and reorganising principle, 3) the randomness as genesis principle, 4) the narrow limits of change principle, 5) the environment and linking principle. The learners' acquired knowledge and skills come from imitation, reading, and listening.

Conclusion

Education in maths contributes – through knowledge, skills, competences – to reach the target „how to manage the problem, and how to solve it". This means also that the subject could generate the will and the attitudes to learning. Second, in general, institutions agree on the frame of maths education for the purpose of learning for economics branches, on its single chapters or themes. Here *the kernel is both in their inner content, and in the approach as well*; in other words, *knowledge contained in the deepness of the deep learning* (see SEFI, learning objectives [6]). This approach must be first shown and passed by instructors themselves. Here is the schema „problem solving rubric": suppose the successful student is endowed by this from his/her (professionally and emotionally successful) math instructor:

- *Exploring the problem:* 1. What information is given by the problem? 2. What is the problem asking me? 3. Is there additional information I need to get started?

- *Resolving the problem:*1. Have I resolved a similar problem before? 2. Do I know the mathematics to solve this problem? 3. What assumptions, if any, do I have to make? 4. Can the problem be broken down into smaller, more manageable problems? 5. Can the problem be looked at from a different perspective?
- *Reviewing my resolution:*1. Is my resolution acceptable? 2. What have I learned from the resolution? 3. Could I use this resolution to resolve other problems?

Because of the findings reported – that knowledge rather than just the entire time in school is that what really counts for economic growth – society policies must pay more attention to the quality of school education. There is a direct linking between education quality and society economic growth.

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ECONOMIC CONDITIONS OF DEVELOPMENT OF POLISH AGRITOURISM

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agritourism – income – financing – growth factors

Abstract:
The aim of the study is to verify the economic conditions of development of agritourism in Poland. Factors that determine the possibilities and opportunities for entities involved in rural tourism – mainly in terms of economy – have been highlighted. The analysis has led to the conclusion that financing of agritourism activities is based mainly on own resources. The level of EU funding has, on the other hand, turned out to be surprisingly low. It was also found that the share of income from agritourism in total income is not high, but important from the point of view of every farm, as well as the local community involved.

Introduction

Agritourism is touristic activity carried out on farms. As indicated by Sikora [14, 116] "Agritourism is not only a form of active holiday on a farm, which allows tourists to satisfy their cognitive, emotional and recreational needs. Agritourism is treated as a form of entrepreneurship, understood as the ability of the farmer to engage in rational action and achieve a particular goal, which, under market conditions, is the additional profit of the farm." In the European Union, it is treated as a field of agriculture. Development of agritourism in Poland in recent years has become significant from the point of view of business practice, as well as development of scientific tools for its analysis. Data included in the Tourism Development Strategy for 2008-2014 indicates that tourism is a key factor that boosts socio-economic development of the country. Its overall significance is due to creation of new jobs and increasing of competitiveness of the regions [15, 3].

There are favourable conditions for development of agritourism in Poland, and its development in recent years has been significant. The existing opportunities in terms of financing and implementation of investment projects determine the ability to engage in business activity and to adapt to the growing demands of tourists. Development of rural tourism, including agritourism, as a cheaper form of recreation, can be due to economic considerations, which are indicated by many families that do not spend their holidays in this manner [17, 56].

1. Methods, literature overview

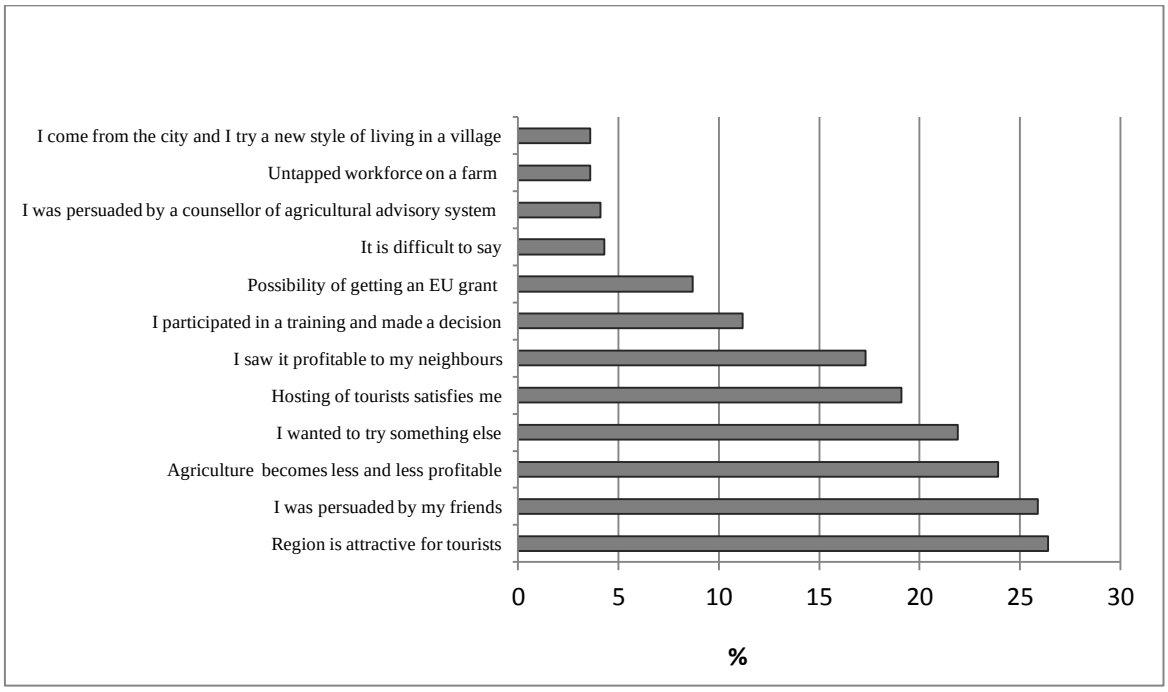
The aim of the study is to verify the economic conditions for development of agritourism in Poland. Emphasis has been put on the factors that determine the possibilities and opportunities for entities involved in rural tourism. The source materials included literature and data from the Central Statistical Office and research carried out at the Department of Economics of Education, Communication and Counselling. Studies were also carried out in two municipalities of the voivodship of Mazowsze with regard to development of agritourism. Since 2009, municipal and commune offices in Poland have been obliged to provide information about accommodation sites (including guest rooms, agritouristic lodgings, camping sites) located in their area for statistical purposes.

2. Opportunities for development of agritourism in Poland

Many factors contribute to the development of agritourism, including the local environment and its components. The fact that number of factors influencing agritourism is significant was pointed out, among others, by Gaworecki [4, 107]. He defined the so-called mega-factors, which included the economic, social, political, technical, environmental and supply-demand factors. In general, it is claimed that development of tourism, including agritourism, depends mainly on such factors as the attractive landscape, clean, unpolluted environment, the presence of historical monuments, cultural values of the region, but also the quality of rural tourism services, standard of accommodation and kindness of the hosts [1, 14], [16, 25]. These are pointed out by tourists. However, from the point of view of the business owner, the

most significant issues include price competitiveness of agritourism services and the possibility of taking advantage of external financing (e.g. the EU funds). As Dziedzic and Skalska have emphasized [2, 23] the factor that influences the activity of travel agencies is the strength of their attachment to a specific location. Some enterprises are characterized by a fixed location – mainly those, which provide services based on visiting specific areas and staying there. While characterizing an area of development of agritourism, it should be stated that such development is facilitated by the free labour resources in the rural areas (high unemployment rates), the relatively low income of the rural population (searching for additional sources of income) [16, 33], as well as available housing resources (which can be designated for lease). This has been pointed out by many researchers [10, 30], [13, 658]. On the other hand, reasons for launching of business activity in tourism vary as shown by the statistics (Fig. 1). Most indications are related to attractiveness of the region, persuasion of friends and low incomes in the agricultural sector.

FIG. 1: Reasons for staring up a business in agritourism



Source: [17, 55]

Basically, the scope of economic issues of agritourism has not been defined strictly. These include micro- and macroeconomic aspects, the economic policy and the social

policy (the aim is for the rural population to keep increasing its income from non-agricultural activity) the market, marketing, production economics, spatial development and planning etc. [16, 29]. The economics of agritourism describes and analyzes entities operating in this field, - farms, as well as companies and associations.

When analyzing agritourism, like any other kind of business activity, we take into consideration the resources, expenditures and outcomes (the categories of expenditures, incomes and costs). It is important to develop a cost calculation for agritouristic products and services (when planning to launch such activity) or to analyze the investment opportunities [16, 115].

The most significant impact on the development of rural tourism is exerted by low income of farms, pricing of agritourism services, the, "flow" of income of the urban population to the farms, the condition of the rural infrastructure and the local government policy [16, 25]. The comparison of monthly income levels shows that agriculture occupies a rather weak position (tab. 1), although it is difficult to calculate the parity of household income of the farming population in Poland as almost half of all households in the rural area sell nothing or very little on the market.

TAB. 1: Average income*per person in households [PLN]

Years	Households			
	farmers	employees (blue-collar workers)	self-employed	pensioners
1995	282,4	257,0	386,1	319,7
2000	455,9	517,9	794,7	617,3
2005	606,2	622,7	977,1	800,3
2010	1024,5	1199,2	1468,4	1180,8
2011	979,5	1253,7	1512,9	1242,2
2012	1091,6	1289,2	1536,8	1297,9
2013	1156,0	1306,0	1531,2	1329,1

***** the table shows the value of disposable income, based on CSO data.

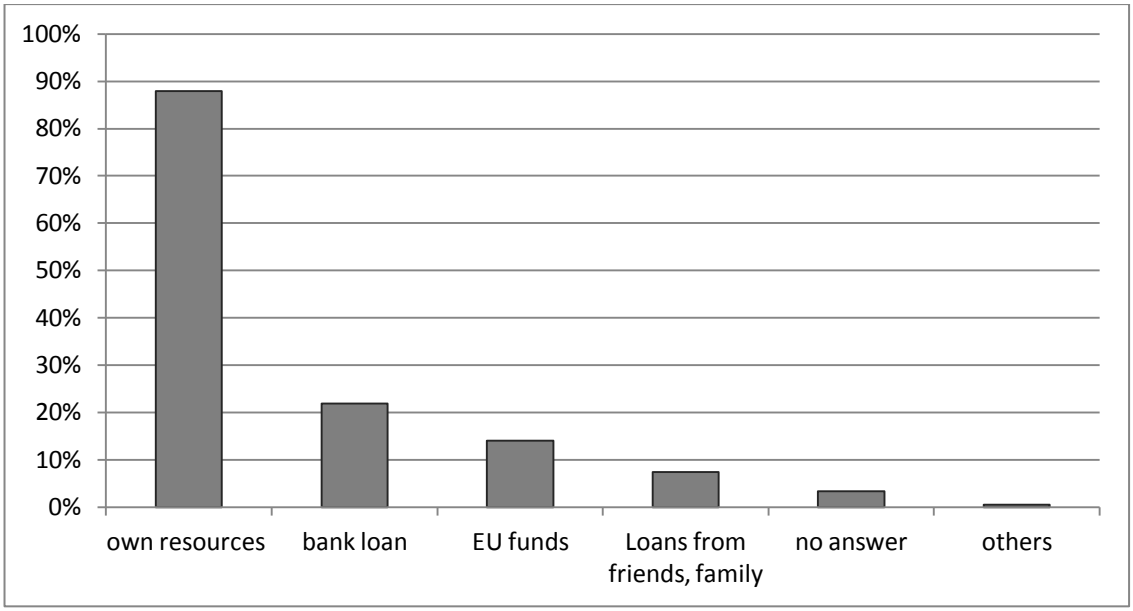
Source: [9], [12].

In most of the annual periods analyzed, the level of income generated by households of farmers was the lowest. Hence search of farmers for additional sources of income. As for the prices of agritouristic services, the main factors which differentiate them are: the type of consumer, the product features, the time, location and quality of service. The price should be understood as a certain value, which is the sum of benefits generated by the product on behalf of the tourist. In this context, it contributes to shaping of the image of the product. When defining the price, the manager/owner will consider mainly the competitive offers, the cost of doing business or the demand for services. So, as indicated by Łazarek [8, 86], under the conditions of market economy, the prices are based on supply and demand - all general and specific characteristics of the tourism product, the characteristics of demand and supply and the factors that influence supply and demand are of great importance.

An important factor, which influences development of agritourism, as well as other types of business activity, is the issue of financing. The expenditures in agritourism, necessary to start business activity – as it has been indicated by research – make it one of the cheapest forms of capital investment. The main type of funding for many farms is the so-called self-financing [17, 32], [6, 78], [5, 1]. Dominance of own capital significantly reduces the dependence of farming on the external factors. The external sources of financing of agritourism are mainly loans (Fig. 2). Similar conclusions have been formulated by Krzyżanowska [6, 78] and Zawadka in their studies [18, 145], indicating that own capital occupied the first place among all sources of financing of business activity. A particularly important type of loan for agricultural activity are subsidized loans based on particularly favourable terms of financing [7, 92].

The share of EU funds was particularly low in comparison with other sources. Research conducted in the period between 2008 and 2010 [6, 81], [18, 146] indicates that this share amounted to 5-10% of all sources.

FIG. 2: The source of funding for start-ups

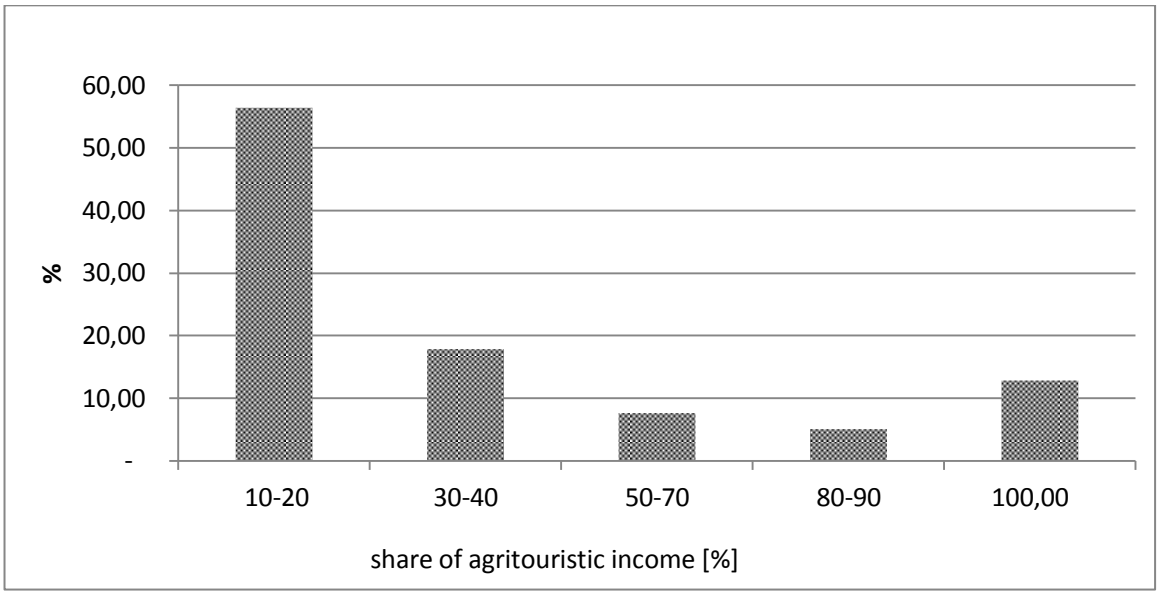


Source: [17, 57]

Analyses carried out in year 2012 [17, 56] indicate an increase by several percentage points. According to the respondents, their reluctance to apply for financing from the EU is associated with intricacy of the procedure (complexity of the legal regulations - 77% of respondents) and excessive bureaucracy (difficulty in applying for funding from the EU - 82% of respondents) [11, 12]. All owners of the households surveyed declared an increase in their income in association with the agritouristic activity conducted (Fig. 3).

The majority of all respondents (54.6%) declared that in their case, the share of income from agritourism in total income ranged between 10-20%. Although it does not indicate a very significant growth in income, it can be stated that it contributed to improvement of the financial situation of the households.

FIG. 3: The share of income from agritourism in total income of surveyed agritouristic households



Source: [5, 179]

Conclusion

Summing up, conditions in Poland are favourable for the development of agritouristic services. Agritourism contributes to the growth of income of residents of the rural areas, and, although the share of income from agritourism in total income is not high, it is important from the point of view of the local community.

Development of rural tourism and agritourism may provide benefits to the rural communities. Tourism-related activities have the potential to create many new workplaces. Thanks to the inflow of tourists, it is possible to maintain the existing jobs in the service industry (e.g. transport, accommodation services). Touristic activity can also attract new enterprises.

The analysis shows that financing of agritouristic activity is based mainly on own resources. The low level of use of the EU funds may be a cause for concern. Therefore, the role of the Agricultural Advisory Centres and other advisory bodies, which should promote and support development of tourism, is very significant in this regard.

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INCORPORATING VELOCITY INTO RISK ANALYSIS

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Keywords:
risk – riskvelocity– risk management– risk analysis

Abstract:
The lesson learned in the wake of the financial crisis and the resulting economic downturn is that risk cannot be looked at in a vacuum. Last investigation about risk analysis says that likelihood and impact alone do not paint the whole picture of risk nature. Incorporate the velocity of risk events into risk analysis criteria improves organization assessment of risk exposure and response planning.The purpose of this article is to investigation impact velocity into risk analysis.

Introduction

The primary purpose of risk management is to create and preserve value.Risk management should be viewed as central to the organization and its means of creating a return on capital employed [7].One of steps of risk management process (according ISO 31000 standard - leading risk management standard) is risk analysis. According ISO 31000 risk analysis is performed in order to support decision-making on risk treatment. The purpose of risk analysis is to understand the nature and level of risks in order to evaluate the significance of risks. Risk analysis takes the information on risks generated during the risk identification process and uses the risk criteria developed during establishing the context to provide the basis for the analysis [5, 53]. Risk analysis involves understanding the causes and sources of risk, their consequences and the likelihood that those consequences can occur. Mainly it focused on the two dimensions of likelihood and the impact.The lesson learned in the wake of the financial crisis and the resulting economic downturn is that risk cannot be looked at in a vacuum. Last investigation about risk analysis says that likelihood and impact alone do not paint the

whole picture of risk nature. Important question is: How fast risk factors influence on organization?

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The goal of paper is present risk velocity as new dimensions for risk assessment. The main method is overview of the literature of the subject in the selected scope of discussion.The scope of this discussion has been limited to identifying key characteristics of risk velocity and explaining the main idea incorporating risk velocity into risk analysis.

1. Risk velocity – definition

The term velocity is generally used to mean the rate of movement in a certaindirection. Within risk context this movement is from where we are today to either the cause of a risk event, or its impact. This dimension represent for risk arising from the time horizon between recognition of the presence of an adverse condition or event and the time available to respond. In the following are listed the leading definitions of risk velocity.

According M. R. Chaparro risk velocity is measures the rate at which the information necessary to understand and manage a risk becomes available. Risk velocity is important to consider in analyzing consequential risk because the time horizon to detect the occurrence and to develop a response may be substantially different [2]. M. R. Chaparro in her work "A new dimension to Risk Assessment" presents two measurement risk velocity. Her proposed two metrics to quantify these concepts is:

- time to cause (TTC) - following the risk event, how long will it take for the impact to unfold or
- time to impact (TTI) - from the known position today, how long will it take for the risk to materialize.

S. Davis and J. Lukomnik define risk velocity as how quickly one goes from the onset of the risk to the impact of the risk [4, 56-57]. In their opinion first step to robust existing ERM program is take a look at the risks already identified and add risk velocity as a third dimension. Next, it will be correct in terms of velocity (slower or faster), because that some risks arising from the same incidents may vary in velocity.

This assessment will enable to create a three-dimensional matrix and follow start examining your escalation and risk response plans against all three dimensions. S.Davis and J. Lukomnik postulate that is the start of the transition from risk measurement and risk anticipation to genuine risk management.

R. Akkiraju, N. Mantripragada and N. Nayak in they work “A Knowledge-based Decision Support Tool for Enterprise Risk Management” define "risk velocity" as "an estimate of the time frame within which a risk event might occur" and suggest using this as part of the overall risk assessment [1,6].

Cited definitions indicate that there is no clear approach to the interpretation of velocity risk concept. In addition, these definitions are quite general in nature.

2. Key factors impacting risk velocity

The risk velocity takes three items into account:

- the speed of onset,
- the speed of impact, and
- the speed of reaction.

The speed of onset is the time it takes for a risk to impact the organization (e.g., the time between the occurrence and when the organization first feels its effects).The speed of impact is the time it takes for a risk to reach full impact to the organization (e.g., the time between occurrence and when the university feels the full extent of its effects).The speed of reaction is the time it takes for the organization to control the risk (e.g., the time between the occurrence and when the organization completely mitigates or controls the risk)[6].

3. Interaction between likelihood, impact and velocity

A classic way to conduct qualitative risk analysis is to rate probability and impact. Taking into account probability and impact we obtain a clear matrix.For example, on a scale of 1 to 5(figure 1).High-probability/low impact situations are managed on a daily basis. Low-probability/high-impact events are often addressed through insurance. High-probability/high-impact events are everyone's high attention and receive the significant

share of risk-prevention efforts. Low-probability/ low-impact events often don't manage at all.

TAB. 1: Risk matrix

		Impact/Consequence				
		1 Insignificant	**2 Minor**	**3 Moderate**	**4 Major**	**5 Catastrophic**
Likelihood /Probability	**5A**	H (5)	H (10)	E (15)	E (20)	E (25)
	4A	M (4)	H (8)	H (12)	E (16)Risk 1A	E (20)
	3A	L (3)	Risk 2 M (6)	Risk 2A H (9)	E (12)	E (15)
	2A	Risk 3 L (2)	L (4)	Risk 1, Risk 3A M (6)	H (8)	E (10)
	1A	L (1)	L (2)	M (3)	H (4)	H(5)

Legend:

Risk Rating: L –Low, M – Moderate, H-High, E-Extreme; L, M, H, E (1,2,3…) - risk score

Likelihood/Probability Rating:1A - Almost certain to occur in most circumstances; 2A - Likely to occur frequently; 3A - Possible and likely to occur at some time; 4A - Unlikely to occur but could happen; 5A - May occur but only in rare and exceptional circumstances.

Source: own elaboration

Using the basic formula:

$$PROBABILITY * IMPACT = RISK\_SCORE \quad (1)$$

we indicate location of risk on a risk matrix.

For example, we might rate probability of a risk and impact as follow in table 2.In results we get the risk score which presented on table 1 (Risk 1, Risk 2, Risk 3).

Introducing an additional dimension of risk - velocity- changing formulas as follows:

$$(PROBABILITY + VELOCITY) * IMPACT = RISK\_SCORE \quad (2)$$

TAB. 2: Risk rating

	Impact /Consequence	Likelihood /Probability	Risk score
Risk 1	2	3	6
Risk 2	3	2	6
Risk 3	1	2	2

Source: own elaboration

When we include following scale of velocity [3]:

5 - Very High - Very rapid onset, little or no warning, instantaneous

4 - High - Onset occurs in a matter of days to a few weeks

3 - Medium - Onset occurs in a matter of a few months

2 - Low - Onset occurs in a matter of several months

1 - Very Low - Very slow onset, occurs over a year or more

Consequently, it changes the risk score (table 3).

TAB. 3: Risk rating with velocity

	Impact /Consequence	Likelihood /Probability	Risk velocity	Risk score
Risk 1 A	2	3	4	14
Risk 2 A	3	2	1	9
Risk 3 A	1	2	4	6

Source: own elaboration

In results we get the risk score which presented on table 1 (Risk 1A, Risk 2A, Risk 3A). This simple example presents how incorporating velocity into risk ratings provide greater perspective scale of risks. Although Risks 1 and 2 have the same probability and impact ratings, Risk 1 is of greater concern since it will likely occur much sooner (see Risk 1A in table 1).

4. Discussion

Risk velocity concept is certainly a new contribution to risk analysis field.The concept of risk velocity seems to be related to a concept of volatility time from Black-Scholes model. The essence is that in periods of high volatility decisions need to be made faster to be effective than is true in less volatile times. In essence, volatility time speeds up relative to chronological time. A related issue is risk management clockspeed, or the speed with which risk management systems can supply the detailed up-to-date information to support defensive actions in periods of high volatility. Considerations presented in this article suggest that the velocity risk concept is a significant in risk management area. However, there is no detailed academic research in this area. Available studies show the general outline of the time problem in risk analysis. Future research should focus, among others, to a more detailed analysis of the measurement of this category.

Conclusion

To improve of enterprise risk model we must include risk velocity concept as one of the criteria for ranking risk priority. While 70% of finance executives agree that risk velocity is a core consideration, only 11% have introduced it into their risk assessments [3].The concept of Risk Velocity can have a powerful impact on a discussion of risk.In most instances companies believe that risks are managed well, especially those that could have a large impact on financial results. According Deloitte survey still we observe tendency to think about risk in silos and not see the interdependencies. A dialogue around Risk Velocity together with a discussion of interdependencies can begin with a simple verification actual risk matrix.Regardless of the methodology used, key result of use an risk velocity is to establish a more robust risk scenario / matrix which can then be used to better estimate the potential impact of a risk event and to use this as a guide towards prioritization of specific initiatives.

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THE GDP GROWTH, INDEX GROWTH AND INVESTMENT STRATEGY RETURN

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Keywords:
investment strategy – investing – efficient market theory

Abstract:
The paper is focused on investing in the stock market. The aim of the paper is to assess three investment strategies over the period from 1998 to 2013. Author investigates, what US GDP growth, Dow Jones Industrial Average Index growth and Standard & Poor´s 500 Index growth during certain year correspond to such returns in following year, which are the three highest returns of whole period from 1998 to 2013. So that, it is investigated, what combination of GDP growth and index growth leads to the most favourable investment in stocks? The returns of three investment strategies are compared, namely 10 % profit strategy, strategy of holding till the first unprofitable month and strategy of holding for a half-year because of taxes. The contribution of the paper consists in making of investor decisions easier.

Introduction

Returns of various investment strategies are often compared by investors when they invest in stocks. Factors which influence the returns are also investigated. The GDP belongs among such macroeconomic factors. Such combination of GDP growth and index growth, which leads to the most favourable investment according to different investment strategies, is looked for in this paper.

1. Literary Survey

Some researchers try to find, what factors and how much influence the stock returns. They focus on the predictive ability of historical stock prices to predict future stock prices. However, random walk hypothesis assumes that stock prices evolve randomly

and thus cannot be predicted. This assumption is consistent with the efficient market hypothesis. Shiller [5] presents that each investor competes against many smart investors, who search for similar investment opportunities on the stock market. So that, every predictive tool to estimate future stock returns could be very useful for each investor. Some researchers focus on the Investment Clock model. North [2] provides this powerful and timely method. He also examines important indicators of different market cycles and he presents how investors can use this knowledge. According to The Investment Clock [6], this model is very important within investment decision. It describes such moments during the market cycle, when real estate values, interest rates, stock prices, commodity prices and overseas reserves rise or fall. It is a good tool to predict the movement of the markets. Gillham [1], based on the Investment Clock model application, presents that Australian stock market is at the end of 2012 heading towards the best and lowest-risk buying opportunity in 40 years. Presenting the development of Australia stock market index during 1875-1976, he analyses important areas during this period and adds the projection till 2014. Based on Investment Clock model, he accurately determines the timing for the top and the bottom of the market. Some cycles from history are very accurate in predicting future highs and lows. The relationship between GDP and stock prices is at the centre of attention of researchers, too. Rejnuš [4] assumes that GDP increases when stock prices also increase and vice versa.

2. Methodology

The aim of the paper is to assess three investment strategies over the period from 1998 to 2013. It is investigated, what US GDP growth, Dow Jones Industrial Average Index (DJIA) growth and Standard & Poor´s 500 Index (S&P 500) growth during certain year correspond to such returns in following year, which are the three highest returns of whole period from 1998 to 2013. DJIA and S&P 500 are major indicators of US stock market. Various combinations of GDP growth and index growth are analysed. Author searches what combination of GDP growth and index growth leads to the most favourable investment in stocks. Thus, investors can find, whether the waiting for specific relationship between the GDP growth and index growth is worth. The relationship can mean simultaneous increase of indicators, simultaneous decrease or inverse trends. In general, they can find at what phase of market cycle they should

invest. Rejnuš [4] assumes that investors should invest in stocks especially during the recession. Bear trend on stock market can be expected after many stock buyouts, so that the stock prices are relatively low at the recession. Market timing is very important for investors.

The returns in per annum of three investment strategies are compared. As for the first, 10 % profit strategy, investor will sell the stock after the stock price increases about 10 %. As for the second, strategy of holding till the first unprofitable month, investor compares the stock prices once in a month and he will sell the stock after the stock price increases. As for the third, strategy of holding for a half-year because of taxes, investor will sell the stock exactly after 6 months. Investors in some countries need not to pay any taxes when they hold stock longer than 6 months. Daily closing index values of the DJIA are collected from Patria Online, a.s. [3], values of the S&P 500 from Yahoo Finance [8] and values of US GDP growth from The World Bank [7].

3. Results

The US economy and US stock market are analysed. TAB. 1 reports annual US GDP growth, DJIA growth and S&P 500 growth over the period from 1998 to 2012.

TAB. 1: Annual US GDP Growth, DJIA Growth and S&P 500 Growth over the period from 1998 to 2012

Year	US GDP growth	DJIA growth	S&P 500 growth
1998	4.45 %	16.10 %	26.67 %
1999	4.85 %	25.22 %	19.53 %
2000	4.09 %	-6.18 %	-10.14 %
2001	0.95 %	-7.10 %	-13.04 %
2002	1.78 %	-16.76 %	-23.37 %
2003	2.79 %	25.32 %	26.38 %
2004	3.80 %	3.15 %	8.99 %
2005	3.35 %	-0.61 %	3.00 %
2006	2.67 %	16.29 %	13.62 %
2007	1.79 %	6.43 %	3.53 %
2008	-0.29 %	-33.84 %	-38.49 %
2009	-2.80 %	18.82 %	23.45 %
2010	2.51 %	11.02 %	12.78 %
2011	1.85 %	5.53 %	-0.003 %
2012	2.78 %	7.26 %	13.41 %

Source: Patria Online, a.s. [3], The World Bank [7], Yahoo Finance [8] and own calculations

The US GDP growth is higher than 4 % only in 1998, 1999 and 2000. This growth is lower in other years, even it is negative in 2008 and 2009. DJIA growth is positive in 10 cases of totally 15 cases. The highest growth is in 2003. S&P 500 growth is also positive in 10 cases, but the highest growth is in 1998. Both US GDP and indexes

TAB. 2: Returns of Investment Strategies over the period from 1999 to 2013

Year	Index	The first strategy	The second strategy	The third strategy
1999	DJIA	38.33 %	9.07 %	39.76 %
	S&P 500	37.21 %	4.93 %	23.82 %
2000	DJIA	-	-61.24 %	-18.62 %
	S&P 500	-	-64.39 %	-2.03 %
2001	DJIA	-	-17.10 %	-5.38 %
	S&P 500	-	-38.49 %	-14.82 %
2002	DJIA	-	-12.20 %	-15.84 %
	S&P 500	-	-18.76 %	-28.13 %
2003	DJIA	24.10 %	-41.57 %	15.75 %
	S&P 500	24.10 %	-33.03 %	21.96 %
2004	DJIA	-	-3.76 %	-0.36 %
	S&P 500	-	19.26 %	5.31 %
2005	DJIA	-	-34.38 %	-9.61 %
	S&P 500	-	-31.99 %	-3.47 %
2006	DJIA	12.40 %	10.33 %	8.24 %
	S&P 500	12.40 %	4.29 %	3.58 %
2007	DJIA	13.04 %	-10.12 %	15.48 %
	S&P 500	13.04 %	-5.25 %	12.24 %
2008	DJIA	-	-55.81 %	-29.45 %
	S&P 500	-	-73.69 %	-26.17 %
2009	DJIA	17.21 %	-111.78 %	-7.66 %
	S&P 500	17.21 %	-108.36 %	3.63 %
2010	DJIA	10.72 %	-46.06 %	-12.80 %
	S&P 500	10.72 %	-49.23 %	-15.44 %
2011	DJIA	-	21.05 %	14.75 %
	S&P 500	-	22.13 %	10.22 %
2012	DJIA	51.63 %	3.50 %	11.06 %
	S&P 500	51.63 %	34.42 %	16.96 %
2013	DJIA	42.17 %	28.11 %	28.11 %
	S&P 500	42.17 %	25.76 %	25.76 %

Source: Patria Online, a.s. [3], Yahoo Finance [8] and own calculations

growths are positive in 1998, 1999, 2003, 2004, 2006, 2007, 2010 and 2012. On the other hand, simultaneous negative values are only in 2008. Annual US GDP growth and index growth during certain year are always analysed together with return of investment strategy in following year. TAB. 2 reports returns of investment strategies over the period from 1999 to 2013.

Stock price increases only about less than 10 % in 2000, 2001, 2002, 2004, 2005, 2008 and 2011. That is why no returns are presented by the first strategy in these years. The return of the second strategy is lower than the return of the third strategy in 20 cases, while in 8 cases it is higher. As for the first strategy and the DJIA, the highest returns are in 2012, then 2013 and 1999. These orders together with other orders of years are presented in TAB. 3.

TAB. 3: The Order of Years according to Return of Investment Strategy

Index	The first strategy	The second strategy	The third strategy
DJIA	2012, 2013, 1999	2013, 2011, 2006	1999, 2013, 2003
S&P 500	2012, 2013, 1999	2012, 2013, 2011	2013, 1999, 2003

Source: Patria Online, a.s. [3], Yahoo Finance [8] and own calculations

The return of investment strategy in 2012 is influenced by the values in 2011, specifically by the positive US GDP growth 1.85 %, positive DJIA growth 5.53 % and negative S&P 500 growth -0.003 %. Returns of investment strategies in 2013 and 1999 are influenced only by positive values. In summary, findings related to all indexes can be presented. Every investment strategy has the highest return in such year, which comes after the year with positive US GDP growth, DJIA growth and S&P 500 growth. The only one exception is negative S&P 500 growth -0.003 % in 2011.

4. Discussion

The period from 1998 to 2012 is comprised of both stable period and crisis period. The consequences of financial crisis are clear especially in 2008 and 2009 by the US GDP growth, according to Table 1. Financial crisis could influence results somehow. Market timing made in order to find the best moment when to invest in stocks, is very important

for investors. It leads to higher profits realised by investors. Investors should take account of following important fact. Some index growth during one year can be calculated already at the beginning of the following year, however GDP growth is announced several weeks or months later. The returns of the three investment strategies presented in Table 2 could be compared with returns of the potential fourth strategy. Investor would hold the stock just for one year. Corresponding returns of DJIA and S&P 500 are presented in Table 1.

Conclusion

Author found for each investment strategy, what US GDP growth, DJIA growth and S&P 500 growth during certain year corresponded to such returns in following year, which were the three highest returns of whole period from 1998 to 2013. The returns of three investment strategies were compared, namely 10 % profit strategy, strategy of holding till the first unprofitable month and strategy of holding for a half-year because of taxes. The highest return is found for each investment strategy in such year, which comes after the year with positive US GDP growth, DJIA growth and S&P 500 growth. However, negative S&P 500 growth -0.003 % in 2011 is the only one exception.

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CHANGES IN SPENDING ON HOUSING POLISH HOUSEHOLDS

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Keywords:
expenditure – households – an econometric model – income – the income situation of households

Abstract:
Consumers and their needs, set goals and motives of the management of consumers and households. The needs of household members generate demand in the market, what can you say affect the economy, but it depends on the financial capacity of individuals. In households, there are close relationships between income and consumption. This paper concerns the analysis of household expenditure on housing, home and energy. The study covers the period from 2003 to 2013 years. The main purpose of the analysis is the average monthly disposable income and expenditure on housing, on the one person in the household.

Introduction

The development of modern economic systems depends on consumer demand. Households are considered as the key unit of consumption. It is closely related to the primary purpose, namely, to satisfy all the needs of household members. Household consumption needs are met mainly by the market, and are reflected in current expenditure, especially in their structure [2, 35]. Consumption is financed primarily income and any savings. But it is the income is a major determinant of the level and structure of consumption expenditure. In the literature, there are many different theories on the effect of income on consumption. The most popular of these include: absolute income theory of John Keynes [5, 198], life-cycle theory, which is developed by Franco Modigliani, and permanent income theory of Milton Friedman [4, 88]. It should be noted that it takes a continuous process of verification of the theory of consumption,

resulting in the formulation of the next concept. Given the economic functions listed holdings, it seems important, the analysis of their financial situation.

1. Income and expenditure of households

The level of income is important differentiating factor consumption for households and is one of the strongest determinants differentiating it [3, 135]. Changes in household income over the period 2003-2013 are presented in Table 1.

TAB. 1: Nominal income in the household (PLN for 1 person)

year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
total	711.9	735.4	761.4	834.6	928.8	1045.5	1114.4	1192.8	1226.9	1278.4	1299.0
disposable income	682.9	706.3	731.8	802.4	894.5	1006.5	1071.6	1147.1	1183.6	1232.8	1254.8

Source: own calculations [1].

The data in Table 1 indicate an increase in the level of nominal income over the 11 years. Disposable income spent on expenditure on consumer goods and services and increase savings accounted for 95.9% - 96.6% of total income per person in the household. The levels of household expenditure in the period 2003-2013 are presented in Table 2.

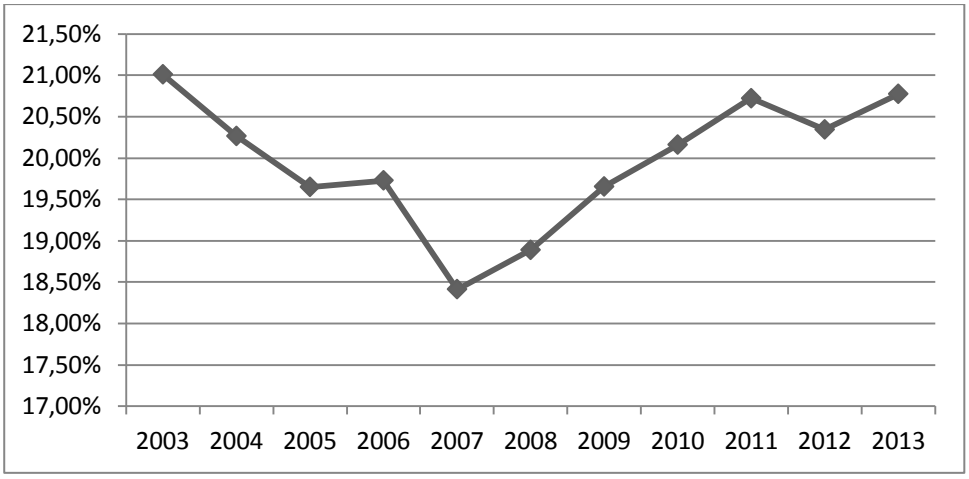
TAB. 2: Nominal household expenditure for 1 person (in PLN)

year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
total	677.8	694.7	690.3	744.8	809.9	904.2	956.6	991.4	1015.1	1050.7	1061.7
housing and energy	142.4	140.7	135.6	146.9	149.4	170.8	188.0	199.8	210.3	213.7	220.5

Source: own calculations [1].

Expenditure by households in 2013 amounted to PLN 1,061.7 per person. A significant part of the total expenditure was spent on the use of the dwelling and energy carriers. The share of these expenditures in the total expenditures is shown in Figure 1.

FIG. 1: The share of expenditure on housing in the total expenditure



Source: own calculations [1].

The smallest proportion of expenditure on housing, the total expenditure was observed in 2007 with a value of 18.41%. In view of the almost systematic increase in energy prices since 2008 is observed to rise the share of expenditure on housing and energy, and by 2013 the share of expenditure on housing, accounted for almost 21% (20.77%).
The rate of price changes were not uniform across all groups examined expenditure. During the period, the average price increase was approximately 40%. The largest increase occurred in the cost of housing and energy prices, in all the years in the level of the price index of goods and services related to housing was higher than the price index of consumer goods and services in general. Given the level of price changes were determined real income per person in the household, based on which the analysis was carried out changes in the level of expenditure in time.

2. Econometric analysis of household expenses

The basic tool used in the analysis of expenditure on housing, households in the years 2003-2013 was a linear econometric model. Using this model examined the development of the total expenditure and expenditure for the use the apartment or house and energy with respect to real income. Estimated function model adopted the following form:

$$y_t = \beta_0 + \beta_1 x_t + \xi_t \quad (t = 1, \dots, n) \qquad (1)$$

where:

y_t – monthly average monthly real total expenditure and expenditure for the use the apartment or house and energy on one person in the household;

x_t – Monthly average real disposable income per 1 person in the household;

β_0, β_1 – structural parameters of the model;

ξ_t - random parameter of the model.

Estimated regression equations were subject to detailed statistical verification. All results were obtained through calculations performed with the use of the Gretl package[1].

The results of MNK estimation of the above regression function (1) of the expenditure in real spending on housing, households in the period 2003-2013 relative to disposable income is shown in Table 3.

TAB. 3: Estimation results for the model of real spending on housing, households in the years 2003-2013

Variable	$\hat{\beta}_i$ parameter estimation	t-Student statistics	p value
Constant	29.2928	2.5943	0.02901**
Disposable income (x_t)	0.145363	12.4788	<0.00001***
R-squared = 0.945			

Source: Own study.

Based on the results shown in Table 3, the model equation for the real costs housing, the estimation took the following form:

$$\hat{y}_t = \underset{(11.3)}{29.3} + \underset{(0.0116)}{0.145}\, x_t \qquad (t = 1,\ldots,\ 11) \tag{2}$$

β_1 parameter estimation is statistically significant at the significance level of 0.05 and stands for the estimation of the final rate of substitution. It shows that the increase in disposable income of households by PLN 100 per person will increase total expenditure

[1] The study used the econometric package, Gretl 1.9.12. The installation version can be found at www.kufel.torun.pl.

of these households on average by PLN 14.5 per person with a mean error of PLN 1.16 per person.

In followed analyzed residues relationship (2). The estimation results of the extended model in real spending on housing, relative to disposable income for households are presented in Table 4.

TAB. 4: Estimation results of the extended model in real spending on housing, households in the years 2003-2013

Variable	$\hat{\beta}_i$ parameter estimation	t-Student statistics	p value
Constant	16,57	1,8078	0,11357
Disposable income (x_t)	0,13329	4,9444	0,00167***
Expenditure on housing (y_{t-2})	0,190978	1,0192	0,34205
R-squared = 0,987			

Source: Own study.

Based on the results presented in Table 4 equation model of spending in real spending on housing, after an assessment took the form of:

$$\hat{y}_t = \underset{(9,17)}{16,6} + \underset{(0,027)}{0,133}\, x_t - \underset{(0,187)}{0,191}\, y_{t-2} \quad (t = 1,\ldots, 10) \qquad (3)$$

Parameter estimations for the equation (3) are statistically significant at a significance level of 0.05. Parameter estimate indicates that an increase in total expenditure of PLN 100 two years earlier would reduce current spending on average by PLN 19 with a mean error of PLN 18.7.

3. Results

Analyzing the structure of income and expenditure of households in the years 2003-2013, we can see that:

- with the increase in real disposable income, the share of expenditure (realigned) for the use of an apartment, house and energy remained at about 20% (with the exception of 2007),
- an increase in disposable income of households of PLN 100 per person will increase total expenditure of these households an average of PLN 14.5 per person with an average error of PLN 1.16 per person,
- an increase in total expenditure of PLN 100 two years earlier, current expenditure will decline by an average of PLN 19 with an average error of PLN 18.7.

4. Discussion

The study of household expenditure involved in many of the authors. Analyses are related to the study of the structure of total expenditure or by socio-economic groups in the region. The presented results are part of the study. The next step will be testing the statistical analysis of factors not related to the level of income.

Conclusion

The resulting estimation models meet the requirements of the classical econometric verification. In the case of expenditure on housing, home and energy derived parameters indicate that the growth in real disposable income by one PLN causes an increase in these expenses by an average of PLN 1.45 per person. The proposed model in real spending on housing, households in the period 2003-2013 explains 94.5% variability of these expenditures.

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ECONOMETRIC ANALYSIS OF EXPENDITURE ON CONSUMER GOODS AND SERVICES OF POLISH HOUSEHOLD

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Keywords:
estimation models – households – expenditure on goods and services

Abstract:
The resulting estimation models meet the requirements of classic econometric verification. In the case of expenditure on consumer goods and services derived parameters indicate that the increase in real disposable income of 1 PLN causes an increase in total expenditure Polish population of 0,692 PLN. The proposed model of nominal expenditure on consumer goods and services for Polish households in years 1999-2012 explains 99.7% of the variability of spending the Polish population and 99.5% of the population province Warmia and Mazury.

Introduction

The purpose of this article is a presentation of the levels of household spending over 14 years. The level of expenditure in the early years of the period was the result of changes resulting from the lack of limitations such as lack of supply of goods. The following years also can be treated as a period of change in consumer habits, rather than arising from the supply, which in delineation of new patterns (after 2004) are often transferred from other European countries. The analysis was based on the analysis of the level of household expenditure (Poland and the province Warmia and Mazury).

1. Methods, literature overview

On consumer behavior is affected by many changes in the nature of macroeconomic and microeconomic [2][8]. Changes in the macroeconomic adjustment processes include mainly household to the requirements of the market mechanism [6]. Households are

subject functioning in an environment of trends and economic factors [7] effecting the consumption patterns. The economic environment, the level of development of a region affects the level of social welfare. The economic situation determines the purchasing power of consumers, propensity to consume or save. On the standard of living while in a direct way that most affects the income obtained. The higher it is the greater availability of consumer goods and a greater opportunity to meet the needs [1][10]. The main factor influencing the level, as well as the structure of expenditure is income [4]. Regardless of the impact of social change (even the influence of other cultures, accepting patterns of active leisure) in the consumption patterns affect economic change [5][8]. Changes in the level and pace of economic development are thus reflected in the formation of the final level of expenditure in households [9].

In the years 1999-2012 he performed yearly increase in income and consumer spending, the decreasing trend of growth (Table 1).

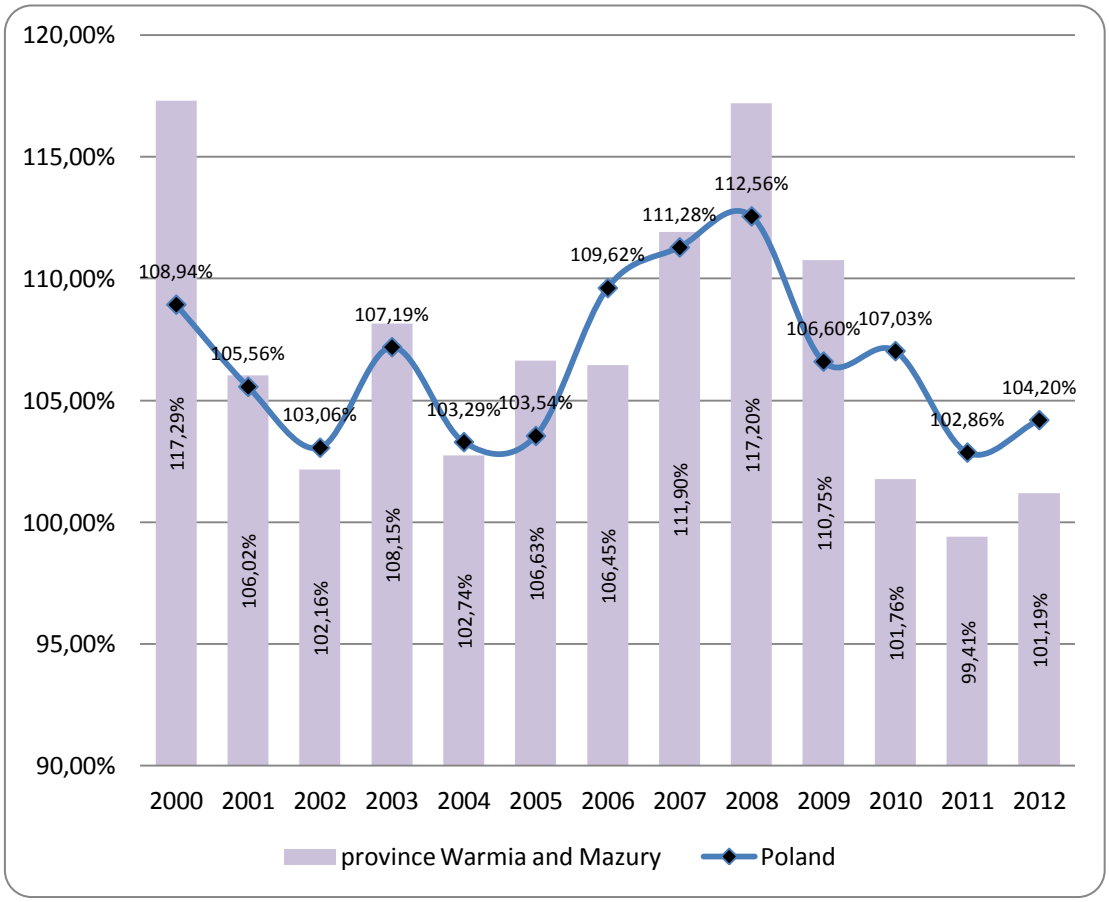
TAB. 1: Nominal Values of Income and Expenditure for the Period 1999-2012 Specification of Poland

specification	Poland					
year	income		total expenditure		expenditure on goods and services consumption	
	in PLN	% change previous year = 100	in PLN	% change previous year = 100	in PLN	% change previous year = 100
1999	560.43		549.76		530.15	
2000	610.51	108.94%	599.49	109.05%	577.62	108.95%
2001	644.48	105.56%	609.72	101.71%	585.72	101.40%
2002	664.21	103.06%	624.99	102.50%	599.20	102.30%
2003	711.96	107.19%	677.81	108.45%	648.74	108.27%
2004	735.40	103.29%	694.70	102.49%	665.63	102.60%
2005	761.46	103.54%	690.30	99.37%	660.67	99.25%
2006	834.68	109.62%	744.81	107.90%	712.56	107.85%
2007	928.87	111.28%	809.95	108.75%	775.58	108.84%
2008	1045.52	112.56%	904.27	111.65%	865.32	111.57%
2009	1114.49	106.60%	956.68	105.80%	913.86	105.61%
2010	1192.82	107.03%	991.44	103.63%	945.80	103.50%
2011	1226.95	102.86%	1015.12	102.39%	971.83	102.75%
2012	1278.43	104.20%	1050.78	103.51%	1005.19	103.43%

Source: CSO Household budgets; 1999-2012, own calculations.

Household income increased to the greatest extent in 2007 and 2008, this change was respectively 11.28% and 12.56% for the years preceding 2007 and 2008 household income for 1 person in 2007 amounted to 928.52 PLN while in 2008 - 10,045.52 PLN per 1 person in the household. The level of household expenditure in 2007-2008 has been the biggest change. Differences in the level of revenue and expenditure also depend on the region. Character of the region, depending on whether it is an agricultural region, tourism and agro-industry, plays an important role in determining the income and consumer spending levels of its residents. Changes in income Warmia and Mazury against changes in nationwide are shown in Figure 1.

FIG. 1: Change in revenue (Poland and the province. Warmia-Mazury) in% the previous year = 100



Source: CSO Household budgets; 1999-2012, own study.

In 2010-2012, the changes of income for province Warmia and Mazury were lower than changes nationwide. Since 2010, household incomes in the province Warmia-Mazury

were a few percentage points (in 2010, 5.27) lower than the changes in the average income of Polish households.

2. Econometric analysis of household expenditure

The main instrument used in the analysis of household expenditure in the period 1999-2012 was linear econometric model. Using this model examined the development of the total expenditure and expenditure on consumer goods and services relative to nominal income. The estimated model function took the following form:

$$y_t = \beta_0 + \beta_1 x_t + \xi_t \quad (t = 1, \dots, n) \tag{1}$$

where:

y_t – average monthly nominal total expenditure and expenditure on goods and services consumption per person in the household,

x_t – average monthly nominal disposable income for 1 person in the household,

β_0, β_1 – structural parameters of the model,

ξ_t – random parameter of the model.

Estimated regression equations were subject to detailed statistical verification. Models were assessed in terms of parameter significance (Student's statistics), adjustment of the model to empirical data (adjusted determination coefficient $\overline{R}^2$ and coefficient of random variation V_ξ) and stochastic assumptions of the model[1]. All results were obtained through calculations performed with the use of the Gretl package[2].

The results of MNK estimation of the above regression function (1) of total household expenses in relation to income is presented in Table 2.

[1] Those assumptions included autocorrelation of random parameter (Durbin-Watson test), normality of random parameter distribution (Doornik-Hansen test), heteroscedasticity of the remainder variance (White test) and linearity of the examined relation (Ramsey RESET test).

[2] The study used the econometric package, Gretl 1.9.12. The installation version can be found at www.kufel.torun.pl.

TAB. 2: Estimation results for the model of total real expenses in households in 1999-2012

specification	Variable	$\hat{\beta}_i$ parameter estimation	t-Student statistics	p value
Poland	Constant	171,113	17,72	5,69e-010 ***
	nominal income (x_t)	0,692	65,36	1,09e-016 ***
	$\overline{R}^2 = 0{,}996$			
Province. Warmia-Mazury	Constant	181,361	18,33	3,86e-010 ***
	nominal income (x_t)	0,629	52,59	1,47e-015 ***
	$\overline{R}^2 = 0{,}995$			

Source: own study.

On the basis of results presented in Table 2, the equation for the model of total expenses after estimation took the following form:

$$\hat{y}_t = \underset{(9,65)}{171{,}113} + \underset{(0,010)}{0{,}692}\, x_t \quad (t = 1,\ldots 14) \tag{2}$$

Parameter estimate is statistically significant at the significance level of 0.05 and represents an assessment of the marginal rate of substitution. It indicates that the increase in disposable income of Polish households with 100 PLN per person will increase the total expenditure of these households an average of 69.2 PLN per person with an average error of 0.010 PLN per person. Equation model of total expenditure for households Warmia-Mazury took the following form:

$$\hat{y}_t = \underset{(9,89)}{181{,}361} + \underset{(0,011)}{0{,}629}\, x_t \quad (t = 1,\ldots 14) \tag{3}$$

Based on the equation (3) can be concluded that overall spending will increase by 62.9 PLN for one person in a household where the income will increase by 100 PLN per person in the household. In the case of total expenditure of households, adjusted coefficient of determination takes the value 0.995, therefore, used the regression function in 99.5% explains the formation of these expenditures. The results of model estimation of expenditure on consumer goods and services are shown in Table 3.

TAB. 3: The results of model estimation of expenditure on goods and services to households for consumption in the years 1999-2012

specification	Variable	$\hat{\beta}_i$ parameter estimation	t-Student statistics	p value
Poland	Constant	169.306	18.77	2.92e-010 ***
	nominal income (x_t)	0.656	66.38	9.06e-017 ***
	$\overline{R}^2 = 0{,}997$			
Province. Warmia-Mazury	Constant	182.494	20.46	1.07e-010 ***
	nominal income (x_t)	0.595	55.22	8.2e-016 ***
	$\overline{R}^2 = 0{,}995$			

Source: own study.

Equation model of spending on consumer goods and services for Polish households have adopted the following form:

$$\hat{y}_t = \underset{(9{,}019)}{169{,}306} + \underset{(0{,}009)}{0{,}656}\, x_t \quad (t = 1,\ldots 14) \tag{4}$$

The results of parameter estimation of Polish households can be concluded that the increase in per capita income of these households by 1 respectively. Cause an increase in their spending on consumer goods and services by 0.65 PLN per person, with an average error of 0,009 zlotys per person.

Adjusted coefficient of determination indicates a very good fit of the model. Used regression function explains 99.7% of the expenditure on the development of consumer goods and services.

The regression for households Warmia and Mazury, based on the results of the estimation of the model (table 3) takes the form:

$$\hat{y}_t = \underset{(8{,}920)}{182{,}494} + \underset{(0{,}010)}{0{,}595}\, x_t \quad (t = 1,\ldots 14) \tag{5}$$

The coefficient of determination indicates a good fit. In the case of expenditure on consumer goods and services households Warmia-Mazury value at the time variable t

(0.595) indicates that the increase of income for these households 100 PLN, will increase spending by 59.5 PLN per person in the household.

Conclusion

The resulting estimation models meet the requirements of classic econometric verification. In the case of expenditure on consumer goods and services derived parameters indicate that the increase in real disposable income of 1 PLN causes an increase in total expenditure Polish population of 0.692 PLN, while for residents of province Warmia and Mazury of 0.629 PLN. The proposed model of nominal expenditure on consumer goods and services for Polish households in years 1999-2012 explains 99.7% of the variability of spending the Polish population and 99.5% of the population province Warmia and Mazury.

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TEACHING QUEUING THEORY BY USE OF CASE STUDIES

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Keywords:
Queue theory – case studies – simulation – teaching – VBA

Abstract:
Tuition of queuing theory can be made easy by using of a case study modelling operation of a bank branch. This article contains tutorial comprising a model of a bank branch that includes basic characteristics of stochastic process of queuing of customers according to the operation with several bank counters. These characteristics are as follows: mean expectancy, mean time spent in the bank, mean length of queue, exploitation of counter staff. The tutorial also includes simulation model dissimulating the bank customers´ activities including animation of their arrivals, queuing and departures. The tutorial imitates bank branch operation during opening hours: for every time segment of the working hours there is possible to set the number of open counters and the rate of customer arrivals.

Introduction

Queuing theory as a part of operational research is the application of scientific approach to the solving complex managerial problems. It describes queuing in front of service unit provided that the customers enter the service system in a random way with known distribution of time between arrivals (exponential distribution is used most frequently) and service time is also supposed to have a given distribution. In case of exponential distribution of the time between arrivals of the customers is the parameter of this distribution denoted as λ and its value equals mean of arrivals per unit of time. If the service time is exponentially distributed with parameter μ then the mean of service time equals $1/\mu$. Given that both parameters are assessed by means of statistical estimation, then the queuing theory can supply values of certain quantities, such a mean

expectancy, mean time spent in the bank, mean number of queuing customers, exploitation of counter staff etc. Evaluation of these quantities can be made by means of mathematical model under certain presumptions and for specific distributions of times between arrivals and departures and for specific distributions of service time. Nevertheless, the theory is rather challenging from the mathematical point of view and it demands preliminary knowledge of statistics and probability theory. Less mathematically exacting approach is to use simulation of the service system. Simulation consists in computer-generated customers of the service system including generating their arrival times and service times. These random values can be created by the quasi-random numbers generator for a given distribution with given parameters. Special simulation languages can be used for facilitating simulation method. These languages allow to create simulation, administer the queue creation process and to evaluate the whole simulation experiment to obtain required information and quantities. Mathematical models as well as simulation methods and languages are difficult to understand for both the students of economics and non-academics. At the Department of Econometrics of University of Economics, Prague was therefore developed a software program in the framework of VBA and MS Excel which enables to comprehend the matters connected with a service system by the help of a case study of a bank branch operation with optional number of counters during the working day. The case study enables evaluation of the service system parameters by both the mathematical model and simulation experiment.

1. Methodology

There are many publication dealing with using case studies in teaching process [1], [4]. The students' ability to use the theoretical background for solving real-world instances provides them high competitiveness level on the labor market. Because the university environment allows to students only a limited contact with practice, they mostly cannot verify the usefulness of modeling techniques and methods. Sarker and Newton [6] and other authors [2], [3], [5] present practical aspects and difficulties of problem solving. A number of case problems are provided, e.g. crop planning problem, power generation, water supply, logistics problems, etc. In addition, the authors present the data-collection and data-preparation methods for model solving and discuss their relevant issues.

2. Results

The proposed simulation programme with application to a case study concerning operation of a bank branch is allocated to presentation of the course Operation Research at the Faculty of Informatics and Statistics of the University of Economics. Considering the theoretical explanation of the queuing theory and simulation methods is exacting for students this programme enables a better comprehension of the matters of the queuing theory and the techniques of the simulation experiments. Another important contribution of the above mentioned programme is an example of the utilisation of the queuing theory proven on the case study of the operation of a bank branch. On the seminars to the course Operation Research there is a possibility to experiment on the programme, to compare results obtained by exploitation of the mathematical model and on a basis of the simulation experiment, and to examine the difference in results dependent on the length of simulation. Furthermore, during seminars there is possible to experiment with the frequency of arrivals of customers, the number of open counters in various time intervals during the day and to examine the influence of those changes to the length of the forming queue, to the duration of the waiting time and to the degree of utilization of the counters. Especially the utilization of the bank counters is the important information for the bank management in light of operation economy.

The programme is also used in doctoral studies and in MBA studies, as the verification of the field exploitation of the queuing theory is very important for workers outside the academic milieu. On account of the long-time utilization of the programme it is evident that it is a contribution to the teaching process and it significantly supports the comprehension of the matters of the queuing theory and simulation techniques and it provides information on practical utilization of this theory.

Presented program comes from the queuing theory and yields mathematically deduced values of parameters. On the other hand, it provides results of the simulation experiment.

In the mathematical model used in the program it is supposed:

- Exponential distribution of time elapsed between bank customer arrivals, parameter λ of that distribution represents mean number of incoming bank customers per a unit of time. This parameter can be put in separately for every hour of the working time of the bank (opening hours from 9:00 a.m. till 6: 00 p.m. are presupposed) or it can be modified by choosing rate of operation following a given scale and the number of branch band customers.
- Exponential distribution of service time; parameter μ of this distribution represents mean number of customers served at one counter per hour.

Numbers of open counters in subsequent hours of the working day from 9:00 a.m. till 6:00 p.m. are additional input parameters. This number can be experimentally changed in order to evaluate the influence of increasing or decreasing the number of open counters on the value of the queue length or the level of exploiting of counters.

The characteristics of the mathematical model are as follows (per one service unit):

$$E\mathit{T}_{\mathbf{S}} = 1/(\mu - \lambda) \quad \text{and} \quad E\mathit{T}_{\mathbf{F}} = \lambda \cdot / \cdot (\mu \cdot (\mu - \lambda)) = \rho \cdot E\mathit{T}_{\mathbf{S}} \qquad (1)$$

For the mean number $E\mathit{N}_{\mathbf{S}}$ and $E\mathit{N}_{\mathbf{F}}$ customers in the service system and in a queue (i.e. $E\mathit{N}_{\mathbf{F}}$ is the mean queue length), so called "little formulae" are valid:

$$E\mathit{N}_{\mathbf{S}} = \lambda \cdot E\mathit{T}_{\mathbf{S}}, \quad E\mathit{N}_{\mathbf{F}} = \lambda \cdot E\mathit{T}_{\mathbf{S}} \qquad (2)$$

In case of more service units, the similar more complicated formulae are valid.

For simulation experiment, it is necessary to input the length of simulation in days, i.e. how many days of simulation are needed to statistically estimate the values of characteristics of the simulation (mean customer waiting time, mean length of queue, etc.) from the data of all customers (waiting time of particular customer, queue length of particular customer, etc.). The larger number of simulation days, the more precise estimates of characteristics.

Besides computation and estimation of characteristics, the program enables visualization and animation of simulation process. One can see customers entering the bank branch, waiting in a queue and leaving the bank branch, in accelerated running of time, from 9:00 a.m. till 6:00 p.m. The rate of acceleration can be preset.

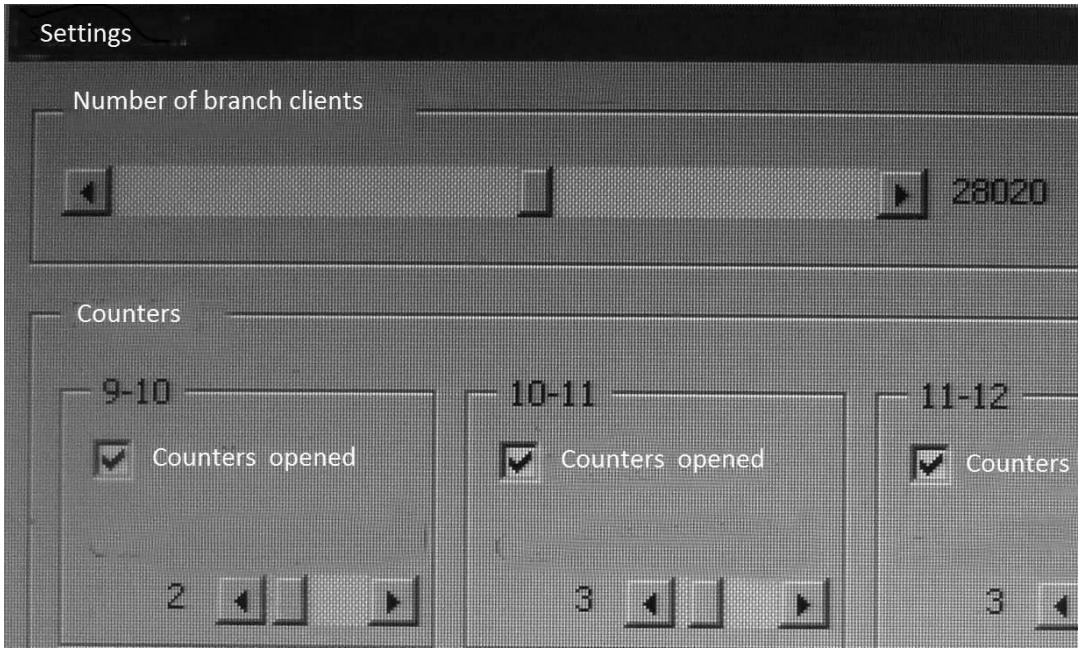
Described model of customer servicing in a bank branch includes the following input parameters:

TAB. 1: The range of input values

Parameters	Range of input data
Bank branch client number	10..50000
Intensity of serving	< 0; ∞ >
Rate of operation (traffic density) level	1..6
Number of opened counters	0..15
Overall number of working days	1.. ∞

Source: Authors´ own data

FIG. 1: The form "Settings" – upper left section



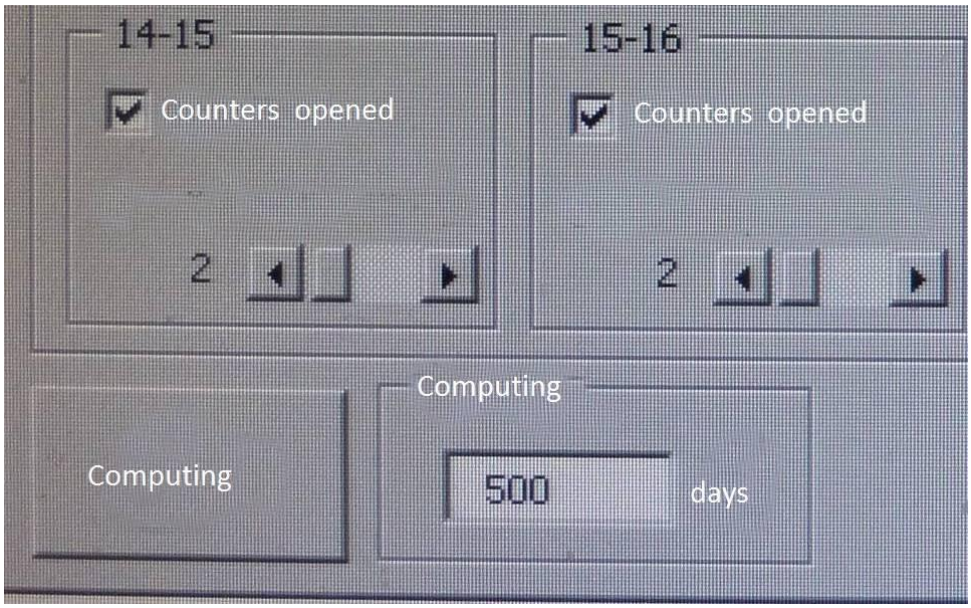
Source: Authors´ photo

FIG. 2: The form "Settings" – upper right section

Source: Authors´ photo

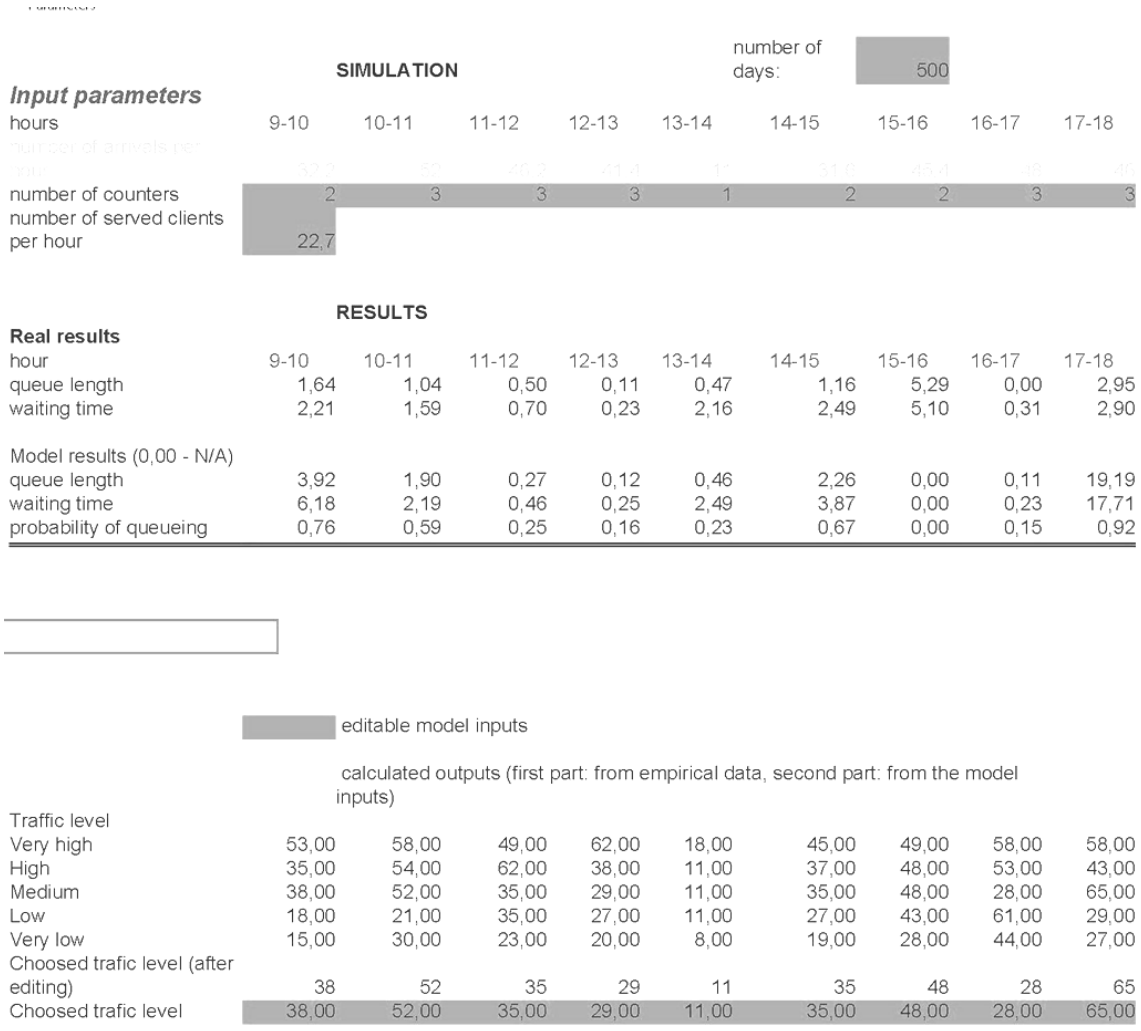
The using of the model is as follows. After launching of the program simulace_VSE.xls, a leaf Setting-Results Switch appears, blank except a button Settings. After pressing the button, the form Settings is opened: Values of all the parameters in the above form can be changed, either by typing or by drawing a scroll box. See the Tab. 1 for the range of values. After changing parameters´ values, recalculations are executed by button Computing. The new values appear in the leaf Parameters also.

FIG. 3: The form "Settings" – lower left section



Source: Authors´ photo

FIG. 4: The leaf "Parameters"



SIMULATION

number of days: 500

Input parameters

hours	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18
number of counters	2	3	3	3	1	2	2	3	3
number of served clients per hour	22,7								

RESULTS

Real results

hour	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18
queue length	1,64	1,04	0,50	0,11	0,47	1,16	5,29	0,00	2,95
waiting time	2,21	1,59	0,70	0,23	2,16	2,49	5,10	0,31	2,90
Model results (0,00 - N/A)									
queue length	3,92	1,90	0,27	0,12	0,46	2,26	0,00	0,11	19,19
waiting time	6,18	2,19	0,46	0,25	2,49	3,87	0,00	0,23	17,71
probability of queueing	0,76	0,59	0,25	0,16	0,23	0,67	0,00	0,15	0,92

editable model inputs

calculated outputs (first part: from empirical data, second part: from the model inputs)

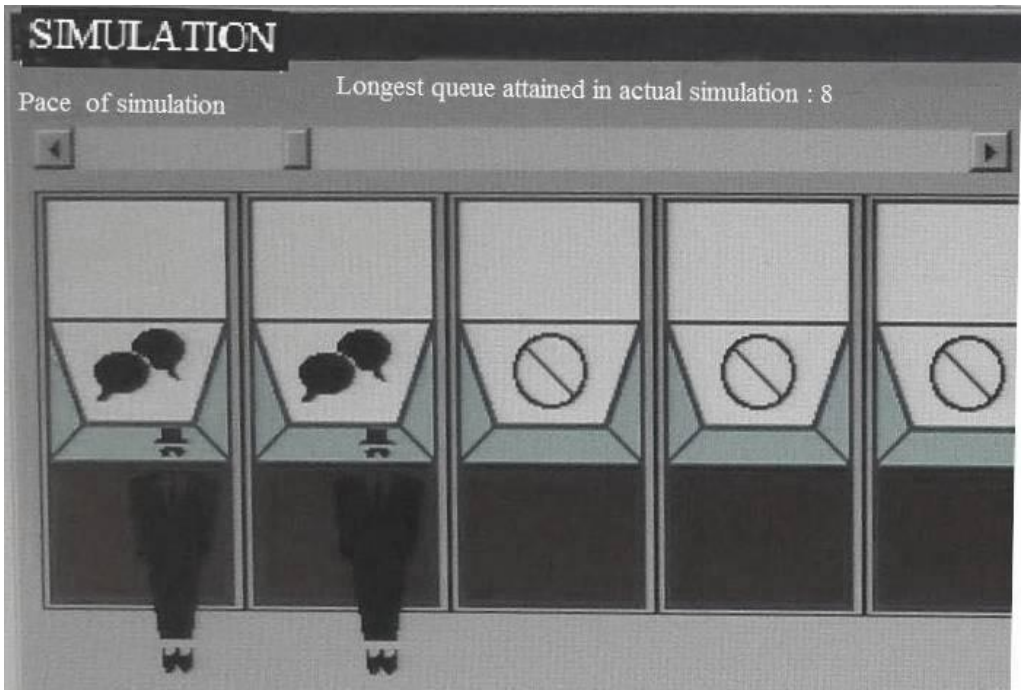
Traffic level									
Very high	53,00	58,00	49,00	62,00	18,00	45,00	49,00	58,00	58,00
High	35,00	54,00	62,00	38,00	11,00	37,00	48,00	53,00	43,00
Medium	38,00	52,00	35,00	29,00	11,00	35,00	48,00	28,00	65,00
Low	18,00	21,00	35,00	27,00	11,00	27,00	43,00	61,00	29,00
Very low	15,00	30,00	23,00	20,00	8,00	19,00	28,00	44,00	27,00
Choosed trafic level (after editing)	38	52	35	29	11	35	48	28	65
Choosed trafic level	38,00	52,00	35,00	29,00	11,00	35,00	48,00	28,00	65,00

Source: Authors´ own data

Simulation mode is then switched by button Simulation. Simulation form is then appears. See Fig. 5-6. Simulation is launched by the green button and it is stopped by the red button in the form Simulation. The pace of simulation can be preset by the scroll box. Duration of the simulation is according the preset pace between 10 seconds and 18 minutes. The simulation manifests the operation during a workday in the bank branch, i.e. between 9:00 a.m. and 6:00 p.m. The length of maximal queue during the day is stated in the top of the form. The time is manifested continuously. In the scheme of the bank branch, the 15 counters are depicted. Open counters without clients are denoted by ears, open counters with customers are denoted by a pair of table tennis bats

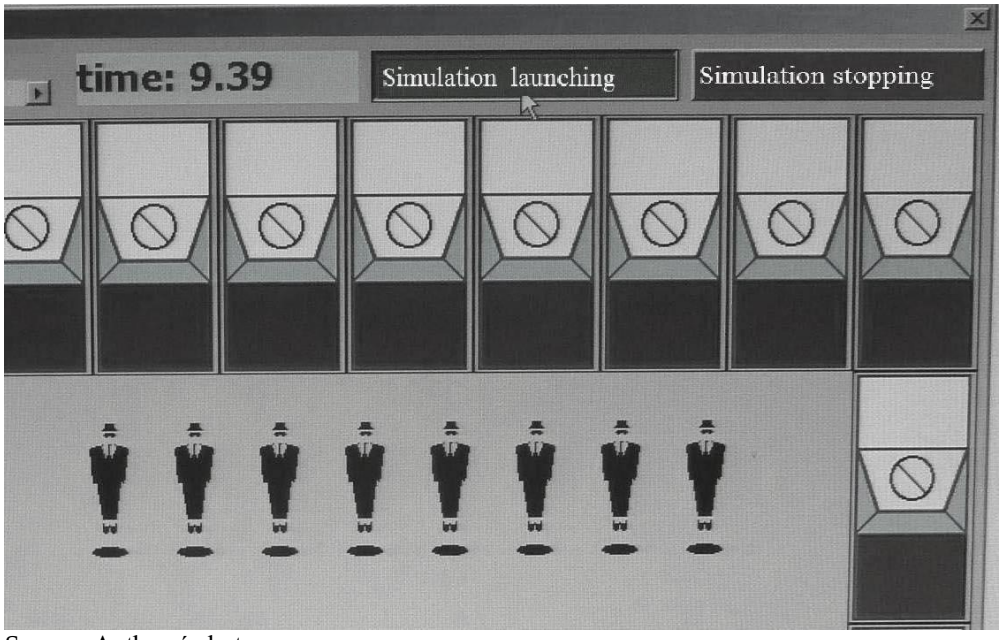
and a figure. Closed counters are denoted by bisected circle. Actual queue is represented by a row of figures.

FIG. 5: The form "Simulation" - upper left section



Source: Authors´ photo

FIG. 6: The form "Simulation" - upper right section



Source: Authors´ photo

Conclusion

Education program for the demonstration and experimenting with applied queuing theory on the case study of a bank branch operation is presented. This program can be also exploited by a bank branch staff for analysis of the bank branch operation with a change of counter number, client numbers and other parameters without knowledge of theoretical background on which the program is based. Programme is used in teaching in both the present and doctoral studies and it constitutes considerable enhancement of teaching process both in interpretation of theory and in approach to exploitation in practise. Integral component of tuition of theoretical subjects, especially of operations research, is the demonstration how the theory can be used in practice. Case studies play important part in this exposition. The case study described in this paper enables students´ contact with real-life problems without their real contact with enterprises and companies.

Acknowledgements:

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THE INFLOW OF FOREIGN DIRECT INVESTMENT INTO THE CZECH REPUBLIC: FOREIGN INVESTORS IN THE ÚSTÍ REGION

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Keywords:
foreign direct investment – investor – region

Abstract:
The articles is focused on analyze of inflow of foreign direct investment into the Czech Republic and Ústí Region The aim will be to identify regional differences in the inflow of foreign direct investment and to assess the position of the Ústí Region among other regions of the Czech Republic. The analyses are based on data from the database of foreign direct investment (Czech National Bank), which is used for the assessment of regional variations and at the same time the attractiveness of individual regions for investment. The role of foreign direct investment within the Czech economy is significant. Foreign direct investment in the Czech Republic is unevenly distributed. The Ústí Region, despite long-term structural problems, is an attractive region for investment.

Introduction

The creation of investment in the Czech Republic is closely linked with the influx of foreign investment, that is, from businesses fully or partially controlled from abroad. The role of these bodies within the Czech economy is significant. In some industries today the representation of foreign manufacturers in production or employment prevails over that of domestic companies. Foreign direct investment in scientific research is evaluated from various points of view, where in regional research connected with foreign investment the theme of analysis of local politics and development often emerges [11, 65]. In the case of analyses dealing with the influx of foreign direct investment into individual states, studies have been published on the Czech Republic, the penetration of foreign direct investment into the Czech economy in

a macroeconomic [4, 23] or regional context [1, 9]. Growth is important what share the Czech economy manages to create in the global chain of added value [8, 70]. A further series of analyses has been compiled at a regional level concerning regional variations in the inflow of foreign investment into the Czech Republic. The works [12, 195] and [6, 192] note a substantial imbalance in the distribution of foreign direct investment in the Czech Republic where a higher influx of direct foreign investment is seen in metropolitan areas and more advanced regions with a higher economic level.

1. Methodology

The research aim of this article is to carry out an evaluation of the development processes at a regional level within the Czech Republic focusing on an analysis of the development of the Ústí Region. Special consideration is given to the role of foreign direct investment in regional economics and an assessment of regional variations in the inflow of foreign direct investment into regions, which is one of the key criteria for monitoring the openness of regional economies. The analyses are based on data from the database of foreign direct investment (Czech National Bank), which is used for the assessment of regional variations and at the same time the attractiveness of individual regions for investment. In this case the cumulative inflow of foreign direct investment to 2012 is observed, recalculated for jobs within the region. The aim will be to identify regional differences in the inflow of foreign direct investment and to assess the position of the Ústí Region among other regions of the Czech Republic.

2. The inflow of foreign direct investment into the Ústí Region

The Ústí Region as a structurally affected region is characterized by a range of demographic and socioeconomic indicators [7, 145] which, in comparison with data on the Czech Republic, point to the weaker level of the region, e.g. a higher level of unemployment, an inferior educational structure and the still existing traditional industrial foundation and extensive brownfields. A large share of the workforce is still employed in stagnating and attenuating industries (mineral extraction or heavy and, in particular, chemical industry). Analyses of regional disparity and regional competitiveness show the Ústí Region in the weakest competitive positions [10, 139].

TAB. 1: Volume of foreign direct investment per person in 2012 in the Czech regions (EUR)

	Total (thousand Euros)	FDI/per labour force
Czech Republic	103 455 729	21 155
Prague	55 105 348	85 092
Central Bohemian Region	12 070 155	19 353
South Bohemian Region	3 503 165	11 867
Plzeň Region	2 894 428	10 442
Karlovy Vary Region	628 717	4 536
Ústí Region	3 328 129	9 399
Liberec Region	2 437 639	12 578
Hradec Králové Region	2 164 079	8 547
Pardubice Region	1 981 464	8 354
Vysočina Region	2 007 906	8 651
South Moravian Region	6 669 023	12 403
Olomouc Region	1 287 948	4 470
Zlín Region	1 954 415	7 271
Moravian-Silesian Region	7 423 315	13 671

Source: own work based on data from the Czech National Bank [3].

If we follow the inflow of foreign direct investment by region, in the case of total volume of foreign direct investment in 2012 (see Tab 1), among all of the regions, Prague, where new quaternary and quintenary activities are concentrated, clearly dominates, which is similar in other central European metropolises. Comparison of other regions against Prague in the field of the influx of foreign investment is somewhat inadequate since Prague, as the capital city with the seats of central branches of foreign companies, is in a different situation. The position of the Ústí Region in comparison with other regions is rather above average. After Prague and the Central Bohemian region, it ranks roughly together with the Liberec and Plzeň regions in third place.

When recalculating the volume of foreign direct investment in jobs it belongs among the more successful regions where the level of foreign direct investment ranges above the average of Czech regions (excluding Prague, into which approximately half of the total volume of FDI flows), which would significantly affect comparison with other Czech regions).

Strengthening of the north-eastern area of the country (except the Karlovy Vary Region) is given by investment into existing industrial businesses, geographic location, as well as by significant localisation of so-called incentive investors thanks to the system of investment incentives. Besides the large cities and metropolitan areas, areas in border regions were also attractive from the perspective of foreign companies, which is especially evident at a regional level. Nevertheless, within the Czech Republic a polarity between its eastern and western parts, that is, between Bohemia and Moravia, emerges, indicating a higher inflow of foreign direct investment to the west of the Republic.

It can be noted that foreign direct investment in the Czech Republic is concentrated in a significantly disproportionate manner, particularly in regions with a higher economic level or which are more urbanised. Together with the aforementioned differences it manifests itself in the long term and encourages the growth in regional differences between metropolitan areas and other parts of the country. Equally, the correlation of creation of fixed capital and the volume of foreign direct investment reaches a relatively high level and indicates a dependence on both variables.

3. Localisation of foreign direct investment in the industry in the Ústí Region

Foreign direct investment has an effect on the transformation of the manufacturing industry, during which the progression of employment in the field indicates a developmental tendency in the organisation of the regional economy as well as indicating the attractiveness of individual industries for foreign investment [5, 38]. Between 2001 and 2010 the number of employees in the manufacturing industry in the Ústí Region grew continuously. The absolute number rose from 49,000 in 2001 to 54,000 in 2008. Due to the crisis a decline occurred, which would stabilise in 2010 at a number of 44,000 workers with a slight growth in 2011.

The development of employment in the industry ran relatively divergently among individual industries. The growth did not concern all branches. In the structure of the field of the manufacturing industry some branches would undergo a long-term depression, e.g. the food or textile industries, whose proportion of employment would fall from 12.23% to 5.42% in 2011. The need for a complex transformation of the structurally afflicted Ústí Region confirms the importance of foreign investment, which

is a tool for the conversion of the economic foundation. Foreign investment has the potential to develop new fields in the region, such as manufacturing operations with innovative technology. It also has high export potential with which it can facilitate the attainment of higher competitiveness in the Ústí Region.

TAB. 2: Foreign investors in the Ústí Region

industry	FDI by sector in %	investment*	jobs	largest investors (by amount of investment)
automotive	43.2	37,553.0	1,334.7	Nemak Europe, Koito automotive, AGC Czech,
wood processing		935.6	45.1	Europahaus-Holzindustries s.r.o.
electronics, electro technical	10.7	9,323.6	402.1	IPS Alpha Technology, Hitachi Home Electronics, CANDY
metal processing, metallurgical	2.3	1,988.3	88.1	Sandvik Precision Tubes Chomutov, Kos Wire, Alcan Děčín
rubber, plastics	7.7	6,658.7	300.9	RAI MOST, Simona Plast-Technik
chemical	3.5	3,050.4	124.4	Air products, Jotun Powder Coatings AS
papermaking	4.5	3,877.7	152.0	Mondi Packaging Paper, Euro-Druckservice
food processing	5.3	4,598.0	211.1	Tivall CZ,SHANGHAI MALING (CZECH), CzechPak Manufact.
glass	8.1	7,006.3	231.8	Glaverbel Czech, AGC Automotive Czech, Pittsburgh Corning
construction materials	1.6	1,385.8	56.3	Wienerberger International, ITS Ceramiche, Hoppe
engineering	6.7	5,827.4	215.2	Black & Decker, Kolbenschmidt, KONE Industrial
textiles	2.5	2,172.3	68.5	Schoeller, Radici, Logit
other	2.5	2,135.4	64.2	Donaldson Torit, R. B. Farquhar, Brush Engineered Materials

Source: Agentura Czechinvest, http://www.czechinvest.org/podpora-investic, own processing of data; * investment in millions of CZK, **aggregate volume of investment in industries recalculated per 1 job;

A breakdown of investors by field (see Table 1) confirms a very high inflow of foreign direct investment into the automotive industry in the Ústí Region. Though no final producers are based in the region, a range of foreign investors have localised themselves in the area. The dominance of foreign investors in this industry can also be determined when evaluating other industrial fields in which large firms integrated in the automotive production chain operate (e.g. in the plastics branch of the company RAI, Most – production of dashboards, or in the glass concern AGC – production of windscreens).

Investment from the field of electronics and electronic components and production constitutes the second most significant representation. Following these, are further located the rubber/plastic and glass industries, where there is a strong representation of businesses oriented towards the production of components for the automotive industry, e.g. AGC Automotive (windscreen manufacture) or RAI, Most (manufacture of dashboard components). Representation of other industries is relatively even. The structure of investment points towards a low attractiveness of traditional extraction and heavy industry and other related areas.

Conclusion

The position of the region among other regions over the observed period stabilised which may be interpreted as its having overcome the largest economic problems in its transformation in the late 1990s and after the year 2000. The inflow of foreign direct investment significantly affected the course of structural changes and contributed to increased competitiveness in the region's economy. Signs of certain recovery in the preceding years could signify a turnover in the inflow of foreign investment to which public politics and its system of incentives for foreign investors should also react.

Underestimating new developmental tendencies which have strategic significance for strengthening the Ústí Region's ability to compete could result in a stagnation of economic growth at a regional level and a lag in strategic areas of the economy (e.g. in the development of innovation) in the future. The Ústí Region should be based on the development of networks which, through foreign investors, will continue to integrate the regional economy into interregional and global production networks [2, 278; 8, 253]. The revitalisation of the Ústí Region should continue in the trend of reduction in the proportion of traditional industrial branches in favour of new industries which, in the context of other necessary economic and social changes, place particular demands on the requalification of the workforce reforms of the regional education system and the attractiveness of the region and local autonomy.

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THE DEBT SERVICE OF THE MUNICIPALITIES AND ITS IMPACT ON THE FINANCIAL MANAGEMENT OF THE MUNICIPALITIES IN SLOVAKIA

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Keywords:
debt service – Pearson's coefficient – financial management – the municipality – modelling using trend lines

Abstract:
The aim of this paper is to evaluate the development of the debt service of the municipalities in Slovakia. Parameters which are evaluated in the article are parts of the methodology of authors Vomočil – Hájek – Olej, 2007 [3] who suggested these parameters for the evaluation of the financial credibility of the municipalities in the Czech Republic. These indicators will be evaluated in conditions of the Slovakia in time period 2005-2013. For the analysis of selected indicators we used modelling via trend lines and we also analysed the relationship between total revenue of the municipalities and capital expenditure of the municipalities through the Pearson coefficient.

Introduction

In the Act. No 583/2004 about financial rules of the local self-government it is defined the total amount of debt of the municipality as the sum of the aggregate liability arising from the repayment of the repayable sources of financing, from the investment of the commitments of supplier credit and from the guarantee commitments of municipality. Effective from January 1st, 2014 into the total debt the municipality do not include loans granted by the Audiovisual Fund, hereinafter from the repayable funds of financing taken to ensure the implementation of the pre-financing of joint programs by Slovak Republic and the European Union, operational programs within the European territorial cooperation and programs which are funded under international contracts, with the ceiling of an maximum amount of the grant awarded. Within the amendment

the abovementioned Act with effect from January 1st, 2015 the new rules will be applied which tight up the conditions of the indebtedness of the municipality over the 50% of the actual current incomes of the previous financial year, with the consequent obligations take measures to reduce the total debt of the municipality.

The highest annual debt service (throughout the period of debt amortization) should be equal to the lowest amount of planned surplus in the current budget as to minimize the risk to repay the debt. In the recent years, is increasingly talking about the regulation of the municipal debt, because it is a part of the public debt [2].

1. Methods

The aim of this paper is to evaluate the development of the debt service of the municipalities in Slovakia. Financial parameters *d*1, *d*2, *d*3 evaluated in this article, are parts of the methodology of authors [3] who suggested these parameters for the evaluation of the financial credibility of the municipalities in the Czech Republic. The selected indicators have been slightly modified, respectively adapted to the conditions of the Slovak Republic.

Let's denote the following sum of „debt service" as

DS = pay the interest + pay on the loan payment + financial operations of expenditures (1)

Then first analysed indicators will be

$$d1 = \frac{\text{debt service}}{\text{cureent incomes}} \tag{2}$$

According to the authors the value of the parameter d1 above 0.15 can be considered as a signal of impend the debt trap.

The next indicator in analysis is

$$d2 = \frac{\text{d1}}{\text{number of inhabitans}} \tag{3}$$

This parameter (according to the authors of the paper [3]) measures the gross level of indebtedness of municipalities, i.e. debt per one inhabitant.

For comprehensive evaluation of debt service, we decided to add the indicator d3 which is not a part of the mentioned methodology. This indicator brings us a view on the debt service in terms of the percentage share of debt in the total expenditure of the municipalities. Thus, the following indicator in analysis is

$$d3 = \frac{\text{debt service}}{\text{total revenues}} \cdot 100 \tag{4}$$

In addition, we investigated the correlation between total expenditures and capital expenditures. We know that two random variables X and Y are correlated if the values of one variable tend as values of the second variable. Cross-values correlation is expressed by the Pearson coefficient (5) and is based on variances of n pairwise correlation of pairs of values (xi, yi) compared to the sample average values ($\bar{x}$, $\bar{y}$). The correlation coefficient rx,y is within the interval (-1, 1). The higher the absolute value of rx,y is, the correlation within values is tighter. A positive correlation coefficient expresses a positive relationship between variables; a negative value expresses a negative correlation between variables. If the value reaches 0, there is not a linear relationship between variables [1].

$$r_{x,y} = \frac{\sum_{n=1}^{n} (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n} (x_i - \bar{x})^2 \sum_{i=1}^{n} (y_i - \bar{y})^2}} \tag{5}$$

Data of selected parameters represent the time series. For the analysis we used tools of MS Excel for adding of data with trend lines. Modelling by trend lines is used if the trend of data corresponds to some known function (e.g. linear, quadratic, power type, exponential, logarithmic). The corresponding trend line illustrates the changes of existing data or forecasts of future data.

We present detected trend lines on figures in the part with results. Analysed parameters are estimated by the equation of trend curve with the coefficient of the reliability R^2. This coefficient expresses how much of the total variability is explained by the relevant endogenous variable of a model. The trend line is the most accurate if the value of the reliability coefficient is close or equal to the number 1.

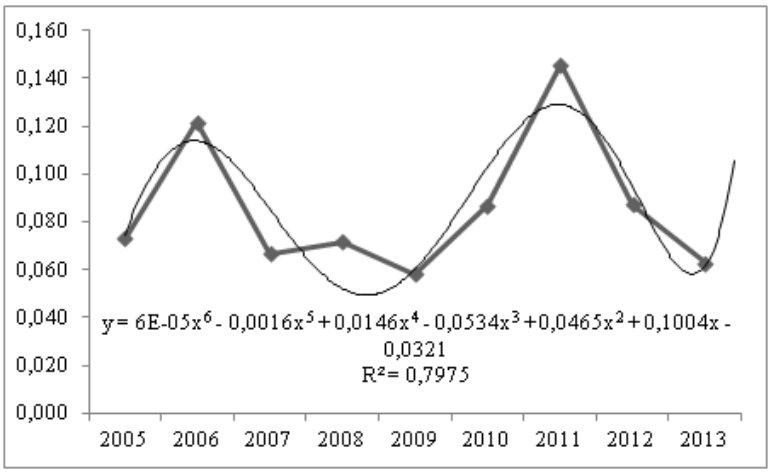
Indicators d1 – d3 are evaluated in time period 2005-2013. The reason for the choosing this period was the fact that in 2005 was fiscal decentralization in Slovakia which changed the method of financing of the municipalities and in this period we can monitor the impact of the financial crisis, as well.

The data for analysis were obtained from the Ministry of Finance of the Slovak Republic from the state final account. The article reviews the development of the financial credibility of all the municipalities in Slovakia (it is the cumulative assessment).

2. Results

From the evaluation of the share of debt service on current incomes (seen from Figure 1) follows that even one year of the analysed period did not exceed the value of 0.15). According to the authors of the applied methodology, this value indicates starting of the debt trap. The lowest point of the indicator was in 2009 (0.058) which was due to a decrease debt burden of the municipalities compared to the previous year. The highest value of the indicator was reached in 2011 (0,146), due to the increase in debt burden. Also in this year the current incomes of the municipalities has increased.

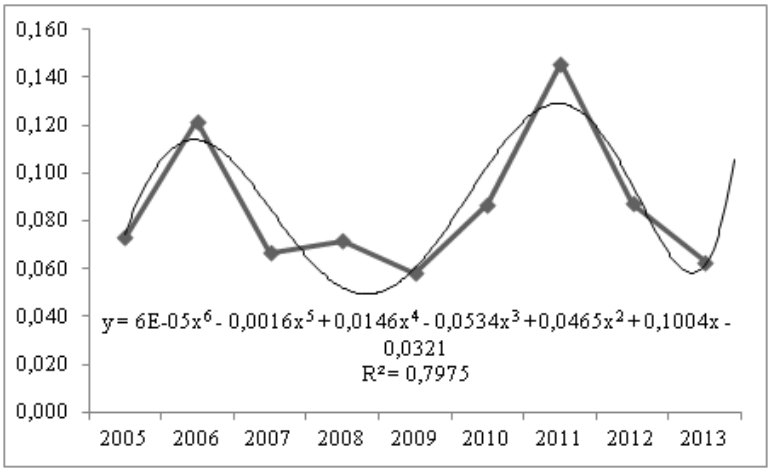
FIG. 1: The development of the indicator d1 and its prediction



Source: Ministry of Finance of the Slovak Republic, own processing

To analyse indicator d1 we used a polynomial function of the sixth degree (Fig. 1). Based on determined trend line we can estimate that in the next period the value of this parameter will increase, which in practice could have a negative impact on the financial management of municipalities in response to the increasing of its debt service.

FIG. 2: The development of the indicator d2 and its prediction

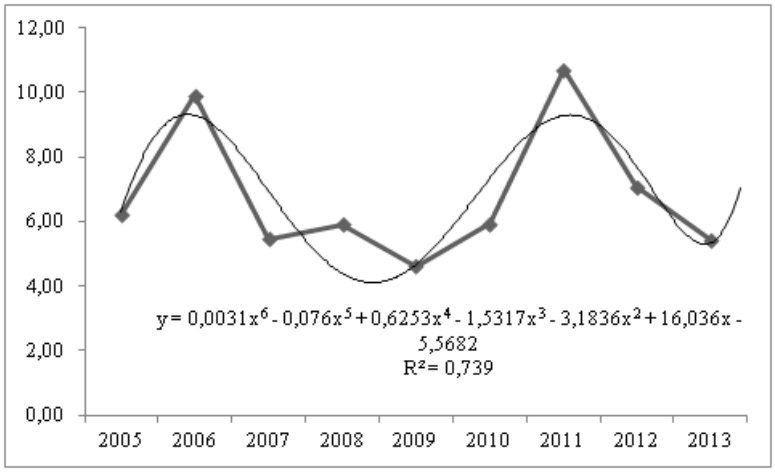


Source: Ministry of Finance of the Slovak Republic, own processing

The value of indicator of the debt per capita is copying development of the indicator *d*2. From graphical presentation we can see (Fig. 2) that data of parameter *d*2 are fluctuating. Therefore, as a trend line we again used the polynomial function of the sixth

degree. On the basis of the determined trend line we predict that in the next period the value of this parameter will be increasing.

FIG. 3: The development of the indicator d3 and its prediction



Source: Ministry of Finance of the Slovak Republic, own processing

When analyzing the parameter d3, we again used the sixth degree polynomial function (Fig. 3). Based on the specified trend line, we can expect that in the next period will be an increase in the value of this parameter.

TAB. 1: Pearson correlation coefficient

Total incomes / Capital expenditures	**2005 - 2013**
Pearson correlation coefficient	**0,73**

Source: Ministry of Finance of the Slovak republic, own processing

Total incomes of municipalities are formed by current and capital incomes. The municipality primarily uses the capital incomes as the capital expenditures for development. We assumed that with increasing of the incomes of the municipalities will increase the expenses, which generally use for their development. By the Pearson correlation coefficient we confirmed the dependence between total incomes and capital expenditures of municipalities and this dependency is at level 73% (see Tab.1).

Conclusion

Fiscal decentralization has caused that the municipality received more incomes than before the decentralization. This motivated the municipality, that they begin to obtain and using not only irreversible funds but also repayable funds in the form of loans. The result of such a process has been growing of the debt service of the municipalities. On the one hand, municipalities evaluate their property through investment activities, on the other hand some municipalities due to indebtedness got into recovery mode, respectively forced administration. That was also one of the reasons why was amending the Act on budget rules of local self-government, which tightens rules on debt service of the municipalities.

Acknowledgements

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ECONOMIC PROGESS AND PROSPERITY IN THE VISEGRÁD GROUP

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Keywords:
economicprogress – prosperity – productivity – remuneration – V4

Abstract:
The problem undertaken in the paper revolves in main social objective of economic development, which is the respect for human dignity. An economic progress (efficiency growth) is a key factor in achieving this goal. The research subject are members of the Visegrád Group – Czech Republic, Hungary, Poland and Slovakia, which share a similar level of economic development and a system transformation in the near past. Article attempts to answer the following questions: To what extent the economic development of the Visegrád Group members translates in achieving social goals? Can clear differences in wealth creation be identified between these countries? The study results are percent shares of workers' average productivity received as remunerations in industrial and services professions.

Introduction

The scientific problem undertaken in the paper revolves in the social objectives of economic development. The main social goal is the respect for human dignity. This objective is achieved through material abundance (prosperity), social security, sense of justice and civilizational progress [1, 38]. The condition for achieving these goals is economic progress measured by the dynamics of economic efficiency.

The problem is an inconsistency towards the development goals and means of their realization, which leads to the dominance of the latter over the first – means become targets [6]. The hypothesis: condition for the achievement of social objectives is to improve the economic efficiency. The aim of the study is to analyze the relationship between changes in indicators of economic progress and improvement of prosperity.

1. The study methodology

The research subject is the Visegrád Group (also called Visegrád Four or simply V4), an alliance of four Central European states – Czech Republic, Hungary, Poland and Slovakia. The Group originated in a summit meeting in the Hungarian town of Visegrád on 15 February 1991 [3]. All four countries share a similar level of economic development [5]. In 1989 all the V4 members conducted an economic and political system transformation from a socialist planned economy to a capitalist democracy [2].

The study main timeframe is 1995-2013 (or shorter depending on data availability). The source of data is World Competitiveness Online database [4]. The used measure of economic progress is productivity and the prosperity meters are compensations (remunerations). All indicators used in the study are listed in Tab. 1.

TAB. 1: Indicators used in the study

	Economic progress	**Prosperity**
Hourly	Labor Productivity (PPP)	Total compensation in manufacturing
Annual	Productivity in services sector (PPP)	Primary school teacher remuneration
		Personal assistant remuneration
		Bank credit officer remuneration

Source: IMD World Competitiveness Online database

Labor productivity is GDP (PPP) divided by employment and working hours. Productivity in services is an average annual worker productivity in services sector. Compensation in manufacturing refers to an average total worker wage per hour in manufacturing. Statistics relate to gross remuneration, before any deductions: taxes, social security and other obligations. Remuneration in services figures are estimated gross annual worker payments in major cities, including bonuses such as profit sharing, performance bonuses, holiday pay, additional salary and family allowances.

The study results are percent shares of workers' average productivity received by them in a form of remuneration. To get the results, the compensation levels are divided by either the hourly (labor) or annual productivity in the economies. The higher percentage shows larger share of employee's productivity paid him as a remuneration for his work.

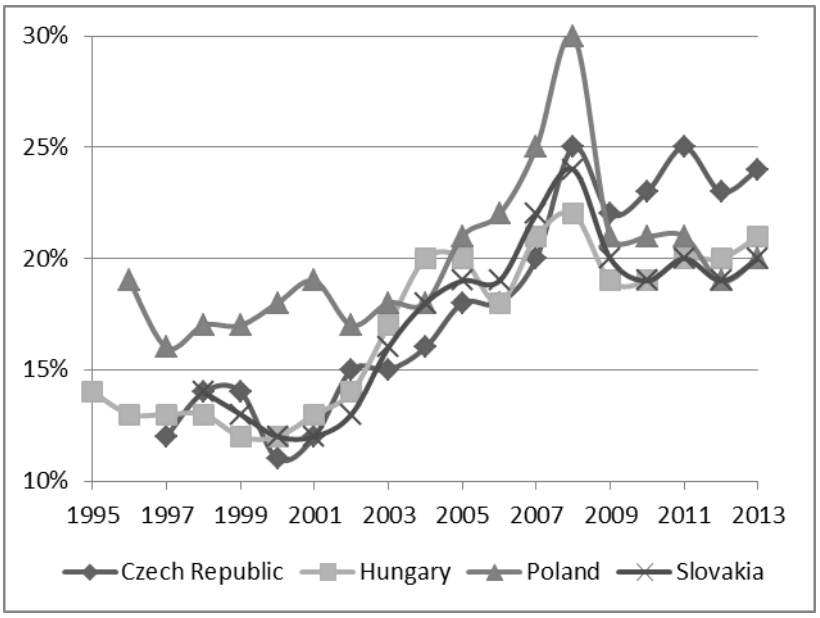
2. The results

The study results are grouped in four categories: one hourly and three annual indicators. The hourly indicator is compensation in manufacturing divided by labor productivity. The annual indices are remunerations of primary school teacher, personal assistant and bank credit officer,each divided by productivity in services sector. The results are presented in charts, with x axis in years and y axis in percent.

2.1. Compensation in manufacturing sector

The share of total hourly compensation in manufacturing in labor productivity showsthe percentage of average industry worker's hourly productivity which is directly transferred to his bank account as a remuneration for his job (see Fig. 1).

FIG. 1: Hourly compensation in manufacturing / Labor productivity (PPP) [%]



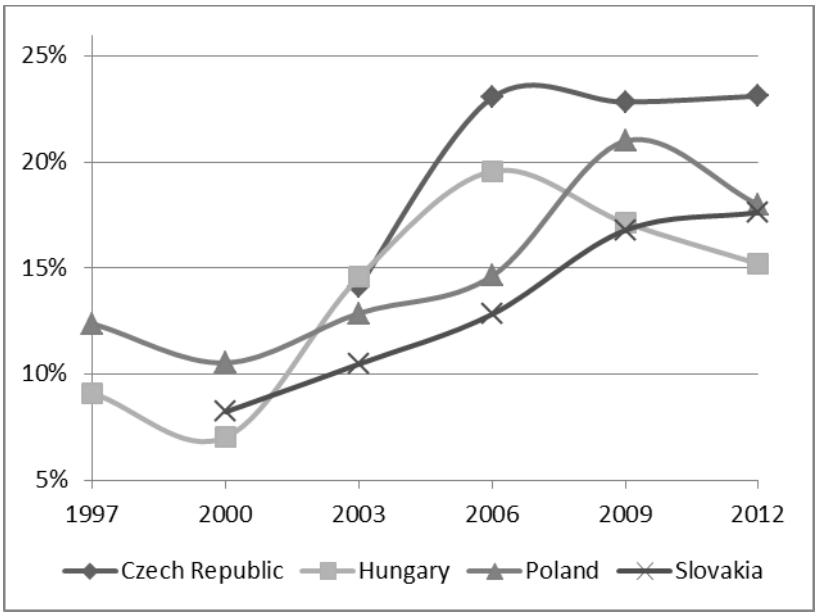
Source: IMD World Competitiveness Online database

Firstly, all the Group members share very similar productivity-to-payment ratio in manufacturing sector. Secondly, in all the states the ratio rose dramatically from around 12% in 2001 to 25% in 2008 and stagnated since at approx. 20%. The share of payment in productivity was most favorable in Poland in the 1995-2008 period. After, the Czech Republic took the leadership. The results show the growing importance of employees' remunerations during the high growth era and a stagnation in crisis times. Moreover, most of the employees currently only receive around fifth of their average productivity.

2.2. Primary school teacher

The results represent a share of average annual primary school teacher remuneration (teaching in the state school systemfor 10 years – not private schools, 35 years old, married with two children) in average productivity in services sector (see Fig. 2).

FIG. 2:Primary school teacher remuneration / Productivity in services [%]



Source: IMD World Competitiveness Online database

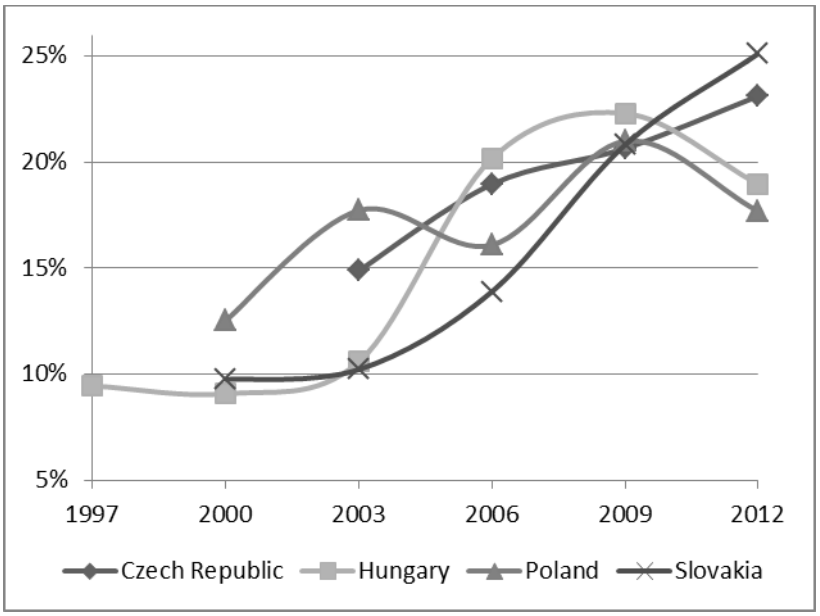
Firstly, all fourstates share a similar productivity-to-payment ratio in primary school teacher occupation. Secondly, in all countries the ratio rose from around 10% in 2000 to approx. 20% in 2009. The share of payment in productivity was most favorable in Poland during the 1997-2003 period at 12%. Later, the Czech Republic have taken the leader position at 23% from 2006 to 2012. The worst primary school teacher earning's percentage was in Hungary and Slovakia.

The results show that similarly to industrial employees, school teachers also saw their remunerations rise faster during high economic growth period. Also, most of the teachers only received around tenth of their average productivity from 1997 to 2003. Currently, school teachers' payment in V4 is 15-23% of productivity.That direction creates prosperity as larger share of remunerations in productivity leads to greater capital accumulation and wealth creation.

2.3. Personal assistant

The results represent a share of average annual personal assistant remuneration (department head PA in an industrial or service company, 5 year experience, 1 foreign language, 25 years old, single) in average productivity in services sector (see Fig. 3).

FIG. 3: Personal assistant remuneration / Productivity in services [%]



Source: IMD World Competitiveness Online database

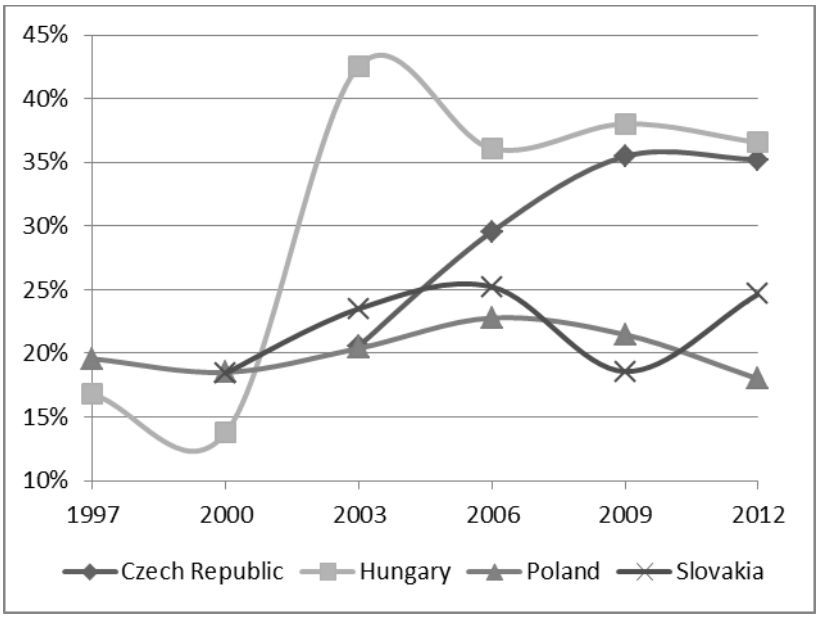
Like in previous results, all V4countries share a closely similar ratio of productivity and payment in personal assistantprofession. In all of the Group countries the ratio rose from around 10% in 1997-2000 to approx. 20% in 2009. In 2012 in Czech Republic and Slovakia rise of the ratio continued, but it felt in Hungary and Poland. The share of payment in productivity was most favorable in Poland in 2000 and 2003, then in Hungary in 2006 and 2009. In 2012 the peak was set at 25% in Slovakia, where it was the worst in previous years.

The results show that, the role and position of personal assistant was mostly ignored during 1997-2003 period, when PAs only received around tenth of an average productivity. In the next years managers and employers realized the huge importance of personal assistants, that lead tofast remunerations rise in later years. In 2009all PAs' average payment rose to over 20% of productivity in services sector.

2.4. Bank credit officer

The results represent a share of average annual bank credit clerk (completed bank training and 10 year experience in a bank, 35 years old, married with two children) in average productivity in services sector (see Fig. 4).

FIG. 4: Bank credit officer remuneration / Productivity in services [%]



Source: IMD World Competitiveness Online database

Unlike all the previous indicators, the payment-to-productivity ratio of bank credit clerk differs vastly between the V4 group countries. The similarity can be observed only in 1997-2000 period, when the average remuneration was around 15-20% of productivity in services sector. In 2003 the ratio peaked at over 40% in Hungary, and felt in later years to around 35%. The systematic rise was observed in Czech Republic, from 20% in 2003 to 35% in 2009-2012. Completely dissimilar situation was perceived in Poland and Slovakia, where the ratio fluctuated between minimum at around 20% and maximum at 25% during the whole timeframe.

The study results show that, the role and position of bank credit officer differs hugely between the V4 states. In Czech Republic and Hungary the share of employee's productivity received as remuneration is almost double the payment/productivity ratio of similar workers in Poland and Slovakia.

Conclusion

Economic efficiency (productivity) growth is an important factor in the achievement of social objectives. Prosperity comes from capital accumulation aslarger share of remunerations in productivity creates wealth in the middle class. The employees' remunerations rise faster during high economic growth and tend to stagnateduring crisis period. The amount of received payment also depends on recognitionof importance, role and position of given occupation. In all of the Visegrád Group members, level and changes of productivity-to-remuneration ratio in industrial and services professions are closely similar with the only exception of bank credit clerk. The ratio rose from around 10-15% in late 1990s to 20-25% in late 2000s. The salaries stagnated during early 2010s.

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EFFICIENCY ANALYSIS USING MULTI-PERIOD DEA MODELS

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Keywords:
data envelopment analysis – multi-period model – efficiency

Abstract:
Data envelopment analysis (DEA) is a non-parametric method for efficiency and performance analysis of decision making units. The paper deals with production systems where decision making units are described by their inputs and outputs in several consecutive periods. The paper presents multi-period DEA models that allow evaluation the efficiency of DMUs within the whole production period. There are available several methodological approaches how to solve this class of problems. Sam Park and Park (2009) model is based on solving one optimization problem for all periods only. The paper deals with modification of this model and formulation of another one that is based on measuring inefficiency using slacks. The results of all formulated models are compared with a small numerical example.

1. Introduction

Data envelopment analysis (DEA) is a non-parametric technique for evaluation of relative efficiency of decision making units described by multiple inputs and outputs. This approach that was firstly introduced in (Charnes et al., 1978) is based on solving a sequence of linear programming problems. Conventional DEA models analyze relative technical efficiency of the set of n decision making units (DMUs) that are characterized by m inputs and r outputs in one period. The efficiency score θ_q of the DMU_q is defined as the weighted sum of outputs divided by the weighted sum of inputs as follows:

$$\theta_q = \frac{\sum_{k=1}^{r} u_k y_{kq}}{\sum_{i=1}^{m} v_i x_{iq}}, \qquad (1)$$

where u_k, $k = 1, 2, \ldots, r$ is the positive weight of the k-th output, v_i, $i = 1, 2, \ldots, m$ is the positive weight of the i-th input, and x_{ij}, $i = 1, 2, \ldots, m$, $j = 1, 2, \ldots, n$ and y_{kj}, $k = 1, 2, \ldots, r$, $j = 1, 2, \ldots, n$ are non-negative values for the DMU_j of the i-th input and the k-th output respectively. Conventional DEA models maximize the efficiency score (1) under the assumption that the efficiency scores of all other DMUs do not exceed 1 (100%). This problem must be solved for each DMU separately, i.e. in order to evaluate the efficiency of all DMUs the set of n optimization problems must be solved. The presented problem is not linear in objective function but it can be modified using Charnes-Cooper transformation into a linear optimization problem and then solved easily. The transformation consists in maximization of the nominator or minimization of the denominator in expression (1). The constraints of this LP optimization problem express the upper bound for efficiency scores of all DMUs except the DMU_q and the unit sum of the denominator/nominator in (1). The model that maximizes the nominator in (1) is referenced as DEA input oriented model, the model that minimizes the denominator is DEA output oriented model. In both cases the DMUs with $\theta_q = 1$ are lying on the efficient frontier estimated by the model and denoted as efficient units. Otherwise the units are inefficient and the efficiency score can be explained as a rate for increasing inputs or reduction outputs for reaching maximum efficiency.

Conventional DEA models evaluate single-period efficiency of DMUs but several models how to deal with multi-period production systems have been proposed. In multi-period case the models estimate the total efficiency in the context of time serial data. Malmquist index (Fare and Grosskopf, 1996) and dynamic analysis (Sueyoshi and Sekitani, 2005) are only two of possible approaches that are relatively widely applied. Sam Park and Park (2009) formulated a two-stage DEA model that evaluates aggregative efficiency in multi-period case (further referenced as PP model). This paper extends the formulation of the PP model and proposes a new SBM model for case of multi-period analysis. The paper is organized as follows. Next section contains formulation of the PP model and discussion about its disadvantages and modifies this model in order to improve its properties. Section 3 formulates a multi-period SBM model and the paper is completed by a small example that compares the results of presented models.

2. Sam Park and Park model and its modification

Conventional DEA models can be formulated either in their primal or dual form - see e.g. (Zhu, 2003). In this section we will use the dual form that has several advantages with respect to formulation of multi-period models. Let us suppose that the DMUs are described by the same set of inputs and outputs in T consecutive time periods $t = 1, 2, \ldots, T$, and assume that x^t_{ij}, $i = 1, 2, \ldots, m$, $j = 1, 2, \ldots, n$, and y^t_{kj}, $k = 1, 2, \ldots, r$, $j = 1, 2, \ldots, n$ are the values of the i-th input and the k-th output in the t-th period of the DMUj. The first phase of the output oriented PP model with constant returns to scale assumption that evaluates the aggregative efficiency of the DMU$_q$ is formulated as follows:

$$
\begin{aligned}
&\text{Maximize} && \theta_q && && \\
&\text{subject to} && \sum_{j=1}^{n} x^t_{ij}\lambda^t_j \le x^t_{iq}, && i = 1,2,\ldots,m, t = 1,2,\ldots,T && (2)\\
& && \sum_{j=1}^{n} y^t_{ij}\lambda^t_j \ge \theta_q y^t_{iq}, && k = 1,2,\ldots,r, t = 1,2,\ldots,T && \\
& && \lambda^t_j \ge 0, && j = 1,2,\ldots,n, t = 1,2,\ldots,T, &&
\end{aligned}
$$

where λ^t_j $j = 1,2,\ldots,n$, $t = 1, 2,\ldots, T$ are variables of the model – coefficients of linear combination of the DMUs in time period t, and θ_q is the total aggregative efficiency score of the DMU$_q$. Let θ^*_q is the optimal objective function value of model (2). The DMU under evaluation is efficient according to model (2) if its efficiency score θ^*_q equals 1. The greater value indicates inefficiency. Sam Park and Park (2009) proposes second phase of their model that allows recognize among fully and weakly efficient units and discriminate among efficient units (super-efficiency model). For more details see the original paper mentioned above or (Jablonsky, 2013).

A main disadvantage of the presented PP model consists in its orientation on the "best" period of the DMU under evaluation, i.e. the efficiency score given by this model is always its best efficiency score among all particular periods considered. Application of this model can lead to inappropriate conclusions. The DMU that is rated as highly efficient in one of the periods only and highly inefficient in all other periods will be

ranked as better than the unit that is efficient in all periods. This disadvantage can be easily solved by a slight modification of model (2) as follows:

$$\begin{aligned}
&\text{Maximize} && \sum_{t=1}^{T} \theta_q^t / T \\
&\text{subject to} && \sum_{j=1}^{n} x_{ij}^t \lambda_j^t \le x_{iq}^t, && i = 1,2,...,m, t = 1,2,...,T \\
& && \sum_{j=1}^{n} y_{ij}^t \lambda_j^t \ge \theta_q^t y_{iq}^t, && k = 1,2,...,r, t = 1,2,...,T \\
& && \lambda_j^t \ge 0, && j = 1,2,...,n, t = 1,2,...,T,
\end{aligned} \tag{3}$$

where θ^t_q is the efficiency score of the DMU$_q$ in the period t. The objective function of the model (3) returns average efficiency score of the unit under evaluation over all periods. The optimum value of this model 1 indicates global efficiency of the unit under evaluation, i.e. efficiency in all considered periods. It is possible to discriminate among these units using a super-efficiency model. Andersen and Petersen (1993) model is one of suitable alternatives. The value higher than 1 indicates inefficiency at least in one period.

3. A SBM multi-period model

SBM models are quite popular group of models that allows evaluation of efficiency independently on the orientation of the model. Probably the most often applied and discussed is the Tone's model in its standard and super-efficiency versions - see (Tone, 2002) – but this model is not suitable for its modification for multi-period analysis. We propose for this purpose a standard SBM model that measures inefficiencies using relative slacks, i.e. negative relative deviations in the input space and positive ones in the output space. This model can be easily written for multi-period system as follows:

$$\begin{aligned}
&\text{Minimize} && \sum_{t=1}^{T} \left(\sum_{i=1}^{m} \left[s_{1i}^{t-} / x_{iq}^t \right] / m + \sum_{k=1}^{r} \left[s_{2k}^{t+} / y_{kq}^t \right] / r \right) / T, \\
&\text{subject to} && \sum_{j=1}^{n} x_{ij}^t \lambda_j^t + s_{1i}^{t-} = x_{iq}^t, \quad i = 1,2,...,m, t = 1,2,...,T, \\
& && \sum_{j=1}^{n} y_{kj}^t \lambda_j^t - s_{2i}^{t+} = y_{kq}^t, \quad k = 1,2,...,r, t = 1,2,...,T,
\end{aligned} \tag{4}$$

$$\lambda_j^t \geq 0, \qquad j = 1,2,...,n,$$
$$s_{1i}^{t-} \geq 0, s_{2k}^{t+} \geq 0, \qquad i = 1,2,...,m, k = 1,2,...,r, t = 1,2,...,T,$$

where s_{1i}^{t-}, s_{2k}^{t+} are negative and positive slacks in the period *t* of the *i*-th input and the *k*-th output respectively. The other symbols have the same meaning as in model (3). The objective function of model (4) consists of two parts. The first part measures average inefficiency in input space and the second one the average inefficiency in the output space. The total objective function value is the average of both inefficiencies over all time periods.

The objective function of model (4) equals 0 if the DMU under evaluation is efficient in all periods, otherwise the DMU is inefficient in at least one period. The units can be easily ranked according to the average inefficiency over all periods. The units that are efficient in all periods can be ranked according to their average super-efficiency measure that can be given using a modified version of the model proposed in (Jablonsky, 2012). Here, the super-efficiency is measured using undesirable slacks, i.e. using positive deviations in the input space and negative ones in the output space. The model is formulated in the following way:

$$\text{Minimize} \qquad 1 + \sum_{t=1}^{T} \left(\sum_{i=1}^{m} \left[s_{1i}^{t+} / x_{iq}^t \right] / m + \sum_{k=1}^{r} \left[s_{2k}^{t-} / y_{kq}^t \right] / r \right) / T,$$

$$\text{subject to} \qquad \sum_{j=1}^{n} x_{ij}^t \lambda_j^t + s_{1i}^{t-} - s_{1i}^{t+} = x_{iq}^t, \qquad i = 1,2,...,m, t = 1,2,...,T, \qquad (5)$$

$$\sum_{j=1}^{n} y_{kj}^t \lambda_j^t + s_{2i}^{t-} - s_{2i}^{t+} = y_{kq}^t, \qquad k = 1,2,...,r, t = 1,2,...,T,$$

$$\lambda_j^t \geq 0,\ j = 1,2,...,n,\ \lambda_q^t = 0, t = 1,2,...,T,$$

$$s_{1i}^{t-} \geq 0, s_{1i}^{t+} \geq 0, s_{2k}^{t-} \geq 0, s_{2k}^{t+} \geq 0, \qquad i = 1,2,...,m, k = 1,2,...,r, t = 1,2,...,T,$$

where s_{1i}^{t+}, s_{2k}^{t-} are positive and negative slacks in the period *t* of the *i*-th input and the *k*-th output respectively and other symbols correspond to model (4). It is possible to prove that the DMUs inefficient in all periods have the efficiency score given by the model (5) equal 1 and the unit that are efficient in all periods greater than 1. That is why the inefficient DMUs can be ranked according to the efficiency scores given by the model

(4) and the the units identified as efficient by this model can be discriminated according to the results of model (5).

4. Numerical illustration

The results of the models presented in previous sections will be illustrated on an example dealing with efficiency evaluation of economic faculties in the Czech Republic. Data set available for the analysis contains information about various economic, teaching and research characteristics of the most important 19 public economic faculties in a four years period starting by 2007. The DEA model works with two inputs (the number of academic staffs and labor cost of the faculty) and three outputs measuring both teaching (the total number of students and the number of graduated students) and research (the number of RIV points) efficiency. Due to the limited space of this paper it is not possible to present the original data set. More information about the problem and the data set is given in (Jablonsky, 2013).

Table 1 presents results of PP model (2) and SBM model (4). The efficiency scores of the first model are given in reciprocal values in order to assign higher values to DMUs with higher efficiency. The values lower than 1 indicate inefficiency of the unit under evaluation and the values higher than 1 that are given using PP super-efficiency model indicate efficiency of the DMU. Then the super-efficiency measure is used for their ranking. The results show that six DMUs are efficient but this conclusion can be quite distorted because not all of them are efficient in all periods. Detailed results (not presented here) show that only two DMUs are efficient in all periods (FSV UK and FME Zlin) and two are efficient in one period only. The results presented in next columns of Table 1 are given using model (4) and they express better than the previous model the efficiency level over all periods. The units efficient in all periods have the efficiency score 0 and inefficient units have higher values. Applying model (5) for these two units leads to values 1.109 for FSV UK and 1.128 for FME Zlin, so that this faculty is then first.

TAB. 1: Efficiency scores and ranking of DMUs

Faculty	Eff.score PP model	Rank	Eff.score SBM	Rank
FSV UK	2.2046	1	0.0000	1
EkF JČU	0.9261	12	0.5777	12
FSE UJEP	0.9603	8	10.6395	18
ESF MU	1.0405	6	0.6629	13
OPF SU	0.9319	10	0.9414	16
FE ZČU	0.9531	9	11.9656	19
HF TUL	0.7356	18	1.4901	17
FES UP	0.8101	17	0.4914	10
FP VUT	0.9230	13	0.2496	5
EkF VŠB	0.8883	14	0.3300	7
FME Zlín	1.4282	2	0.0000	1
FFU VŠE	1.2244	5	0.1606	4
FMV VŠE	0.6826	19	0.7595	14
FPH VŠE	0.9288	11	0.4588	9
FIS VŠE	0.8236	16	0.4961	11
NH VŠE	1.2511	4	0.0219	3
FM VŠE	0.8398	15	0.7898	15
PEF ČZU	1.3193	3	0.3930	8
PEF MZU	0.9711	7	0.3026	6

Source: own calculations

5. Conclusions

The aim of the paper was to propose an original model for evaluation of efficiency in multi-period production systems. The proposed model eliminates some drawbacks of the PP model which belongs to commonly used models of this category. The results of new models are discussed on an example of real-world nature and compared to the results of PP model. The significant differences in ranking of DMUs given by the two models can be easily explained, while the second model provides results that are closer to real expectations.

Acknowledgements:

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FACTORS AFFECTING INVESTMENT DECISIONS IN THE CZECH REPUBLIC

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Keywords:
investment environment – investment factors – financial factors

Abstract:
The aim of this paper is to divine the main factors affecting the investment activity of enterprises in the tertiary sector. These factors will be investigated in a future project that aims to define steps to increase an investment activity of enterprises in services. Investment factors that hindered the development and investment factors with a positive impact on the investment activity will be explored. The aim of this paper is only to identify the factors. The aim of the future project will be the subsequent examination of the impact of macroeconomic and microeconomic factors on the investment activity. In addition, the project will examine possible correlation between the level of the investment and general indicators of the national economy.

Introduction

An investigation of important external factors on investment decision in the tertiary sector to increase its vitality shall be conducted in this paper. A thriving private sector means new firms entering the market, creating new jobs, developing innovative products and contributing to a more prosperous society. [2, 7] To attract the tertiary sector entities a detailed analysis of the investment environment should be made. The factors that have a certain influence on investment environment should be defined. A greater emphasis will be given to factors influencing the investment environment of enterprises in the tertiary sector because of its importance to the national economy of the Czech Republic, where roughly 70% of GDP is made up just of the tertiary sector.

At first it is necessary to define the investment environment, which can be understood as an external factor of the organization and a direct motivator for implementing change in the company. It is a key element for organizational innovation, because constant

changes make managing the value and quality of products and services difficult, and for stimulating the creation of new products, services and processes to compete in the marketplace [4], [6], [16]. Secondly, investment factors will be described. Economic literature has identified numerous approaches to investment factors. From the following review of literature, several key factors will be selected to be examined and evaluated in the following period.

1. Theoretical framework

Investment decisions are crucial for the performance of the economy with respect to macro and micro perspectives, and that is why the examined factors will be divided into two groups. From the macro perspective, they are important for the growth of the gross domestic product, and their magnitude serves as a significant leasing indicator of economic performance [15]. The main macroeconomic factors are:

- **government** – plays a crucial role because it sets the rules that establish and clarify property rights, helps to reduce the cost and loosen political and economic control. [13] The government can promote innovation activities through self-owned or acquired innovations. [9]
- **administrative obstacles** – these barriers relate not only to getting subsidies, but also to the length of an administrative process accompanying a new business.
- **level of the advancement and the economic cycle** – the negative outlook or a long recession, that was recorded in the Czech Republic after the economic crisis of 2008, had a severe negative impact on investment activity of economic entities.
- **dynamics of environment** – the environment is an external force that influences the business organization, depending on the marketplace where it operates and the technology it uses. The changes in the environment are increasingly fast, and it could presume that they will be even faster in the future. To survive, companies should create new products, services and processes all the time. [15] For example Han, Kim and Srivastava [7] analyze the environment from two main aspects. The first is market turbulence, associated with the diversity of

consumer preferences; the second is technology turbulence, associated with the lack of technological standards in the manufacturing sector.

According to CNB the amount of investment restricts following factors from the macroeconomic point of view:

- interest rates,
- little incentive tax measures – tax policy also states Alam and Stafford [1] and Hodgkinson [8] and many others [12], [13] as the most important factor for deciding the investment environment, because this factor could directly influence the rate of return on an investment. [16]

Results of a similar Polish research show the greatest importance to these macroeconomic factors of investment:

- **taxes** – this factor can be considered as a key factor not only for foreign direct investment and thus for new entrants investors, but also as one of the main factors in deciding on a new investment by existing domestic businesses,
- **trust in the economic situation** – this factor is closely related to a factor in the economic cycle and its vision for the future,
- **legal barriers** – this limiting factor should be removed primarily. In this area it is necessary to undergo a thorough analysis of the current situation and to remove any possible legislative barriers.
- **prospects of growth**.

In addition to macroeconomic factors, there is an issue of the investment factors from a microeconomic point of view, since it is possible to define several factors that are not directly related to the economic situation and are not tied to the macroeconomic environment, but are directly associated with the company. The key macroeconomic factors include mainly financial factors. Usually these factors are more important with regard to the investment process for smaller firms. [5] The main problem here is, that small firms have a limited access to capital markets, and therefore they are often tied to risky financial resources such as unsecured loans or financial funds from dubious financial institutions. Financial factors can be classified:

- **financial environment** – especially the possibility of obtaining funding can be considered as one of the key factors of an investment.
- **liquidity** – another important factor that could affect strongly the investment possibilities and the related problem of late payments. This problem can be classified as the most important single issue determining investment decision of Polish companies. [10]

From a microeconomic point of view, CNB defines the following factors:

- **lack of own funds,**
- **difficulties in obtaining external sources (mainly loans),**
- **uncertainty about future demand,**
- **wrong choice of unskilled workers. [16]**

2. Results

Our study will be based on individual survey data from a set of special questions about investment factors. The research targets are randomly selected Czech business entities. The sample of firms is weighted with respect to the structure of the tertiary sector in the Czech national economy. This means that respondents will only be from the tertiary sector. A random selection from almost all branches of tertiary sector, which somehow decide on their investment activities, will be conducted. Therefore following sectors will be omitted:

- extraterritorial organizations,
- public services,
- cultural, entertainment and recreational activities.

Among the addressed business entities of the tertiary sector business subjects where could be already expected their efforts to invest and the active expansion of its business through this activity will be included:

- administrative and support service activities,
- transport and storage,
- information and communication activities,

- finance and insurance,
- professional, scientific and technical activities,
- accommodation, catering and hospitality,
- wholesale and retail.

The last sector, which will be examined after a significant modification, is **real estate activities** where the research will be addressed only to real estate agencies.

Considerable differencies are to be assumed between chosen factors. It means that in further analysis authors of the project will search for common driving forces responsible for patterns of a response with a respect to the importance of a specific factor in the decision process. To find them, an **exploratory factor analysis** and probably also a **cluster analysis** will be done.

A number of hypotheses and assumptions are to be verified in this article. An assumption is for example, that external factors are more important for large firms than for small ones [1] and larger firms that will be much less exposed to investment reductions. [10]

3. Discussion

The aim of the discussion is primarily to assess which factors should be included in the present research and why. As already noted, investment factors can be divided into macro and micro. Selected and subsequently researched macroeconomic factors will include:

- **political situation** – confidence in government;
- **lengthy administrative process** with investing in another company;
- **innovative activity of the region**,
- **the interest rate**,
- **tax policy.**

Researched microeconomic factors:

- **the possibility of obtaining a loan or credit,**
- **the solvency of customers,**
- **skilled workforce.**

It should also be noted that the authors of the future project will try to establish mutual international cooperation. The survey would not be carried out only in the Czech Republic, but it would be possible to compare the approach to investment factors from multiple perspectives. The data could also, of course, get a higher value.

Conclusion

A set of questions concerning the factors affecting investment decision of companies in the Czech Republic will be asked twice – in 2015 and then in the nearly future. The survey will be conducted by using a structured interview. On the basis of these two studies it will be possible to analyze the impact of the economic situation on investment factors. To this aim, a tailor-made survey designed to measure the impact of the most important investment factors was worked out. The importance of different investment factors influencing the decisions of companies from tertiary sector in the Czech Republic is to be also evaluated.

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TOURISTS' SATISFACTION WITH THEIR HOLIDAY EXPERIENCE IMPLICATIONS FOR TOURISM PRODUCT MANAGERS

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Keywords:
tourism product attributes – tourist satisfaction – tourism research – quantitative analysis

Abstract:
The current study attempts to investigate tourists' perceptions of their holiday experience with regard to tourism company products and destination products. Tourists spending their summer holidays on coach tours in Poland in 2013 were the subjects of the analysis. Tourists' perceptions of the importance of the distinguished tourism product attributes as well as of the performance of each of those attributes are taken into account in this study. The researcher suggests that tourist satisfaction depends of the overall holiday experience, including the quality of packaged holiday services, as well as of the cultural, natural, social, economic and functional environment. The results of the study enable to formulate recommendations for product managers with regard to the tourism product development process.

Introduction

The increasing importance of tourism and its impact on the social and economic development of regions triggered interest in improving the competitiveness of tourism destinations as well as of tourism products and tourist services. Moreover, tour operators and other tourist services providers are challenged with the constant need to adjust market offering to more and more sophisticated needs and wishes of customers. Thus, all entities involved in the tourism product development process need to cooperate to create superior customer value and offer customers unforgettable experience regarding their visit to a specific destination. Due to the complex character

of tourism products, it is necessary to consider all factors that influence tourists' holiday experience while designing tourism products.

The paper presents the results of a quantitative analysis examining tourists perceptions of Poland as a tourist destination. The aim of the analysis is to identify tourism product attributes important to tourists. Another important goal of this analysis is to analyze tourist satisfaction with regard to the distinguished product attributes. Tourism product attributes were classified into two groups: internal tourism product attributes including packaged holiday services and external tourism product attributes including environmental factors. The conclusions of the study are concerned with recommendations for tourism product managers and other tourist services providers regarding the tourism product development process.

1. Methods, literature review

Customers' perceptions of the service are always considered relative to expectations. Because expectations are dynamic, customers' evaluations may shift over time - from person to person and from culture to culture [10]. Thus, it is necessary to regularly gather information on how customers assess the quality of services and whether they are satisfied with experienced services. Given the differences in meaning between quality and satisfaction, the precise and clear definition of both terms is required. There are controversies among practitioners and theorists over the meaning of quality and satisfaction. Some writers use them interchangeably, but many researchers suggest that two concepts are different. Whereas service quality refers to customers' perceptions of reliability, assurance, responsiveness, empathy, and tangibles [8], satisfaction is influenced by perceptions of a number of factors including: service quality, product quality, and price, as well as personal factors and situational factors [10].

There are numerous tools measuring service quality and customer satisfaction. Among the most commonly used analytical instruments are: SERVQUAL, SERVPERF and IPA. SERVQUAL is a measure of service quality, which is used to measure customers' expectations and perceptions with regard to five service quality dimensions [4]. SERVPERF is based only on the perception component [6], while IPA measures the

importance and performance of various product attributes [5]. Because very many service products are complex and vary significantly in terms of their components, it is suggested that the best procedures to evaluate and classify the quality of services is by measuring the user's degree of satisfaction concerning a set of relevant criteria. Tourism product refers to the overall holiday experience consisting of various components including transportation, accommodation, meals, image as well as other attributes important for tourists [6]. Thus, tourists spending their holidays on coach tours experience packaged holiday services as well as other destination attributes, which means that services provided by a tour operator as well as environmental factors should be regarded as tourist satisfaction determinants.

In the present study, the researcher analyzed tourists' perceptions of their holiday experience with regard to tourism company products and destination products. Tours were organized and sold in the form of package holidays by tour operators and travel agents in the United States, Canada, and Australia. Mazurkas Travel, Polish Incoming Tour Operator, was a local partner responsible for arranging tourist services. The program of tours included the major Polish cities and the most important tourist attractions.

The research tasks included the identification of tourism product attributes crucial for travelers and factors influencing their holiday experience. Tourists' perceptions of the importance of the distinguished tourism product attributes as well of as the performance of each of those attributes are taken into account in this study. The study analyzes tourists' opinions on the quality of services provided during the tours and their satisfaction with other destination attributes. Numerical evaluation of all attributes was made using 1-5 Likert scales.

Specifically, the research addresses the following questions:

- What tourism product attributes, including services provided by the tour operator and other destination attributes, are of the highest importance to tourists?

- What are tourists' perceptions of tourism product attributes, including services provided by the tour operator (internal tourism product attributes) and other destination attributes (external tourism product attributes)?

The paired sample t-test was used to determine whether there are any statistically significant differences between tourists' perceptions of the internal and external tourism product attributes with regard to the importance and performance of distinguished attributes.

Tourists spending their summer holidays on coach tours in Poland were the subjects of the analysis. The questionnaires were distributed among tourists who were spending their summer holidays on coach tours in Poland in 2013. A paper-and-pencil questionnaire distributed to the tourists at the end of each tour was completed by 463 travelers. According to the survey results presented in Table 1, 59.8% of tourists were females and 40.2% males. 69.1% of respondents were over 60, 15.3% were within the age bracket of 51-60, 6.1% were between ages of 20-30, 5.4% between 41-50, 2.4% between 31-40 and 1,7% were under 20. Considering the country of residence, 83.8% of tourists were from the United States, 8.7% from Canada, 4.7% from Australia, and 2.9% from other countries. The majority of travelers were the United States residents over 60.

TAB. 1: Sample characteristics

Description			Frequency	Percent	Valid Percent	Cumulative Percent
Gender	Valid	Female	275	59.4	59.8	59.8
		Male	185	40.0	40.2	100.0
		Total	460	99.4	100.0	
	Missing	System	3	0.6		
	Total		463	100		
Age	Valid	under 20	8	1.7	1.7	1.7
		21-30	28	6.0	6.1	7.8
		31-40	11	2.4	2.4	10.2
		41-50	25	5.4	5.4	15.6
		51-60	70	15.3	15.3	30.9
		over 60	317	68.5	69.1	100.0
		Total	459	99.1	100.0	
	Missing	System	4	0.9		
	Total		463	100.0		
Country of residence	Valid	United States	377	81.4	83.8	83.8
		Canada	39	8.4	8.7	92.4
		Australia	21	4.5	4.7	97.1
		Other countries	13	2.8	2.9	100.0
			450	97.2	100.0	
	Missing	Total	13	2.8		
	Total	System	463	100.0		

Source: own research

2. Results

The distinguished tourism product attributes have been grouped in two categories: internal and external tourism product attributes. The importance and performance of internal tourism attributes are presented in Table 2. Considering the importance of the internal attributes for tourists, it can be concluded that tour escort (4.84), organization (4.73), price/quality relationship (4.67), and attractiveness of the program (4.62) are perceived as the most important for tourists. However, other internal product attributes including hotels (4.54), restaurants and meals (4.53) and standard of the bus (4.50) are also very important for tourists. The performance of the internal tourism attributes can be evaluated as high. The highest rated attributes include: tour escort (4.84), organization (4.70), attractiveness of the program (4.69), standard of the bus (4.66) and price/quality relationship (4,60). Restaurants and meals (4.48) and hotels (4.38) are the lowest-rated attributes.

TAB. 2: Internal tourism product attributes (importance vs. performance)

Pairs	Tourism product attributes	N	Mean Importance	Standard Deviation	Mean Performance	Standard Deviation
1	Attractiveness of the program	439	4.62	0.630	4.69	0.505
2	Organization	433	4.73	0.514	4.70	0.528
3	Hotels	440	4.54	0.591	4.38	0.626
4	Restaurants and meals	443	4.53	0.621	4.48	0.680
5	Standard of the bus	446	4.50	0.663	4.66	0.557
6	Tour escort	449	4.84	0.406	4.84	0.404
7	Price/quality relationship	442	4.67	0.551	4.60	0.575

Source: own research

The importance and performance of the external tourism product attributes are presented in Table 3. The importance of attributes varies more for the external tourism product attributes. The most important external tourism attributes include: safety (4.69), tourist attractions (4.66), cleanliness (4.64) and reasonable prices (4.57). Among important attributes it is possible to distinguish: tourist information (4.45), kindness toward foreigners (4.45), climate and atmosphere of the stay (4.44), nature (4.34), possibility to communicate in English (4.24), weather (4.09), opportunity to meet new people (4.02). Shopping opportunities (3.79) and handicapped facilities (3.45) were perceived as the least important attributes. The highest evaluated attributes include: tourist attractions (4.67), safety (4.66), cleanliness (4.61), nature (4.57), climate and atmosphere of the stay (4.54), and reasonable prices (4.51). Kindness toward foreigners (4.49), tourist information (4.44), possibility to communicate in English (4.33), opportunity to meet new people (4.31), weather (4.12) received lower ratings, but the mean scores indicate a relatively high level of performance with respect to other attributes. Shopping opportunities (4.01) and handicapped facilities (3.60) are the lowest-rated attributes.

TAB. 3: External tourism product attributes (importance vs. performance)

Pairs	Tourism product attributes	N	Mean Importance	Standard Deviation	Mean Performance	Standard Deviation
1	Climate, atmosphere of your stay	435	4.44	0.745	4.54	0.633
2	Tourist attractions	426	4.66	0.556	4.67	0.546
3	Nature	430	4.34	0.767	4.57	0.617
4	Shopping opportunities	424	3.79	1036	4.01	0.857
5	Safety	429	4.69	0.546	4.66	0.570
6	Opportunity to meet new people	432	4.02	0.872	4.31	0.774
7	Weather	432	4.09	0.779	4.12	0.888
8	Cleanliness	436	4.64	0.561	4.61	0.533
9	Reasonable prices	437	4.57	0.623	4.51	0.564
10	Tourist information	425	4.47	0.629	4.44	0.649
11	Kindness toward foreigners	435	4.45	0.640	4.49	0.707
12	Possibility to communicate in English	430	4.24	0.788	4.33	0.778
13	Handicapped facilities	277	3.45	1.278	3.60	1.068

Source: own research

As a next step of the analysis the researcher investigated whether there are any statistically significant differences between tourists' perceptions of the internal and external tourism product attributes and the importance and performance of distinguished attributes. The results of the paired sample t-test are presented in Table 4. It can be observed that in two cases the significance level is below 0.05, which means that the difference between means can be interpreted as significant. Thus, it can be concluded that the internal tourism product attributes are more important to tourists than the external ones. Moreover, tourists evaluated higher the performance of the internal attributes.

TAB. 4: Importance and performance of internal versus external tourism product attributes

Pair	N	Mean	Standard Deviation	Standard Error Mean
Importance				
Internal attributes	440	4.6281	0.38783	0.01849
External attributes	440	4.2984	0.52960	0.02525
Performance				
Internal attributes	455	4.6217	0.37863	0.01775
External attributes	455	4.4061	0.47271	0.02216

Pair	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. 2 tailed
				Lower	Upper			
Importance Internal/External	0.32965	0.45418	0.02165	0.28710	0.37221	15.225	439	0.000
Performance Internal/External	0.21567	0.40363	0.01892	0.17848	0.25285	11.397	454	0.000

Significance level at 0.05

Source: own research

Discussion

The current study brings insight into measurement of service quality and customer satisfaction with regard to tourism products offered by tour operators. Unlike other studies which tend to focus on tourists' perceptions of product attributes of hotels [2, 4, 9] or on tourists' perceptions of destination attributes [1,7], this study is concerned with evaluations of tourism products offered by tour operators. Moreover, the researcher distinguished two groups of attributes representing values for tourists: services offered by tour operator and destination attributes, which shows a new perspective on measuring customer satisfaction. Furthermore, the results of the analysis enable to draw conclusions on tourism product development process.

This study has considered only inbound tourists in Poland with regard to visitors coming from the United States, Canada and Australia. Future studies may replicate the current study by increasing the sample size and including tourists from different countries visiting Poland as well as tourists visiting other tourist destinations.

Furthermore, this study has considered all tourists as a single homogeneous cluster. In the future, research could be undertaken to overcome these limitations and perform comparisons across cultures.

Conclusions

The results of the analysis enable to formulate recommendations for tourism product managers with regard to the tourism product development process. All of the distinguished internal product attributes representing packaged holiday services are very important for tourists. The ability to create an attractive and varied program of the tour can be considered as one of the key competencies of tourism product managers. Moreover, careful planning of itinerary is crucial for good organization and smooth realization of tours. Additionally, managers should consider criteria important to tourists while selecting hotels and restaurants. It is also important to cooperate with reliable and knowledgeable tour escorts as they are of the highest importance to visitors. Furthermore, a package holidays' price set on an adequate level to received benefits is perceived as an essential attribute

Besides internal tourism attributes, external tourism attributes representing environmental factors are important to tourists. Product managers have no influence on them, but they need to plan tours considering their impact on visitors. Thus, it is necessary to include the most impressive tourist attractions in tours' itineraries as well as places renown for natural beauty. Safety, cleanliness and good atmosphere are very important to tourists, so it is important to assure that travelers feel secure and visit clean, pleasant, safe and uncrowded places, and have good shopping opportunities. Meeting friendly people able to communicate in English is an additional asset enhancing tourists' holiday experience.

At the start of each season, product managers need to work on product modification and introduce changes to tours' itineraries to increase tourist satisfaction. Tourists' evaluations with regard to the performance of distinguished tourism attributes can be perceived as a good source of information for managers to make necessary service improvements. Moreover, communications strategy should reflect the areas of tourists'

satisfaction and highlights of the program. It is also recommended that tour operators cooperate with their partners and other entities providing services for tourists and organizations responsible for regional tourism development as well as local authorities.

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THE USE OF THE EXTREME VALUE THEORY TO MEASURE THE WHEAT PRICE RISK IN THE EUROPEAN UNION

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Abstract:
The main aim of the paper is to assess the extreme price risk on the consumer wheat market in the European Union (EU). The risk was estimated on the basis of average weekly procurement prices of the consumer wheat in chosen EU member states. Two measures of risk were determined: Value at Risk (VaR) and Expected Shortfall (ES), by means of Extreme Values Theory (EVT). The results of the research show the existence of differences in the level of extreme price risk on the wheat market in EU member states.

Introduction

The growth of prices volatility on agricultural commodities markets observed in past years caused a bigger exposure of the market participants to price risk. Hence, the assessment and monitoring of risk on the agricultural commodities markets became extremely important from the point of view of risk management of market entities.

One of the basic agricultural commodity markets in the European Union (EU) is the market of consumer wheat. The price risk of wheat is caused by the prices fluctuation of that resource. The fluctuation of wheat prices are influenced by many factors. One of them of a bigger importance is the level of production which is dependent on weather conditions (droughts, hailstorms, ground frost, floods), other natural and political conditions. The research proves relatively frequent occurrence of extreme price fluctuations on agricultural commodities markets [1, 2, 5, 6]. It means that a proper management of the unfavourable price changes of those commodities requires carrying

out an analysis of extreme prices changes behaviour and the estimation of extreme price risk. The theory which enables such an analysis is the Extreme Value Theory (EVT). The research of that theory use in measuring the risk on agricultural commodities markets can be found in [5, 6].

The aim of that paper is the evaluation of extreme price risk on consumer wheat market in the EU. Two measures of risk were determined: Value at Risk (VaR) and Expected Shortfall (ES), by means of Extreme Values Theory. The implementation of this theory enables to focus on modelling distribution tails rather than the whole distribution. In addition, the estimated risk measures were compared to measures obtained using conventional methods.

1. Measures of extreme risk

The first measure is Value at Risk (VaR). It is a maximum loss (loss of value commodity) which can be experienced in a specific time with a definite probability. Formally, VaR is defined as follows:

$$P(P_t \le P_{t-1} - VaR) = \alpha \qquad (1)$$

where: P_t – a value of the commodity in time t, α – tolerance definite level.

A proper choice of a correct way to assess VaR is a vital problem.

VaR of the long position is the opposite of a quantile of the loss distribution

$$VaR_{\alpha,t+1} = -F_{r_t}^{-1}(\alpha), \qquad (2)$$

where $F_{r_t}^{-1}$ is the inverse of cumulative distribution function of commodity returns, F_{r_t}.

For short position it is a $1-\alpha$ quantile of the returns distribution

$$VaR_{1-\alpha,t+1} = F_{r_t}^{-1}(1-\alpha). \qquad (3)$$

The second measure is Expected Shortfall (ES). This is an expected loss (loss of value commodity) on condition that the loss is greater than VaR.

In this paper VaR and ES are determined on the basis of the tail of Generalized Pareto Distribution (GPD). Returns modelling on the basis of generalized Pareto distribution enables to include returns fat tails and the skewness.

Extreme Value Theory (EVT) provides the tools to measure the extreme risk. In this theory, there are two approaches to modeling extreme values: Block Maxima Model and Peaks over Threshold Model.

Using Peaks over Threshold Model (POT) [3] one can estimate the tail of the returns distribution. A datum in this approach is a conditional distribution of peaks over thresholds (exceedances; hits; violations) of a random variable *X* of a certain threshold *u* defined as:

$$F_u(x) = P(X - u \le x | X > u) = \frac{F(x+u)-F(u)}{1-F(u)}, \quad (4)$$

where *F* is an unknown distribution of a random variable *X*. According to Pickands-Balkema-de Haan theorem for a large class of underlying distribution functions *F*, and large *u*, F_u is definite and is well approximated by the generalized Pareto distribution:

$$G_{\xi,\beta}(x) = \begin{cases} 1-(1+\xi x/\beta)^{-1/\xi}, & \xi \neq 0 \\ 1-\exp(-x/\beta), & \xi = 0 \end{cases}, \quad (5)$$

where: $\beta > 0,\ x \ge 0$ for $\xi \ge 0$ and $0 \le x \le -\beta/\xi$ for $\xi < 0$. This distribution only has two parameters: β – a scale parameter, ξ – a shape parameter responsible for the tail thickness. To estimate the probability of Pareto distribution one must choose the level of u threshold. This choice defines the levels of assessed estimators. Combining formulas (4) and (5) results in the following form of the random variable distribution *X*:

$$F(x) = (1-F(u))G_{\xi,\beta}(x)(x-u) + F(u),\ x > u. \quad (6)$$

$F(u)$ should be replaced by an empirical estimator of $F(u) = 1 - N_u/n$, where n is a number of observations and N_u is a number of excesses u. A following estimator of *F* is received:

$$F(u) = 1 - \frac{N_u}{n}\left(1+\xi\frac{(x-u)}{\beta}\right)^{-1/\xi}. \quad (7)$$

Calculating x from formula (7) a short-position VaR can be estimated:

$$VaR_{1-\alpha} = u + \frac{\beta}{\xi}\left(\left(\frac{n}{N_u}\alpha\right)^{-\xi} - 1\right), \quad (8)$$

where α is a tolerance level for VaR. To calculate VaR of a long position one must carry on estimation for returns multiplied by minus one.

A short-position ES is given by:

$$ES_{1-\alpha} = \frac{VaR_{1-\alpha}}{1-\xi} + \frac{\beta-\xi u}{1-\xi}. \quad (9)$$

2. Data description

Value at Risk and Expected Shortfall were estimated for prices of wheat consumption in selected EU member states. To achieve that the series of average weekly procurement prices for wheat were used in the period of December, 27th 2004 and October, 12th 2014 [4]. Those EU member states were selected for which the number of observation in price series in the analysed period was relatively high (the accepted number of data deficiency was 10% of the whole series). The missing data were complemented. For all member states the wheat prices were expressed in EUR per ton. An additional series was formed by average wheat prices in the EU. The series for Poland and three Polish macro-regions (central-east – Poland_CE, south – Poland_S, north-west – Poland_NW) were also included in the analysis and expressed in PLN per ton. VaR and ES were calculated on the basis of weekly percentage log-returns using the formula: $r_t = 100\ln(P_t / P_{t-1})$, where P_t means an average weekly procurement price of wheat in time *t*. Table 1 presents descriptive statistics of the analysed series of returns and the value of Jarque-Bera test.

The highest volatility, measured by the standard deviation and the spread between maximum and minimum, characterised the returns of wheat for Slovakia, Lithuania and Hungary. It means that a higher volatility of wheat prices occurred in small member states. It must be stressed that the volatility of wheat prices for Lithuania and Hungary was even higher due to the interpolation of big number of observation. The impact of data spatial aggregation on volatility can also be noticed when comparing the returns volatility for Poland and its macro-regions. In case of all analysed series the average returns were close to zero. The distribution of the returns of wheat for Poland, Lithuania and Hungary were characterised by a negative skewness. High values of the kurtosis show that the distributions of analysed returns of wheat are characterised by fat tails that is a frequent occurrence of extremes in the series. It means that the wheat returns distributions were not of a normal distribution. Rejection the hypothesis of distribution normality of analysed returns was based on the Jarque-Bera test.

TAB. 1: Descriptive statistics of the analysed returns and the value Jarque-Bera test (J-B)

Series	No. of ob.	Max	Min	Mean	S.D.	Skewness	Kurtosis	J-B test
Germany_EUR	510	17.85	-15.92	0.08	2.93	0.07	10.19	1098.07
France_EUR	510	14.39	-14.89	0.09	3.25	0.03	6.45	253.42
Poland_EUR	510	12.37	-18.32	0.08	2.87	-0.83	8.13	618.09
Poland_PLN	510	13.61	-17.67	0.08	2.56	-0.89	11.35	1548.21
Poland_CE_PLN	510	15.24	-19.20	0.09	3.01	0.00	9.31	846.23
Poland_S_PLN	510	12.28	-18.40	0.07	3.19	-1.05	10.40	1256.08
Poland_NW_PLN	510	15.65	-18.82	0.08	3.11	-0.95	12.31	1917.56
Lithuania_EUR	510	37.78	-32.08	0.07	5.95	-0.27	9.57	924.45
Slovakia _EUR	510	39.46	-35.94	0.08	7.37	0.00	10.50	1195.82
Hungary_EUR	510	23.35	-29.71	0.11	4.87	-0.43	9.39	884.45
UE_EUR	510	11.69	-12.39	0.08	2.52	0.01	6.87	318.94

Source: own study

3. Empirical research

VaR and ES were calculated for market entities of a long and short position of wheat, that is for left and right tails of wheat returns prices distributions. Calculations were carried out for four tolerance levels: 0.005, 0.01, 0.025, 0.05. To estimate VaR and ES

the Extreme Values Theory was used, where was estimated the tail of generalised Pareto distribution – assuming the threshold of 90% (the remaining 10% of positive and negative data were considered extreme observations).

The results are presented in Table 2 and 3.

The estimation of Expected Shortfall are higher compared to estimation of Value at Risk. It results from the ES definition, because this measure is an expected value of the values exceeding VaR. The level of price risk measured by ES and VaR increases along with the declining tolerance level and in that case the difference between ES and VaR estimations also usually grows. There are differences in the level of risk for the long and short positions on the wheat market in most countries (Poland, Lithuania, Slovakia and Hungary).

TAB. 2: Value at Risk estimates obtained for generalised Pareto distribution

	Left tail				Right tail			
Tolerance level	0.005	0.01	0.025	0.05	0.005	0.01	0.025	0.05
Germany_EUR	10.25	8.22	5.84	4.24	10.95	8.57	5.96	4.31
France_EUR	10.60	8.54	6.28	4.85	11.07	9.48	7.23	5.42
Poland_EUR	11.27	9.31	6.69	4.68	8.42	7.14	5.47	4.20
Poland_PLN	11.09	7.96	5.06	3.52	8.11	6.66	4.92	3.73
Poland_CE_PLN	10.42	7.94	5.54	4.21	11.04	9.13	6.67	4.86
Poland_S_PLN	14.06	10.65	7.02	4.81	11.38	8.51	5.73	4.19
Poland_NW_PLN	12.91	9.26	5.98	4.30	9.96	8.16	6.02	4.57
Lithuania_EUR	23.34	18.80	13.24	9.36	20.26	16.71	12.22	8.97
Slovakia _EUR	28.60	23.62	16.81	11.49	30.97	23.00	14.77	9.93
Hungary_EUR	18.11	14.17	9.79	7.01	16.26	13.55	10.14	7.68
UE_EUR	8.40	7.12	5.40	4.07	8.67	7.00	5.08	3.83

Source: own study

TAB. 3: Expected Shortfall estimates obtained for generalised Pareto distribution

	Left tail				Right tail			
Tolerance level	0.005	0.01	0.025	0.05	0.005	0.01	0.025	0.05
Germany_EUR	13.89	11.49	8.69	6.81	15.73	12.66	9.28	7.15
France_EUR	14.75	12.09	9.16	7.31	13.16	11.68	9.59	7.91
Poland_EUR	14.05	12.12	9.53	7.55	10.27	8.99	7.30	6.03
Poland_PLN	20.50	14.88	9.67	6.92	10.57	8.93	6.96	5.60
Poland_CE_PLN	17.07	13.03	9.11	6.93	13.94	11.95	9.40	7.53
Poland_S_PLN	21.48	16.79	11.81	8.78	19.14	14.43	9.87	7.35
Poland_NW_PLN	24.90	17.84	11.49	8.24	13.13	11.03	8.56	6.88
Lithuania_EUR	30.85	25.82	19.66	15.36	25.77	22.02	17.27	13.83
Slovakia _EUR	35.39	30.61	24.08	18.97	49.51	37.95	26.03	19.01
Hungary_EUR	25.90	20.89	15.30	11.76	20.51	17.63	13.99	11.38
UE_EUR	10.18	8.93	7.26	5.96	11.82	9.77	7.43	5.90

Source: own study

The calculated levels of VaR and ES indicate the existence of differences of extreme price risk on wheat market in analysed EU member states. In smaller countries (Slovakia, Lithuania, Hungary) the participants of the market are put at a higher risk of extreme wheat price changes. The highest level of wheat price risk is found in Slovakia. The market entity of a long position, e.g. the producer can suffer a loss 29% or more in a week with the probability of 0.005. It means that the loss 29% or more in a week can occur once in four years. In bigger member states (Germany, France, Poland) the risk estimated on the basis of VaR and ES is much lower. The assessment of VaR for wheat in those countries do not differ significantly among one another and from VaR calculated for average wheat price in the EU. In case of big countries the entity on the wheat market can suffer from a loss of 11% or more in a week every four years. It should be stressed that those countries belong to a group of the four biggest producers of wheat in the EU. The production in France is approximately 4 times bigger than in Poland and in Germany approx. 2,5 times bigger than in Poland. The extreme price risk is also bigger for local Polish markets than for the domestic market. It means that the

market participants are put to even bigger risks than the ones estimated on the basis of aggregated prices in particular countries.

The estimated risk measures were compared to measures obtained using conventional methods. In the conventional approach VaR was determined on the basis of an empirical quantile of returns distribution – Historical Simulation Method and quantile of normal distribution – Variance-Covariance Method. The results are presented in Table 4 and 5.

The results obtained for the generalized Pareto distribution and the empirical distribution are similar. However, VaR estimates obtained for the normal distribution differ significantly from those obtained for other distributions. The risk estimated for the normal distribution is underestimated for low levels of tolerance. It means that the market entities, using this method of measurement may be exposed to the risk of the loss of liquidity. The obtained results confirm the legitimacy the use of Extreme Value Theory to measure the price risk of wheat.

TAB. 4: Value at Risk estimates obtained for empirical distribution

	Left tail				Right tail			
Tolerance level	0.005	0.01	0.025	0.05	0.005	0.01	0.025	0.05
Germany_EUR	10.84	6.67	5.47	4.14	11.26	9.07	5.62	4.18
France_EUR	10.19	8.36	6.14	4.88	11.60	8.60	6.58	5.46
Poland_EUR	10.07	8.72	6.56	4.73	7.55	7.04	5.74	3.91
Poland_PLN	9.89	9.11	5.05	3.55	8.06	6.77	4.69	3.57
Poland_CE_PLN	9.47	8.90	5.42	4.11	11.34	8.65	6.44	4.83
Poland_S_PLN	14.81	12.12	6.29	4.34	10.53	9.59	6.14	4.05
Poland_NW_PLN	14.99	10.05	5.58	4.28	8.53	7.09	6.17	4.55
Lithuania_EUR	22.12	19.81	14.06	9.20	16.66	15.49	13.02	8.89
Slovakia _EUR	31.87	22.50	16.40	10.48	31.01	25.35	15.40	8.94
Hungary_EUR	17.18	14.18	9.64	6.92	14.84	13.11	10.59	7.60
UE_EUR	8.35	6.52	5.15	4.04	10.25	6.45	4.84	4.08

Source: own study

TAB. 5: Value at Risk estimates obtained for normal distribution

	Left tail				Right tail			
Tolerance level	0.005	0.01	0.025	0.05	0.005	0.01	0.025	0.05
Germany_EUR	7.47	6.74	5.67	4.74	7.64	6.91	5.84	4.91
France_EUR	8.29	7.47	6.28	5.26	8.46	7.65	6.46	5.43
Poland_EUR	7.32	6.61	5.55	4.65	7.48	6.76	5.71	4.80
Poland_PLN	6.51	5.88	4.94	4.13	6.68	6.04	5.10	4.29
Poland_CE_PLN	7.65	6.90	5.80	4.86	7.83	7.08	5.98	5.03
Poland_S_PLN	8.15	7.35	6.19	5.18	8.29	7.49	6.32	5.32
Poland_NW_PLN	7.92	7.14	6.01	5.03	8.08	7.31	6.17	5.19
Lithuania_EUR	15.26	13.77	11.59	9.72	15.41	13.92	11.74	9.86
Slovakia _EUR	18.90	17.06	14.36	12.04	19.06	17.22	14.52	12.20
Hungary_EUR	12.44	11.22	9.44	7.90	12.66	11.45	9.66	8.13
UE_EUR	6.42	5.79	4.87	4.07	6.58	5.95	5.02	4.23

Source: own study

In the following research the quality of the estimated extreme price risk should be examined. However, it requires the accessibility of data series which are sufficiently long.

Conclusions

The paper examines the extreme price risk of consumer wheat market in the EU. To estimate the risk measure the Extreme Value Theory was used. The implementation of this theory enables to focus on modelling distribution tails rather than the whole distribution. The risk measures were calculated as the functions of quantiles of a generalised Pareto distribution.

The obtained results show the existence of diverse levels of price risk on the wheat market in particular EU member states. Much higher risk is present in smaller countries and local markets. Due to that fact the actual exposure of market entities to the price risk is much higher than the estimation of risk levels on the basis of aggregated prices. The lack of distribution normality of wheat price returns and the occurrence of fat tails

indicate high probability of extreme returns appearance. Therefore the analysis of extreme returns, the measurement and monitoring of extreme risk is of a key significance from the point of view of the risk management of the entities whose financial condition depends on wheat prices. One of the theories which enables that is the Extreme Value Theory.

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LOCAL GOVERNMENT CONSOLIDATION – THEORY AND PRACTICE

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Keywords:
local government – consolidation – reform – effect of scale.

Abstract:
The article presents theoretical arguments for the consolidation of units, and a review of the ex-post global experience in achieving the expected results of such reforms. Despite the mixed results of empirical analysis, consolidation remains the main reform trend of local government. It is determined by policy consideration, because it is easier to implement the consolidation reform than laboriously create institutional change inside the units.

Introduction

All consolidation propositions *a priori* imply that reduction in the number of units and enhancing their size will rationalize the administrations. Moreover, this demand is largely formulated in any public debates concern functioning of the administration (not only self-government). The basic argument is a reference to the already mentioned effects of scale, which assumes that with the increase in the scale of production (in this case, scale of the public service), the unit cost of the product decreases (for example, administrative services). [1, 201]

Meant by the author, the article has to accomplish two aims. The first goal is to present theoretical arguments for the unit's consolidation and an international experience in the implement of such projects. The second objective is to formulate its own recommendations concerning the elimination of territorial division dysfunction.

1. Theoretical aspects

The arguments in favor of territorial consolidation (leading to creation of large subnational jurisdictions) are synthetically summarized by Swianiewicz [12, 15]. In the opinion of many economists, too much of structures grinding results in increased transaction costs of provided services. Consolidation of entities providing these services should therefore lead to a reduction in the unit operating costs and increase efficiency [9, 42].

Larger councils are thus supposed to enjoy lower administrative costs, smaller costs of representation, increased purchasing Power improved use of depot, plant and equipment, and more diverse funding base, among many other purported advantages. It goes on to say that, accordingly, amalgamation delivers economies of scale and allows councils to employ a wider range of professionals, so that can offers a wider range and quality of service. In effect, policymakers in several countries believe that local government consolidation will result in reduced costs [3].

2. Results of ex post studies

At this point, question may be raised - if consolidation is to produce concrete results, then they should be diagnosed in the ex-post assessment in the countries that have carried out such reforms. What picture emerges from a review of these studies? Well, the conclusions are surprising. The *ex post* studies positive effects of consolidation were identified rarely, completely different than assumed in the *ex-ante* models. They have not confirmed the effect of scale (defined as the unit cost of procedures) in terms of the whole units, as well as in particular specialties. In one of his articles Dollery gave the following conclusion that there is no evidence for a cheaper operation of larger and the experience of many countries in the concentration of services and connecting the units proved to be not “a miracle solution” to reduce expenditure. By contrast, consolidated and concentrated tend to be associated with higher spending [4]

Similar in its expression are American studies [10], [11]. They did a summary of dozens of North American studies on the effects of the public services consolidation. As a summary we use the fragments quoted by them:
"Over the past 20 years there have been many case studies of consolidation in the United States and Canada. However, failed to find significant economies of scale for most municipal services. The conclusions of these and other studies have shown that the cost of many services, after the large municipal consolidations, paradoxically increased." [7]

"A review of 25 research studies conducted over the past two decades on "fragmentation" versus centralization in U.S. local a government suggests that local government systems which are fragmented and deconcentrated are generally associated with lower spending and greater efficiency. The power of bureaucracies grows the larger the centralized government becomes (...) They are hemmed in by empire-building bureaucracies and government employee unions, which are stronger in the larger "fragmented" municipalities" [5].

Excellent review of international experience from empirical studies of structural reforms, perform Dollery and Grant [2]. They confirm that the results of empirical research are dubious and that despite many consolidation reforms, scope of research on their effects is still a causal nature. Against this background, the European researches are relatively poorly developed. Dominated studies here are *ex ante* which clearly cultivating neoliberal beliefs about the need to limit public sector. They do not notice the specificities of the local government functioning quite often, equating them to the private sector institutions. The few major papers that treat this problem slightly wider are among others, Houlberg i Swianiewicz [6], [13].

3. Discussion

This brief review of the literature on the effects of the territorial division reform of countries shows, that there is no conclusive theoretical premises that would allow to determine the optimal size of local government. Interdisciplinary nature of learning about the local administration and diverse nature of the institution, that shape it, does

not let to make simple and universal synthesis in this regard. This fact alone should slightly cool down an enthusiasm of reformers who believe that the economy of scale is an automatic mechanism that always turns up in case of administrative units enlarging. So instead of changes in local government structures, more attention should be paid to changes inside these institutions. It turns out that this element is far more important in shaping the general costs of the system of local government, than the structure defects.

Conclusion

Without taking into account the complicated nature of the units, consolidation may not lead to the expected results. Larger effects can bring internal reform of the institutions – most of the phenomena that reduce the effectiveness of local governments are located in them. It is therefore necessary to improve the operation of the existing structures. In contrast, the effect of scale achieved by changes in the structures is usually overestimated. Consolidation of two dysfunctional units will not decrease but increase these dysfunctions. Their nature appears not from the scale of units but from internal conditions. First it might be well to find ways to rectify the situation inside the units, and then possibly think about the obtaining effect of scale. Despite premises it is difficult to pass through the well-established paradigm that consolidation is the cure for many problems. From where is thus attractiveness of this solution comes from? It is determined by policy consideration. From this point of view it is much easier to perform the consolidation reform, emphasizing its activity in the introduction of spectacular changes than laboriously creating institutional changes inside the units. This political perfection, however, does not bring the expected economic changes.

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ECOTOURISM MANAGEMENT - CASE STUDY OF SELECTED DESTINATION OF EUROPE

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Keywords:
ecotourism – opportunities – destination – Greece – Europe

Abstract:
The paper deals with the issue of Ecotourism focusing on case study of selected destination of Europe. Travel is increasingly becoming an essential part of our lives and one sort of tourism is just Ecotourism. The World Tourism Organization defines Ecotourism as responsible travel to natural areas that conserves the environment and sustains the well-being of local people. Ecotourism contains all nature-based forms of tourism in which the main motivation of the tourists is the observation and appreciation of nature as well as the traditional cultures prevailing in natural areas. The aim of this paper is to introduce various opportunities of the ecotourism in selected destination of Europe.

Introduction

Tourism is one of the most dynamic economic sectors in which especially in recent decades increasingly reflected new trends. Society changes continuously, and trends - whether economic, social or lifestyle - subsequently impact on tourism, as tourism is an integral part of our society. It is important for the tourism sector to assess these changes at an early stage. All the countries in the continent have their distinct characteristics that are peculiar and unique to the place. [2, 133]

Europe has been at the heart of eco-tourism growth in recent years. Eco-tourism has proved very popular among the professional classes and higher educated segments of the population in many countries including the UK, the Netherlands, Germany, Scandinavia, and France in particular. Many European destinations which have not

previously attracted many tourists, have managed successfully to attract eco-tourists offering a range of products that are based on their particular natural and cultural resources. [9]

Ecotourism in Europe is unrivalled when it comes to the diversity of the landscapes. The continent is home to vast expanses, dramatic mountains, heart-stopping beauty, and breath-taking experiences. You can do it all in Europe, from cycling to hiking, in the snow or in the hot, hot heat, from the Arctic Circle to the shores of the Mediterranean, ecotourism in Europe will keep you exploring forever. [6]

Greek regions are extremely well endowed in natural and cultural resources. These include a unique and picturesque countryside, attractive mountainous landscapes, a hundreds years' old tradition of folk arts, music, food, and life style and friendly, hospitable, local communities. These can become successful eco-tourism destinations because of its outstanding cultural and natural attractions. [9]

1. Materials and Methods

Ecotourism is an alternative form of tourism whose sole purpose is holiday activities and the core element of this type of tourism is natural-based. The main characteristics of Ecotourism, concern mainly destinations where the cultural and environmental heritage are in abundance, in certain parts of our planet. The increasing demand for alternative types of tourism, such as Ecotourism, make countries (like Greece) more popular as destinations. According to Responsible Travel, there's a constantly rising need from consumers for Ecotourism: [5]

- 96% of Condé Nast Traveler readers think hotels and resorts should be responsible for protecting the environment they operate in.
- 74.5% says that a hotel's environmental policies can influence their decision to stay there.
- 46 % of the German's think 'it is an added value to stay in an environmentally friendly accommodation
- 80 % of the Dutch want information on ethical issues in their travel information.

The aim of this paper is to introduce various opportunities of the ecotourism. For purpose of this paper was selected destination of the Greece. Author using theoretical research, in which the initial descriptive stage of scientific research clarified the concepts, definitions and categories, enabling to organize and categorize phenomena on the basis of similarity and repetition. To obtain primary information there was selected the complementary method of participatory observation from traveling along Greece regions. The main Hypothesis is that the Ecotourism potential of the Greece is sizable.

2. Ecotourism in Greece

Greece has a long tradition in tourism and hospitality mainly due to its history and ancient civilization. Foreigners were considered sacred in ancient Greece. Xenias Zeus, the father of gods, also became the god of hospitality to protect foreigners and inspire locals to look after their visitors. Greece is land of rich economic, religious and intellectual activity for more than three and a half millennia. [3, 335]

Greece is situated in the southern part of the Balkan Peninsula and the islands of the Ionian and Aegean Sea. The country boasts more than 2000 islands and islets. The total length of the coastline is very rugged 13,482 km. The surface of the country is mostly mountainous. Region is crossed by a massive Pindos with the highest mountains Smolikas (2637 m) and Parnassos (2457 m). The highest mountain in Greece is sacred Olymp (Olymbos 2,917 m). The Ionian Islands are these: Kerkyra (Corfu), Leukas, Cephalonia, Ithaca and Zakynthos. In the Aegean island group Cyclades, Dodecanese and North Anatolian coast in the Dodecanese, as well as the islands of Lesbos (Lesvos), Chios, Samos, Ikaria, Rhodes and many others. The southernmost is the largest Greek island of Crete (8,335 km^2) separated from the Aegean Sea in the north Cretan Sea. Many islands remain uninhabited for small area and lack of drinking water. The climate is Mediterranean, with long periods of summer drought. When the sea temperature almost never falls below zero, winter is mild and rainy, summer is hot. In mountainous areas the temperature decreases with increasing altitude and the climate is harsher.[4, 165]

Traditionally Greece is known for the spectacular holidays it provides, but now offering something very unique and interesting to visitors, who do not like to tread beaten paths,

Greece is opening its doors to welcome ecotourism holidays enthusiasts. Catering to all tastes, Greece gives you the opportunity to either explore breathtaking forests, or take a ride through a national park, not just on the mainland, but also on the little explored quaint islands. [10]

Ecotourism in Greece we can divide into, for example: [7], [10]

- Eco Sailing and Diving - One of the most stunning natural attractions in Greece is its coastline. Greece is famed for its gorgeous blue waters and unbelievably picturesque islands, so ecotourists will absolutely adore eco sailing and diving trips. This sort of Ecotourism was inspired by team of sailors, divers, biologists, and environmentalists, all of whom are dedicated to studying and preserving the marine world. They also operate a series of unique ecotourism activities to expose the public to the biodiversity of the marine ecosystem, but also to raise public awareness of associated environmental issues. They operate some incredible experiences that include encounters with sea turtles, dolphins, and whales, as well as multiple day adventures throughout the magically blue Aegean and Ionian Seas.
- Some companies in Greece offer Eco-Farming. I tis ideal place to get away, relax, and experience the beauty of the destination. Tourists will be accommodating in houses surrounded by garden terraces, each with easy access to the forest, beach, and organic vegetable and herb gardens. Cooking is done outdoors, and emphasis is placed on an organic, natural lifestyle and experience.
- Another sort of Ecotourism in Greece is visiting Organic Winery. Visiting local wineries is one of the best ways to explore a country, especially if the winery is organic, operates an organic farm, and practices agro-tourism, as Ikarian Wine does. They also have wine courses, cooking courses, and accommodation, and are located on the Greek Island of Ikaria, the ancient birthplace of the wine-god Dionysus.
- Tourist can discover Mountains, forests and rivers too. The northwest part of Greece is mostly known for its forested mountains and deep winding rivers, which have some of the oldest and exquisite bridges standing over them. One such breathtaking place is Zagoria, located in Epirus, which is famous for its

45 villages, consisting of stone houses and surrounded by mountains full of pine and oak trees. Nearby is Bourazani environmental park, which is guaranteed to blow you away. Central Greece is an unspoiled heaven, which is once again famous for its pine forests, and the high mountains they stand on. Some of the most impressive gorges can be found in this region and it is ideal for treks.

- Visiting caves. Another attractive feature are the caves in Greece, ranging from underwater to subterranean caves, they can be found in huge numbers both on the mainland as well as on the numerous islands. With many villages rejecting mass tourism and adopting ecotourism as a means to increase revenue, the number of visitors wanting to explore the real Greece is increasing every year.

Actually, one of the best kept secrets is that Greece is a true European biodiversity hotspot! A few facts: [8]

- It has around twice the number of plant species (6000) as compared to a large country like Germany (which has 3000 plant species) whilst around 15% of the plant species in Greece are endemic. This means that those species are unique and cannot be found anywhere else in the world!
- With 446 bird species recorded in Greece it makes it a paradise for bird lovers and a great place for bird watching.
- Northern Greece has vast mountainous areas, a virgin forest and the largest population of European Brown Bears in Southern Europe!
- The marine environment is an important biotope for species like the near extinct Mediterranean Monk Seal, the Logger Head Turtle and the Eleonora's Falcon.

For example Rhodes' flora as well as containing representatives of all the major flowering families found in the Mediterranean is also home to over 52 orchid species including many that are endemic to the eastern Aegean region. One of the more interesting spots for the Rhodian fauna is the world famous valley of the butterflies, where large concentrations of the Lepidoptera Callimorpha quadripunctata congregate during summer. Untypical for an island is the case of an endemic species of fresh water fish, the teeny fish Ladigesocypris ghigii. [1, 202]

Conclusion

The aim of this paper was introduced various opportunities of the Ecotourism. For purpose of this paper was selected destination of the Greece. Author used theoretical research, in which the initial descriptive stage of scientific research clarified the concepts, definitions and categories, enabling to organize and categorize phenomena on the basis of similarity and repetition. To obtain primary information there was selected the complementary method of participatory observation from traveling along Greece regions. The main Hypothesis of this paper is confirmed. Ecotourism is an alternative form of tourism whose sole purpose is holiday activities and destination of the Greece offer whole of opportunities of Ecotourism. Ecotourists will absolutely adore eco sailing and diving trips or will be accommodate in houses surrounded by garden terraces, each with easy access to the forest, beach, and organic vegetable and herb gardens. Tourists in Greece can visit Organic Winery or visiting one of 8 500 caves too. The northwest part of Greece is mostly known for its forested mountains and deep winding rivers, which have some of the oldest and exquisite bridges standing over them. Greece is optimal destination for Ecotourists to discover not only ancient natural wonders.

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MONEY IN MODERN ECONOMY

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Keywords:
evaluation study – fiat money – fractional-reserve banking – alternative currencies

Abstract:
The evaluation study is focused on the current knowledge and theories on the function of money in economy. Some experience gained in last worldwide economic crises and systematic shortcomings of the current practice of the fiat money and of the fractional-reserve banking based economy are summarized in the study. There are also described some merits and demerits of alternative time based currencies in the evaluation. However, introducing them into global economy would desire some effort to create criteria for distinguishing valuable, efficient profitable labour, products, goods, services and works, as well as to develop procedures how to measure and express the value of natural resources and other impositions upon nature, environment, society on the whole planet.

Introduction

In our previous contribution to the HED 2014 conference [1], we have shown that the main reason for the last global economic crises was caused rather by failure of the managerial and government authorities than by lack of theoretical knowledge of modern economic relations and processes. As stated in a AngelidesComission report [2], they knowingly committed such practice as so called „subprime" mortgages for clients who were under standard conditions to afford it. Mortgages were formed through brokers who receive remuneration based on the number of closed mortgages. The interest rate on these subprime mortgages were variable, moreover, clients have the option to pay only the interest in the early years. The American government even supported it via its own companies (such as Fannie Mae and Freddie Mac). The Federal Reserve System did not take the necessary regulatory measures and did not stop the influx of these "toxic" mortgages in time. The FED did not even check properly purchase and sale of

mortgage-backed securities and other financial institutions, and was oblivious to the observance of adequate bank reserves, committed funding of "overnight market "and other violations of banking ethics.

We have shown in our previous evaluation, that the last economic crisis, as well as the previous ones had its roots in wrong understanding of the role of money in the modern economy, too [3-7]. We stated [1] that

- money should serve, not to rule,
- money is a very important and useful tool for the economy, but not else than just a tool,
- money expresses consensus on value assignment, serves as a payment instrument, as a tool for assessing the economics of material processes, represent the right (option) to acquire a certain kind property, products (goods), valuable artifacts, liabilities (stocks, bonds), and have other essential function,
- development of a healthy economy, prosperity and well-being must be available not only money, but also other "tools" such as know-how, educated, experienced and skilled workers and managers, science, modern technology and technology, information, traffic a means of communication and many other "tools" and assumption,
- lack of or insufficient levels of money lead to overall backwardness of countries and to regional and/or local disparities.

We have also highlighted: money in hands of speculators represents a destructive danger for economy, business, social and political developments around the world, especially, in conditions when value of money, or amount of money in economy, is set on more or less subjective considerations of central bankers and other authorities.

It is obvious, that conventional money systems based on fiat money together with fractional reserve banking and a central issuance are at the root of recurring economic and social problems [7].

In this evaluation study we would like to pick up some aspects of currency based on time and contribute to the discussion of its use for economic recovery, in general.

Methodology

The evaluation study is based on the method of qualitative analysis of secondary data and information available on the function of money in modern economy. It is of pre-formative character on thinking about needs and possibilities for creating a stable and objectified monetary and banking system. Namely, this (ex-ante) evaluation describes some of the current problems of the monetary and banking system, analyzes needs and reasons for improvement and their implementation. It suggests possibilities of interventions and feasibility of the implementation of a time based currency in future economy to potential stakeholders.

Time-based Currency

The time-based currency is a currency which unit of exchange is one person-hour [8,9]. Everybody has just 24 hours or 86400 seconds total in a day. This feature is a firm foundation for a valuable time-steady currency, as an hour is 3600 seconds today, and will be same tomorrow and in a hundred years from now, and as the life time is the most precious value in the world, which is not a subject of inflation. None of the bankers, state or other authorities or persons can to increase artificially the amount of the day time allocated to each person, nor to store it, nor to buy or sell it.

It is a matter of fact, that the current practice of the fiat money and fractional reserve banking in debt-based economy enables creation of "speculative commercial-bank money". Namely, the fractional-reserve banking permits the total money volume in economy to grow beyond the amount of the underlying reserves of the base money originally created by the central bank [12].

Moreover, the loans for borrowers bear interests per annum, which are usually considerably greater than the interests of deposits or central bank interest rate and fold greater than reasonable growth of value added, or GDP in the real economy. These disparities cause inter alia an excessive production of goods and services which is useless and harmful with respect to the environment, nature resources, safety and wellbeing on the Earth.

In our opinion, on the contrary to fiat money,
labor time is a specific commodity whose value is extraordinary per se,
amount of labor time is in a direct correlation with increase of population,
value of the labor time is at disposal to mankind for managing all the emerging challenges, conditions coupled with the increasing number of population.
That is why time should be the base for the future currency.

So far, the time-based complementary currencies, called Time Dollar, or Time Credits, or Service Credits [8,10], or "Minuto" time vouchers [11], "OCCCU" Occupy money and others [7], have showed their viability in the branch of services. These currencies value mostly everyone's contributions equally: one hour equals one service credit, regardless of the service provided in one hour or how much skill is required to perform the task during that hour. Each exchange of services and/or time is recorded as a corresponding credit and debit in the accounts of the participants. It is provided usually in time banks using standard banking procedures and technologies for a specific community. Thus, the time banking is a pattern of reciprocal service exchange that uses units of time as currency, which is a type of a complementary monetary system. Services offered by members in Time Banks usually include: child care, legal assistance, language lessons, home repair, and respite care for caregivers, etc. [11].

For broader purposes, it would be necessary to distinguish and assess qualification and skills "obtained" in hours of the services provided. It would be needed to add somehow all the time needed for obtaining of the appropriate qualification and skills for providing qualified services or jobs in medical and health services, education, science, engineering, etc. Everyone should be evaluated for her/his efforts.

Time Banks have been established yet in 34 countries, with at least 300 Time Banks established in 40 US states and 300 throughout the United Kingdom [7,9] Time Banks also have a significant presence in Japan, South Korea, New Zealand, Taiwan, Senegal, Argentina, Israel, Greece, Spain, Canada, Australia, Ukraine, and Tunisia [7,10]

The Minuto currency – although originally created to work in social networks between people who trust each other – is capable to complement the traditional currencies (like Euro, Pound, Dollar, Yen, etc.), because many items (for instance: petrol, heating oil, telephone bills, electricity, gas, new cars, etc.) are available by paying with these currencies yet. For these purposes, the specific "exchange rate" 60 Minutos = 30 Euros was adopted in Germany, based on assessment/cost of one hour of quality work– on average – about 30 Euros (in August 2010) [11]. It makes also possible to solve the issue of taxing, because income from commercial transactions in Minutos or in other time-based currency follows the same rules as income from conventional currencies, and needs to be paid in the conventional currency [11].

To introduce the time-based complementary currency into global economy, it would desire surely tremendous effort to create criteria for distinguishing valuable, efficient, profitable labor, products - goods, services and, as well as to develop procedures how to measure and express the value of natural resources and other impositions upon nature, environment, society on the whole planet works in a broad democratic process. However, we have at disposal capable ICT technologies nowadays for detailed assessing of the value of economic subjects, processes, raw materials and machinery used (including the values of past labor, land, environmental, capital, etc.) in time-based units.

It is our opinion, that mankind should accelerate research and development of new prospective currency and tools, methods, procedures, etc. for managing fundamental conditions for harmless economic development and safe life on Earth.

Conclusions

Money deserves a good modern theory and practice based on actualized labor and resource theories of value. Otherwise, the current practice of the fiat money and of the fractional-reserve banking based economy will create speculative money in exponentially expanding measures, and the volatility, subjectivism, relativism, particular political interests, violations of banking ethics, corruption, managerial and political failures and other negative phenomena can seriously damage or even destroy the existing global economic system totally in recurring crises.

The time-based units (or currency) are capable to serve as an objective base for quantification of all the economic, financial, marketing categories in current practical use, like: costs of production, profit, rent, the socially-necessary labor time value, the use value, the exchange value, desire to gain products, market prices, prices of supply and demand, and others. it would desire surely tremendous effort to create criteria for distinguishing valuable, efficient, profitable labor, products as well as to develop procedures how to measure and express the value of natural resources and other impositions upon nature, environment, society on the whole planet works in a broad democratic process. However, we have at disposal now capable ICT technologies to solve these issues.

Time bankers shall become then very important protectors of the time value deposits and administrators of all the relevant time value transfers in economy as well as among people. Their value adding work will undoubtedly be correctly evaluated in the time based money.

It is the highest time to break the curse of the medieval bank practice of fiat money and of the fractional-reserve banking based economy and to start a new future economic era based on advanced technologies, new prospective tools, methods, procedures, rational thinking, and real democracy for managing fundamental conditions for harmless economic development and safe life on Earth.

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INVESTMENT INCENTIVES OF THE EURASIAN CUSTOMS UNION MEMBER

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Keywords:
Eurasian customs union – Belarus – investment incentives – free economic zones – decree # 6

Abstract:
Investment climate of the Eurasian customs union members has substantially changed during the last several months. Due to the economic sanctions imposed by Russia as the reaction on EU sanctions, international market players are seeking new the possibilities to supply their products to Russia. The use of the Eurasian Customs Union member might be the right choice to access the market in Russia. During the last several years Belarus made enormous progress in attracting the FDI and changing its business climate. Belarusian state makes sufficient efforts to attract foreign investors, guarantees their rights and offers several forms of investment incentives. Analysis of conditions and the comparison of operation in High Technology parks, Free economic zones and under Decree # 6 are the objectives of this paper.

Introduction

Investment climate of the Eurasian customs union members has substantially changed during the last several months. The Crimean crisis, almost official name of the annexation of the Crimea Peninsula by Russia, and still lasting armed conflict in Donetsk and Lugansk regions of Ukraine resulted in the series of economic and political sanctions that severely affected the attractiveness of Russia for foreign investors. Although the sanctions themselves can be revised or changed in the nearest future in case that the conflict will come to an end, the perception of the investment climate in Russia will most probably last for quite a long time.

One of the most substantial problems of the current crisis is its unexpectedness. The analyses of the economic situation and political and economic risks in this region have not included the probability of isolation and imposing of the economic sanctions against Russia [1]. Russian private sector net outflow of capital substantially increased and is reaching the level of 85,2 billions of US dollars for the first nine months of 2014 [2]. As the reaction on the sanctions, imposed by the USA and the EU, Russia decided to protect its market and imposed selective sanctions on the import of some food products.

Taking into consideration the size of the Russian market we can assume that international market players might seek the possibilities to supply their products there. The methods, used by the importers to circumvent the sanctions underline the attractiveness of the market. For instance Norway salmon producers rerouted fresh salmon supplies through Belarus as the Eurasian Customs Union (ECU) member, by allocating the its processing there, and afterwards entering the Russian market with the new customs code (resulted in approximately 30 percent price growth) [3]. EU and US sanctions are implied specifically on Russia, and do not involve the other members of the ECU, which makes these countries an alternative for investment allocation. The products compliant with the applicable Technical Regulations, and produced on the territory of the ECU member, have the access to the market of all member states. Due to its location, Belarus seems to be the best choice to enter the Russian market through the ECU member [4]. Investment incentives of Belarus and Kazakhstan are influencing the investor's decision making and are gaining the importance in the current economic and political situation. The basic overview of the attractiveness of Belarus for FDI and main investment incentives of Belarus are the subject of this paper.

1. Current business environment outlook

Since 1991 Belarus has successfully avoided political and economic turbulences by preserving strong centralized government system and sufficient state influence on its economy. This strategy brought stability, but kept desirable foreign capital outside of the country [1]. Taking into consideration current Crimea Crisis, political and economic situation in Ukraine and Russia, we can state, that Belarus is politically and economically more stable than most of the CIS countries. The only factor, which need

specific attention and has to be precisely evaluated - the risk of political instability in Belarus - has been substantially lowered by the threat of the repeating of the Ukrainian crisis. As do Šavrina and Sproge-Rimša state, if a country's political system, even if it is a dictatorship, is stable, it becomes a contribution factor with fundamental impact for foreign entrepreneurship. Initial analysis of the business environment in Belarus for FDI indicates such business promoting factors as low political risk, non-discriminating business environment, affordable workforce, and the advantages of the ECU [5].

During the last several years Belarus made enormous progress in attracting the FDI and changing its business climate. The main changes have been made in the simplification of doing business, including tax reforms and investor protection [6]. Doing Business 2014 report indicates that since 2008 Belarus made third biggest progress among 189 analyzed countries in reducing business regulations. The overall rating of the ease of doing business in Belarus has been improved by 47 positions since 2008 being ranked as 63rd country in this rating (Czech Republic – 73, Slovakia - 49, Poland - 45, Russia – 92) [7]. Belarus has the 15th easiest business starting process, 3rd easiest property registration with just almost zero cost of registration. Belarus has achieved the main progress in reduction of the registration fees, simplification of preregistration and registration formalities for incorporation; speeding up property registration and advanced the most in regulatory practice in paying taxes in Europe and Central Asia and globally since 2008 [7]. What is important for importers, Belarus has made the greatest progress in reducing regulatory practice in trading across borders in the World since 2009. The predictions of the economic development of Belarus expect the growth of the FDI facilitated by ongoing efforts of Belarusian government to improve the business environment. We can expect that the bureaucracy will scale-back its role in the economy and permit greater free market enterprise, but do also expect the state to retain a major role in the economy and that the authoritarian political system will prevail [8].

2. Investment incentives in Belarus

Since 2014 the basis for legal regulation of investment activity of the investors in Belarus is the law "About Investments" from July 12, 2013 of No. 53-Z. It determines the general legal conditions for investment activity in the Republic of Belarus and defines state support as well as protection of investor's rights on the territory of Belarus.

According to this law, Belarus guarantees the rights of the investors to transfer the profits of the investment out of Belarus, guarantees the safety of the foreign investments, grants the right to employ foreign employees and have a right to enclose an investment agreement with Belarus [9]. Besides the basic investment protection guarantees these forms of investment incentives are been offered for domestic and foreign investors.

2.1. High Technology Parks

Special tax and legal regime is being provided for the residents of the High-Tech Park (HTP), which can be located anywhere in Belarus, include special favorable conditions for enterprises or individual entrepreneurs, operating in the field of analysis, software support and development, and other forms of data processing. The special tax and legal regime is valid until 2020, and provides the HTP residents with the total exemption from value added tax and corporate income tax, lower rate of individual income tax for employees (9%), exemption from import duties and VAT for the hardware and software, required to carry out their activities [10].

2.2. Free economic zones

Free economic zones (FEZ) created by law in 1998 are located in all 6 regions of Belarus, have strictly defined boundaries and offer favorable conditions such selected entrepreneurial activities as industry, science, technology, export, trade, recreation, and also insurance and banking. Investment incentives for the FEZ resident include a privileged procedure of taxation (less number of taxes, 5 years of the corporate income tax exemption (50 % discount after 5 years), real estate tax exemption) and special customs regime. When importing of foreign and domestic goods to the territory of the free customs zone, the taxes and customs payments except for the dues for the customs processing are not collected and the measures of economic policy are not applied [11]. In case that the FEZ resident exports goods to the territory of the Eurasian Customs Union (ECU), the goods are considered to be either foreign, or domestic, depending on the measures of economic policy. Export out of the ECU is exempted from the custom duties and is being treated as produced out of the ECU, which makes the allocation in the FEZ attractive for the export oriented foreign producers. According to the current legislations, Free economic zones will operate till 2017 (might be prolonged).

2.3. Decree No 6

The less known, but potentially the most attractive form of investment incentives is defined by the Decree of the President of the Republic of Belarus No 6 of May 7, 2012 On Stimulating Entrepreneurial Activity in the Territory of Middle, Small Urban Settlements, Rural Area. Companies, generally located out of the largest cities, which are basically covered by Free economic zones, are exempted for 7 years from the income tax for the sale of own production, property taxes for the property, located in the defined region, customs duties and value added tax on imported equipment, components and spare parts. What is even more important, companies working under Decree No 6 are exempted from compulsory usage of Belarusian Universal Commodity Exchange when acquiring raw materials, components and materials for own production, and which is a big issue in Belarus [11]. Direct contracts with the suppliers allow the investors to receive better financing conditions of the FDI. The specified decree also specifically allows the local budgets to finance the expenditures for the production field's preparation, including provision of the brown-fields with no charge of investor.

3. Comparison of the investment incentives options

The comparison of the investment invectives options is provided in the following table. Operations in the HTC are being substantially supported, but the investor must take into consideration the fact, that HTC VAT exemption is valid only for operations in Belarus. Territory of middle, small urban settlements and rural area is the most attractive for the investors, seeking the possibility to place the production factory in the ECU and supply the products to the Russian market.

TAB. 1: Comparison of the investment incentives options

	High Technology Park	Free economic zones	Decree #6
Basic requirements	Operation in the field of analysis, development and software support of information systems and data processing	Operation in the field, supported by selected FEZ	Operation out of the largest cities, own production
Allocation	Anywhere in Belarus	6 largest cities	Out of the largest cities
Validity	Up to 2020	Up to 2017	Not limited
Income tax exemption	Up to 2020	5 years, 50 % later	7 years
Income tax for employees	9%	-	-
VAT	Up to 2020	50% reduction for the import replacing products	-
Real estate (property) tax exemption	Yes	Property inside FEZ	Yes
Import duties exemption	Technical equipment	All equipment, delivered to the FEZ	Technical equipment, components and spare parts
Import VAT exemption	Technical equipment	All equipment, delivered to the FEZ	Technical equipment, components and spare parts
Export duties exemption	-	Yes	-
Other	5% income tax for the activities of the permanent establishments of the HTP resident abroad	-	Exemption of the obligatory usage of Belarusian Commodity Exchange

Source: Laws of the Republic of Belarus

Conclusion

Investment climate of the Eurasian customs union members has substantially changed during the last several months. Due to the economic sanctions imposed by Russia as the reaction on EU sanctions, international market players are seeking new the possibilities to supply their products to Russia. The use of the Eurasian Customs Union member might be the right choice to access the market in Russia. During the last several years Belarus made enormous progress in attracting the FDI and changing its business climate. Belarusian state makes sufficient efforts to attract foreign investors, guarantees their rights and offers several forms of investment incentives. Analysis of conditions

and the comparison of operation in High Technology parks, Free economic zones and under Decree # 6 shows, that investors have exclusive investment invectives for operation in Belarus. Combination of the incentives allows allocating the investment in almost any part of the Republic of Belarus, and use substantial tax exemptions.

The most favorable conditions apply for enterprises, operating in the field of analysis, software support and development, and other forms of data processing. High Technology parks tax exemptions make Belarus a tax haven for this industry till 2020. The territory of middle, small urban settlements and rural area of Belarus seems to be the best choice for the producers, seeking and alternative way to circumvent the sanctions and supply their products to the Russian market and market of the Eurasian Customs Union members.

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BOUNDED FUZZY APPROACH FOR BINARY PORTFOLIO SELECTION PROBLEM

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Keywords:
bounded fuzzy approach – fuzzy parameters – *p*-fractile approach – portfolio optimization problem – triangle fuzzy number

Abstract:
Fuzzy approach is a recent approach to uncertainty modeling, which deals with uncertainty by describing it using fuzzy sets defined by fuzzy membership functions. This paper introduces fuzzy bounded methodology to solve binary portfolio optimization problem with fuzzy parameters. The problem takes into account the fact that real share profit values could be different form predicted; the future profit of the shares are presented in the model by triangle fuzzy numbers. Paper also reviews *p*-fractile approach which is used to defuzzify share profits and solve the model using *p*-fractile coefficients. Fuzzy portfolio optimization problem is transformed into linear programming problem with bounded constrains and solved by presented techniques using different formulation modifications. The paper presents case study computation experiments and results.

Introduction

The paper is focused on binary portfolio optimization problem which is designed for estate market, where you can either purchase estate or not. In the case study in order to simplify the model we work with data from share market. The paper presents portfolio problem formulated as fuzzy problem with fuzzy parameters and binary variables and suggests bounded approach to solve the problem. The idea of introduced approach is to find an optimal solution for fuzzy linear programming (FLP) portfolio optimization problem by setting a bounded constrained on the potential loss, expressed by the difference between upper bound and lower bound of the objective function.

1. Portfolio selection problem and its mathematical formulation

Basic model for portfolio optimization problem can be formulated as follows: let us define n as a given number of shares from which we should select a subset; K is the limit of total expenses on selected shares; for share i a_i is the price of share, c_i is expected profit of share i. Binary variable x_i defines the decision to choose share i, when x_i=1, or decision not to choose the share in case x_i=0[1]. The basic model is described below:

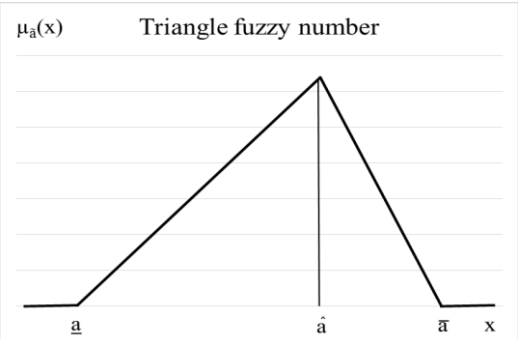
$$max \sum_{i=1}^{n} c_i x_i \,, s.t. \sum_{i=1}^{n} a_i x_i \leq K, x_i \in \{0,1\}\, i = 1,2, \dots \,, n. \tag{1}$$

2. Preliminaries

We will use triangle fuzzy number $\tilde{a}$= ($\underline{a}$, $\hat{a}$, $\bar{a}$) (see FIG. 1), where $\underline{a} \leq \hat{a} \leq \bar{a}$ and membership function $\mu_{\tilde{a}}(x)$ is described as follows:

$$\mu_{\tilde{a}}(x)=\begin{cases} 0, & x < \underline{a}, \\ L(x) = \frac{x-\underline{a}}{\hat{a}-\underline{a}}, & \underline{a} \leq x \leq \hat{a}, \\ R(x) = \frac{\bar{a}-x}{\bar{a}-\hat{a}}, & \hat{a} \leq x \leq \bar{a}, \\ 0, & x > \bar{a}. \end{cases} \tag{2}$$

FIG. 1: Triangle fuzzy number



Source: author

[1] Presented model is designed for estate market, where you can either purchase estate or not. In the paper in order to simplify the model we work with share market.

Let's now define multiplication (3) for triangle fuzzy number: let $\tilde{a}$ = ($\underline{a}_i$, $\hat{a}_i$, $\bar{a}_i$) be a triangle fuzzy number, then

$$k * \tilde{a} = (k * \underline{a}, k * \hat{a}, k * \bar{a}) \; pro \; k > 0. \tag{3}$$

3. Linear programming portfolio optimization problem with fuzzy parameter

Consider the following linear programming portfolio optimization problem with *n* variables and fuzzy parameter $\tilde{c}_i$, formulated as follows:

$$max \sum_{i=1}^{n} \tilde{c}_i x_i \, , s.t. \sum_{i=1}^{n} a_i x_i \leq K, x_i \in \{0,1\} \; i = 1,2, \dots \, , n. \tag{4}$$

Let the parameter $\tilde{c}_i$be the triangular fuzzy number ($\underline{c}_i$, $\hat{c}_i$, $\bar{c}_i$). Now we define the portfolio problem based on fuzzy relations. For fuzzy $\tilde{c}_i$ and binary variable x_i the objective function $\tilde{z}(x) = \sum_{i=1}^{n} \tilde{c}_i x_i$ is a fuzzy number calculated according to (3) as

$$\tilde{z}(x) = \sum_{i=1}^{n} \tilde{c}_i x_i = (\underline{z}_i, \hat{z}_i, \bar{z}_i) = (\sum_{i=1}^{n} \underline{c}_i * x_i, \sum_{i=1}^{n} \hat{c}_i * x_i, \sum_{i=1}^{n} \bar{c}_i * x_i) \tag{5}$$

In the following modification we substitute triangle fuzzy number $\tilde{z}(x)$ in the objective function with its middle value $\hat{z}_i$ in order to obtain a linear programming problem instead of fuzzy linear programming problem. Then, to defuzzifie the problem (4) it can be modified according to the bounded principle as follows:

$$\max z = \sum_{i=1}^{n} \hat{c}_i * x_i, \tag{6}$$

$$s.t. \sum_{i=1}^{n} a_i * x_i \leq \mathrm{K} \, , \tag{7}$$

$$\sum_{i=1}^{n} \bar{c}_i \, x_i - \sum_{i=1}^{n} \underline{c}_i \, x_i \leq r, x_i \in \{0,1\} \; i = 1,2, \dots \, , n, \tag{8}$$

where (6) is objective function which uses middle values of triangle fuzzy numbers as coefficients (according to (5)); the objective function is to be maximized. Equation (7) protects us from investing an amount greater than disposable capital. $\sum_{i=1}^{n} \bar{c}_i \, x_i - \sum_{i=1}^{n} \underline{c}_i \, x_i$ is the difference between the highest possible amount we can earn and the

lowest value of expected profit which is bounded by parameter r (8), which can be defined using several different ways:

- as a given amount of money – we set the difference as a certain amount of money, which is acceptable for an investor,
- as a percentage of expected return – the difference is limited by a percentage of expected returns,
- as a percentage of invested amount – the acceptable difference is given by a percentage of invested capital.

All the above presented modifications prevent us from choosing extreme portfolio, where the difference between the highest amount of earnings and the lowest amount of earnings is huge. This method tries to balance the amount earned at all possible situations on the market, whether the expected share returns are high or low.

4. Possibility p-fractile approach

Let me then present another approach, used to solve problems with uncertain parameters described in [1, 11], which calculates expected share profit according to possibility p-fractile.

Let ã be a fuzzy number and g a real number. Now we define the measure of possibility of the event as $\alpha \in \tilde{a}$, which is described in the interval $(-\infty, g >$ by

$$Pos(\alpha \leq g) = sup_{r \in (-\infty, g)} \mu_{\tilde{a}}(r). \quad (9)$$

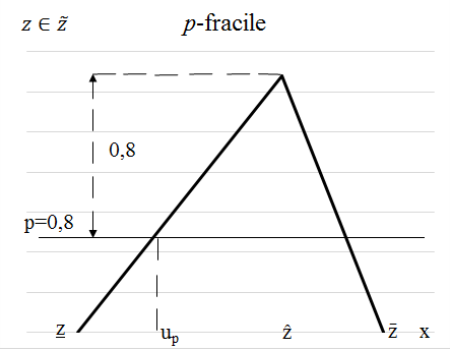
The necessity of event that $\alpha \in \tilde{a}$ is certain in the interval $(-\infty, g >$ is then described by

$$Nes(\alpha \leq g) = 1 - sup_{r \in (-\infty, g)} \mu_{\tilde{a}}(r). \quad (10)$$

Similarly we can define $Pos(\alpha \geq g)$ and $Nes(\alpha \geq g)$. Now let's define p-necessity fractile. P-necessity fractile is given for $p \in (0,1)$: p-necessity fractile $u_p = \max u$, where u satisfies: $Nes(\alpha \geq u) \geq p$.

Let's set $p \in (0,1)$ to p=0,8, then we can formulate portfolio optimization problem as a maximization of $u^{0,8}$, where $u^{0,8} = max(u)$ for $Nes(z \geq u) \geq 0,8$. From FIG. 2 it's clear that $u^{0,8} = \hat{z} - 0,8(\hat{z} - \underline{z})$.

FIG. 2: *p*-fractile



Source: author

The problem can then be transformed according to the bounded method as follows:

$$\max z = \sum_{i=1}^{n} c_i^{0,8} * x_i, \tag{11}$$

$$s.t. \sum_{i=1}^{n} a_i * x_i \leq \mathrm{K}, \tag{12}$$

$$\sum_{i=1}^{n} \bar{c}_i x_i - \sum_{i=1}^{n} \underline{c}_i x_i \leq r, x_i \in \{0,1\}\ i = 1,2, \dots, n, \tag{13}$$

where triangle fuzzy number $\tilde{z}(x)$ in the objective function (11) is substituted with *p*-fractile coefficients $c_i^{0,8}$ calculated as $Nes(c_i \geq c_i^{0,8}) \geq 0,8, c_i \in \tilde{c}_i$, equation (12) protects us from exceeding our investment limit, (13) is equation which ensures that the difference between the highest possible amount we can earn and the lowest value of expected profit which is less than parameter *r*, expressed by one of the options presented in the previous chapter.

5. Case study

Let us solve the problem with investment limit *K*=500 thousand dollars and a set of 30 shares, from which a subset has to be selected. Each share has a current price in

thousand dollars, which was stated in the beginning of April 2014, estimated profit of the share in thousand dollars – low, average and high profit $\underline{c}_i$, $\hat{c}_i$ and $\overline{c}_i$ respectively. We had used the approaches described in this paper and solve the presented linear problem, results are shown in the TAB. 1.

TAB. 1: Optimal solution

r	middle value $\hat{c}_i$							p – fractile $c_i^{0,8}$						
	r	Δ	**F**	**K**	$\sum \underline{c}_i$	$\sum \hat{c}_i$	$\sum \bar{c}_i$	**r**	Δ	**F**	**K**	$\sum \underline{c}_i$	$\sum \hat{c}_i$	$\sum \bar{c}_i$
d	**7**	6.99	44.1	496.3	40.58	44.07	47.57	**7**	6.99	41.3	496.3	40.58	44.07	47.57
	6	5.96	42.9	496.9	39.67	42.93	45.63	**6**	5.64	40.8	499.7	39.86	42.91	45.5
	5	4.96	41	494.7	38.36	40.97	43.32	**5**	4.95	39.2	497	38.2	40.96	43.15
% z	**20**	8.65	45.3	499.2	41.06	45.26	49.71	**20**	8.33	41.8	499.1	41.17	45.21	49.5
	15	6.13	43	499.8	39.67	43.01	45.8	**15**	5.64	40.8	499.7	39.86	42.91	45.5
	10	3.91	39.3	498.8	37.22	39.3	41.13	**10**	3.63	36.6	494.5	36.02	37.97	39.65
% K	**2**	8.89	45.3	497.9	40.98	45.26	49.87	**2**	8.33	41.8	499.1	41.17	45.21	49.5
	1.5	7.38	44.7	500	40.92	44.66	48.3	**1.5**	7.38	41.7	500	40.92	44.66	48.3
	1	4.95	41	497	38.2	40.96	43.15	**1**	4.95	39.2	497	38.2	40.96	43.15

Source: author

Beside the optimal value F in the table you can also find the pessimistic estimate of profits for presented solution $\sum_{i=1}^{n} \underline{c}_i$, average estimated profit of solution $\sum_{i=1}^{n} \hat{c}_i$, and optimistic estimated profit for the solution $\sum_{i=1}^{n} \bar{c}_i$, total capital invested K, difference between the upper and lower bounds – Δ. The first column in each part of table contains the amount of acceptable difference *r*. From the table you can see how the bounds of solution change when changing the value of parameter *r*. You can also compare results for classic approach and *p*-fractile approach.

The table is divided into three parts. First part of the table presents the solution for the first modification for *r* where *r* is presented as a given amount of money. It is clear that with the lower amount of potential loss the value of objective function is also decreasing. The solution for both approaches is similar for *r* = 7. Second part presents the solution for *r* presented as a percentage of future profits. As you can see from the table, solution is different for the two approaches for all values of *r*, the value of objective function is greater for the first approach for any value of *r*, but the loss is also

greater. Third part presents the solution for r presented as a percentage of total amount invested. The solution for both approaches is similar for all r except for $r = 2$.

6. Conclusion

This paper offers a possibility to solve portfolio optimization problem with uncertain share profit values using bounded approach which balances the solution by defining acceptable potential loss. The problem is first solved using middle values of triangle fuzzy numbers and then the results are compares with the solution achieved with p-fractile coefficients in objective function. This paper concentrates on bounded approaches for portfolio optimization model with fuzzy parameter which use defuzzification method to solve the problem. The presented method has three modifications – the potential loss can be described by a set amount of money, by percentage of expected return or by percentage of invested capital. Case study is solved to give a better overview of presented technique, computation experiments and comparison of results are provided.

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OPPORTUNITY ANALYSIS OF CONGRESS TOURISM IN THE MORAVIAN-SILESIAN REGION

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Keywords:
tourism – congress – development conditions – region

Abstract:
Opportunities of development of congress tourism in the Moravian-Silesian Region are investigated in this paper. Congress tourism is one of the rising components of tourist industry. It may be influenced by many different factors, e.g. the number of complying accommodations, number and capacity of congress rooms, price of congress services etc. It is necessary to check out influence of these factors on congress tourism. Results of analysis of development of congress tourism can then be used to mapping of market opportunities, which can have positively impact on development of tourism in the Moravian-Silesian Region.

Introduction

Congress tourism by Čertík [2] and Beránek [1] is a form of tourism which essence is the exchange of scientific and technical information and knowledge related with exploring the region and the offer of side events. It is considered the most resistant part of tourism, because economic pressures and changes in exchange rates did not significantly show his development. More and more countries realize the benefits arising from the event congress tourism [5]. Congress events means for destination increase of employment, tax revenue and increased visitors, because satisfied participants of congress events will return to the region as tourists. In [10], congress tourism transfers knowledge and skills into practice, this form of tourism plays currently a major role. Congress Tourism (Meeting Industry, conference industry) is one of the components of the MICE (Meetings, Incentives, Conference and Exhibitions / Events).

1. Methodology, searches

Czech Statistical Office defines congress / conference as "a formal meeting for more people (more than100 persons) with professional orientation, which are the subject of presentations, lectures, discussions and consultations. This may be a congress of scientists, meeting of diplomatic representatives of states, etc. A typical feature of the congress / conference is events (often including excursions, cultural and social program and gastronomic events)."

Orieška [8] shows, that congress tourism performs in relation to individuals and to society several important functions. Among the most important functions would be classified scientific information, cultural and educational, economical function and finally congress tourism is an important factor of regional development.

Congress tourism cannot be considered only as a generator of financial gain, but also as the creator of tens of thousands of job opportunities [7]. In addition to the direct effect of turnover, this component of tourism indicates the number of additional services that are linked with the organization of congress, fairs and similar events. For the city in which the convention is held, it implies a high income to the city budget. It belongs to the economic most fulfilling forms of tourism. Average spending of congress, conference or exhibition participants is higher than common tourist spends. However it requires a wide range of services and proactive approach throughout the region. A state also increases its prestige by the organization of significant international conferences. Professionals of convention tourism agree that it is one of the fastest growing a tourism sector. The cities and regions of the world compete for large congresses, like they compete for the right to organize the Olympic Games and other large commercial and beneficial events.

In the Czech Republic congress tourism developed mainly in the larger cities [5]. However, the potential of congress tourism is not sufficiently exploited. Due to downward trend of the number of participants it is already possible to use smaller centers, which can profile as local convention centers. This profiling requires investments in infrastructure and human resources.

In [8], congress tourism in comparison to other forms of tourism has certain characteristics:

- There are accomplished specific job duties, participation in work time;
- participation is paid by the employer
- expenses of the participants are 2 to 3 times higher than other forms of tourism,
- there are consumed the specific services of higher standard, usually as a comprehensive package of services,
- has a specific infrastructure
- implementation is mostly in big cities,
- it has a positive impact on the promotion and positive image of the destination.

In [9], congress actions can be divided to the traditional events (congress, conferences, symposia and seminars) and to the events connected with the issuing of various exhibits and presentations with a variety of services, technologies, etc. (exhibitions, fairs or workshops).

Site selection factors of congressional action, according to [10] are primary (transport links, accommodation and catering facilities, necessary infrastructure, the size of the venue, destination image) and secondary influencing the choice of venue action congress tourism, especially related on services and cultural and natural attractions.

2. Statistical register of the international congresses under UIA

The position each of countries, respectively cities in the field of conference tourism is based on international statistics of UIA (Union of International Associations) and ICCA (International Congress & Convention Association). The purpose of the acquisition and processing of information is knowledge, seeking tendencies in development, in particular, their use in practice [6].

UIA Congress Department has spent many years engaged in the systematic collection of information of convention tourism. On this basis, it can create analyzes and forecasts the development of congress tourism. Congress including in the UIA statistics are organized and funded by international organizations, which appear in the Yearbook of International organizers and the International Congress Calendar.

In TOP 5 convention destinations in the world dominate Paris, Vienna, Berlin, New York and Tokyo. In the field of congress tourism still dominates Europe, but in the future we can expect the onset of the Asian countries.

According to UIA 50 % of all congress take place in ten countries which have a stable position in the congress tourism market. The comparison shows that long-term growth among the top ten countries has the U.S. A. and Germany. Some eastern European metropolis like Prague and Budapest entered on the European congress tourism market at the beginning of the 90th. The Czech Republic is on the 30th position. Its percentage in world congress tourism is less than 1%.

3. Condition for congress tourism in the Czech Republic

Czech Republic is in the world ranking among countries with significant position in MICE market and its position constantly improves [3]. In 2012, the Czech Republic held 11,547 shares MICE with 1,535,597 participants [12]. The Czech Republic has good potential for these types of events, regions in the country offers many cultural and natural attractions and sufficient conference capacity. The country is easily accessible, there are five international airports, transport infrastructure is sufficient.

Czech Statistical Office has provided information about congress / conferences in collective accommodation establishments since 2006. Data on collective accommodation establishments are obtained from the Register of accommodation that is continuously updated from the available information sources and from survey of capacity and traffic.

Information about the congress includes the number of facilities, activities and participants. In 2012 the City of Prague hosted nearly 37 % of all events (4,264 shares), South Moravia Region was on the second place with almost 17 % of the events (1,947 shares), Moravian-Silesian region was the third with nearly 10 % (1,078 shares).

Shares of individual regions in the total number of participants in the congress tourism events correspond roughly to their share in the total number of shares. Most participants

were in the City of Prague, and 671,812, representing nearly 44 % share, Moravian took third Instead of cca12 %, see the Table 1.

TAB. 1: Conference events and their participants held in the Moravian-Silesian Region

Year	Percentage of M-S Region in the number of events	Order of events in the Czech Republic	Percentage of M-S Region in the number of participants	Order of participans in the Czech Republic
2006	5.26%	5	4.84%	5
2007	7.50%	3	6.50%	3
2008	9.63%	3	9.38%	3
2009	8.20%	3	8.44%	3
2010	7.00%	4	7.59%	3
2011	9.51%	3	10.03%	3
2012	9.34%	3	12.31%	3

Source: Statistical Yearbook of the Moravskoslezský Region, 2013

4. MICE statistics in the Moravian-Silesian Region

In the "Statistical Yearbook of the Moravskoslezský Region" is registered 49 facilities suitable for this type of tourism (Table 2) [14]. Region has the potential for the development of congress tourism, which mainly relates to regional city of Ostrava, having adequate infrastructure and congress hotel capacity in the relevant standard. Most events are concentrated in Ostrava, Opava and Frýdek-Místek. Notable are: OKD Mining Museum and Landek Park in Ostrava, having a capacity of 1,000 seats connected halls, convention center hotel Clarion Congress Hotel (600 seats), Mammaison Imperial Hotel (500 seats), the new convention center Gong (600 seats). Other facilities offering 400 seats or more are National House (Frýdek-Místek, 440), House of Culture Frýdek-Místek (400) and the House of Culture (Bílovec, 400). In Ostrava one of the largest exhibition centers of the Czech Republic can be also found – exposition ground, which has a conference hall with a capacity of 300 seats.

The potential for congress tourism is highlighted in the marketing strategy of tourism in the North Moravia and Silesia, the ROP NUTS II and also in tourism development conception of Ostrava in 2004. Ostrava is here defined as a commercial center of the region offering exceptional conditions for professional tourism. Visions of Ostrava reports that in 2015 Ostrava should be "an attractive and popular professional tourism destination, offering exceptional conditions for congress, conferences, exhibitions, corporate and business meetings, this unique should be based on the strengths and industrial history of Ostrava and proximity to the natural pearls of the region (Beskydy, Odra)." In the region there is one organization that is engaged in the development and promotion of congress tourism. Ostrava has been ranked among the city's first choice in the draft categorization congress cities.

TAB. 2: Capacity for MICE actions organizations in the Moravian-Silesian Region

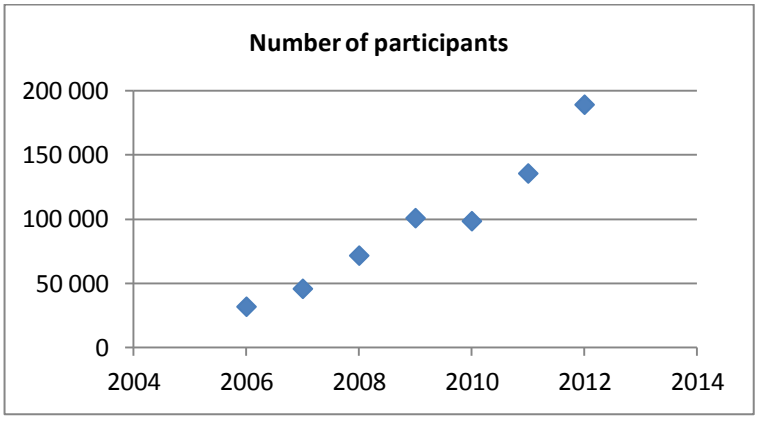
hotels ****	hotels ***	conference centre	cultural centre	exhibition grounds	sports hall
12	22	3	10	1	1

Source: Statistical Yearbook of the Moravskoslezský Region, 2013

5. Development of number of participants in congress events in the Moravian-Silesian Region

In terms of benefits for the selected region we are interested in development of number of participants in the congressional events, i.e. the modeling of time series of the number of participants.

FIG. 1: Progression of number of participants



Source: Czech Statistical Office

For modeling of the trend component of this time series has been used simple linear regression, i.e. the aim has been found the linear regression function

$$y_t = \beta_0 + \beta_1 t \qquad (1)$$

Regression parameters β_0 and β_1 have been estimated by the method of least squares. Found function has the form

$$\mathrm{v}Y_t = -48593993.96 + 24235.96t \qquad t = 2006,2007,\ldots$$

Quality of this regression function is expressed by entries in the next table.

TAB. 3: Regression function quality

correlation coefficient R	0.968951433
coefficient of determination R^2	0.93886688
adjusting coefficient of determination $adjR^2$	0.926640256
P-value for b_1	0.0003

Source: Own research

In the time series is often a breach of the condition classical linear regression model, i.e. the occurrence of autocorrelation, which is a connection result of the modeled economic variables, for which it is typical effect of the past on the future. Therefore, the founded model has been tested for autocorrelation, from rich group of different type of autocorrelation only the most common type of autocorrelation was tested, a since autocorrelation 1. For testing Durbin-Watson test has been used with criterion

$$DW = \frac{\sum_{t=2}^{T}(e_t - e_{t-1})^2}{\sum_{t=1}^{T} e_t^{\,2}},$$

where e is residue.

For our model $DW = 1.866$. Because sample correlation coefficient is

$$r = \frac{\sum_{t=2}^{T} e_t e_{t-1}}{\sum_{t=1}^{T} e_t^{\,2}} = -0.104,$$

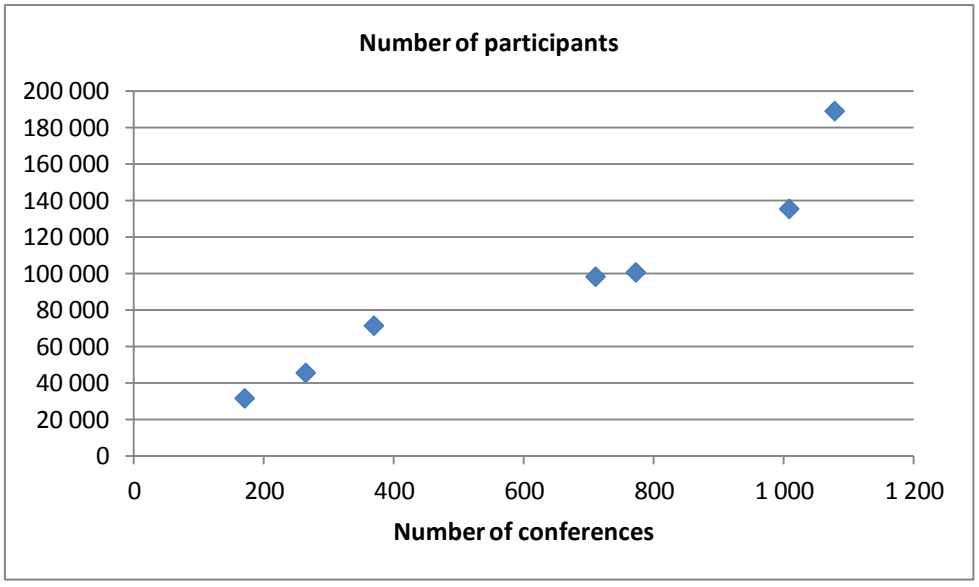
we have to work with spare statistics

$DW^* = 4 - DW = 4 - 1{,}866 = 2.134$,

which we compare with [11] $D_L = 0{,}7$ a $D_H = 1.356$. Because $DW^* = 2.134 > 1.356$, null hypothesis about absence of autocorrelation is accepted.

It can be assumed that number of participants depends on number of events. As for the other considered factor, i.e. the number of congress capacities, than whereas the number of congressional capacities in recent years except 2012, when new congressional center Gong was opened, weren't changed it does not sense for further analyze. The number of accommodations for congressional tourism also was not significantly changed. Therefore we will continue only on description of relationship between the number of events and number of participants, see next Fig. 2.

FIG. 2: Dependence of number of participants on number of conferences



Source: Own research

For description of relationship the formula (1) has been also used. A found regression function has form

$Y = 6908.52 + 142.77x$,

where x is number of events. Information about this regression function quality we can see in Table 4.

TAB. 4: Regression function quality

correlation coefficient R	0.954883924
coefficient of determination R^2	0.911803308
adjusting coefficient of determination $adjR^2$	0.89416397
P-value for b_1	0.00081

Source: Own research

Conclusion

The situation in congress tourism is globally stable. Growth and decline observed values in different continents, countries and cities are particularly striking. The development of conference tourism is concentrated in certain areas, but affects all parts of the world. Large international congresses can significantly affect the entire national economy the host country. The financial impact will be felt both private and public sector. Organizing international congresses is very prestigious, not only for the city but for the whole country.

The statistics of international organizations Union of International Associations and the International Congress and Convention Association clearly shows that Europe is the most organized congress and conference events.

At the congress of the Czech Republic entered the market only in the 90 the last century. Czech Republic managed primarily through Prague to get between major conventions destinations. In the struggle with competitors is well placed and Moravian-Silesian region, which is constantly trying to follow trends and adapt to market changes, use the cooperation of the private and public sectors and in the future it is possible that his position will be further strengthened.

The time series of annual data on the number of participants at the conference events in the Region was modeled using linear regression and the trend was estimated at almost 94 %. Was also found linear regression function that allows you to determine with

accuracy of about 90 % to estimate evolution the number of participants congress events in the Region, depending on the number of planned events. Found regression functions allow you to predict the possible economic effects resulting from congress tourism.

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MANAGEMENT OF CANDIDACY TO MUNICIPAL COUNCILS BASED ON AN ANALYSIS OF PREFERENTIAL VOTES

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Keywords:
management – municipal elections – preferential vote – municipal council

Abstract:
Regional development in the Czech Republic is largely influenced by endogenous factors. A key element in shaping development potential is the staffing of the municipal council. In this context, this article deals with method of establishing political bodies at the local level of decision-making. The elementary area of interest is the possibility of analytical use of preferential votes for understanding the voting behaviour of the local electorate as the basis for the successful candidacy of municipal representatives. Voting behaviour can be partially assessed via an analysis of the variance of electoral votes for candidates on the list. The purpose of the paper is to characterize the predominant formulas of voting behaviour of municipalities of the Administrative District of Trhové Sviny, and to derive from that an appropriate candidacy strategy.

Introduction

Municipalities in the Czech Republic play one of key regional development roles. The basic municipal bodies that can make decisions within the independent powers of municipalities are the elected councils. In this context, a wholly elementary prerequisite for successful municipalities, and hence a developing region, is a well-staffed, quality council.

Although the Czech Republic is characterized by a heterogeneous municipal structure, the same electoral system is used in all municipalities to elect councils. Its reductive effects increase with a decrease in the size of the constituency (number of voters), which in the smallest municipalities paradoxically leads to the largest political

overrepresentation of some candidates over others. The paradox lies mainly in the fact that the political environment of small municipalities is considerably personalized. Yet the electoral system does not entirely generate political bodies that would correspond to the personal interests of the citizens of the municipality [5].

In the past, several works were devoted to the possibilities of understanding the electoral decision making of voters in the Czech municipal elections. They were usually based on an analysis of preferential votes for individual candidates. In this context, based on logistic regression, there is possibility to detect a relationship between the personal characteristics of the candidates and their electoral support. In particular for voters with low levels of awareness, some of the basic characteristics of candidates are important elements of electoral inclinations [3]. Important characteristics of candidates that affect voting behaviour are incumbency and achievement of academic and scientific titles.

With regard to the nature of the applied electoral system, acquisition of mandates for candidates in unelectable spots in the candidate list is not overly common, which applies for various size types of municipalities. Preferential votes have personnel-stabilizing effects within the political representations of the relevant municipalities. They contribute to the re-election of former councillors who run from unelectable areas of the candidate list [6], [1], [2]. The stabilizing effects of preferential votes were also detected on the basis of standardized interviews with voters [4].

However, the conclusions of works which are based on an analysis of preferential votes, the number of which is obtained thanks to the Czech Statistical Office, are to some extent misleading. The election results do not give a clear answer as to how many votes a candidate received “directly,” and how much he/she obtained as a the member of an electoral body list (party support). However, knowledge of prevalent forms of voting may be very important for determining candidacy strategy.

1. Methodology, research

The aim of the article is to propose an appropriate candidacy strategy for a municipal council on the basis of the conclusions drawn from the analysis of preferential votes for

candidates. The work is based on data from the Czech Statistical Office, specifically preferential votes for candidates of municipalities of the Administrative District of Trhové Sviny in the elections in 2014 (available at www.volby.cz). The data are processed using statistical methods (coefficient of variation) and are then compared according to the variables size of the municipality, the nature of the electoral body and the degree of pluralism of the local party system.

The municipalities of the Administrative District of Trhové Sviny were selected intentionally. The selected set is characterized by internal heterogeneity (according to the size of selected municipalities and diversity of local party systems). The Administrative District of Trhové Sviny is located in the South Bohemian Region, České Budějovice District.

2. Results

On the basis of existing knowledge, we can safely say that the electorate does not know the nature of the municipal electoral system (see above), and therefore cannot imagine its distributional effects. It can thus be assumed that voters using preferential votes for individual candidates do so with the hope that their amount is itself a criterion for election. Similarly, we can consider that voters supporting the entire list of an elected political entity are seeking to maximize personal representation of members of relevant party in the local political group. The actual method of election cannot be read from the election results. However, it is possible to assume that if there is a significant variance of preferential votes compared to their average value per candidate lists, voters increasingly prefer only certain candidates instead of supporting the entire list. In the opposite case, i.e. in a state where the variance of values of obtained preferential votes compared to the average reaches low values, it is very likely that the electorate primarily supports the list as a whole. Indirectly, the form of support for electoral bodies can thereby be deduced. In terms of an effective method of candidacy, this knowledge offers an answer to the question of whether the relevant political environment relates to the form of voting behaviour. The analysed areas are the size of the municipality, the nature of the political entities and level of plurality of local political environment.

The rate of the utilization of preferential voting is derived from calculating the coefficients of variation of the municipalities of the Administrative District of Trhové Sviny in 2014 – Table 1.

TAB. 1: Variation coefficient – election to the local councils in 2014

Borovany	ČSSD (5; 0,18) KDU-ČSL (5; 0,25) ČSNS (3; 0,39) SNK (3; 0,24) ODS+TOP09 (1; 0,31) Zel.+NK+Piráti (0; 0,22)
Čížkrajice	NK (5; 0,52) SŽ (4; 0,58) NK –P.B. (0; nelze)
Horní Stropnice	KSČM (8; 0,12) OS (2; 0,34) ZPKS (2; 0,58) ČSSD (1; 0,43) KDU-ČSL (1; 0,29) TOP09 (1; 0,29) ODS (0; 0,45)
Hranice	NK (5; 0,2)
Jílovice	PV (5; 0,3) ČSSD (4; 0,28) KSČM (3; 0,39) SNK (3; 0,41)
Kamenná	NK (3; 0,45) SNK (2; 0,6) N1 (2; 0,4)
Ločenice	SNK1 (3; 0,28) SNK2 (3; 0,41) SNK3 (2; 0,29) SNK3+4 (1; 0,4) SNK4 (0; 0,53) NK (0; nelze)
Mladošovice	NK (7; 0,34)
Nové Hrady	OPZM (9; 0,12) ČSSD (3; 0,33) KSČM (1; 0,26) SNK (1;0,57) ODS+NK (1; 0,34) KDU-ČSL (0; 0,43)
Olešnice	SNK1 (8; 0,21) SNK2 (6; 0,17) SNK3 (1; 0,34)
Ostrolovský újezd	NK (7; 0,35)
Petříkov	SNK (7; 0,15)
Slavče	SNK1 (10; 0,15) SNK2 (5; 0,19)
Svatý Ján nad Malší	SNK1 (6; 0,2) SNK2 (2; 0,53) SNK3 (1; 0,26)
Trhové Sviny	VPM (5; 0,25) JTD (5; 0,21) SNK S.Z. (4; 0,18) KDU-ČSL (2; 0,4) ODS (2; 0,33) SNK T.S. (2; 0,42) ANO 2011 (1; 0,25) KSČM (1; 0,17) SNK Šance (1; 0,35) ČSSD (0; 0,27) Dokážeme to! (0; 0,66) SNK Výzva (0; 0,44) SNK ZPTS (0; 0,48) SZ+NK (0; 0,48)
Žár	SNK1 (4; 0,39) SNK2 (3; 0,23)

Source: Own calculation based on election data from the Czech Statistical Office

Note: the brackets after the running political entity show the number of obtained mandates, and the value of the coefficient of variation

Coefficients of variation up to 0.2 show a low level of variation of preferential votes for individual candidates compared to the average value of votes for one candidate on the list. In the municipal election in 2014, a total 63 political entities ran in the municipalities of the Administrative District of Trhové Sviny. A total of 61 political parties or associations of independent candidates with several candidates on the list ran for election. A coefficient of variation value up to 0.2 (inclusive) was ascertained for eleven lists. It is therefore likely that the political parties received the majority of votes on basis of support for the entire candidate list.

A coefficient of variation value over 0.2 usually indicates that the number of preferential votes for the most successful candidate is more than double compared with the least successful candidate. It is therefore possible to assume that in such a case a voter does not make use of all of the available votes – i.e. only a part thereof.

It arises from coefficients of variation that reach a value higher than or equal to 0.3 that voters vote via personalized voting, and that they chose from specific candidates. Values of coefficients of variation above 0.3 were achieved in 34 municipalities. Based on the results, it can be stated that the electoral result of political entities is the result of voter support for individual candidates, not the entire candidate list.

It applies in all of the municipalities of the Administrative District of Trhové Sviny that the party with the highest number of obtained mandates also has the least scattered values of coefficients of variation compared to the average. There are six municipalities in the sample of municipalities wherein at least four political parties or associations of independent candidates ran in the elections. In five cases, it was shown that the two strongest parties together won a majority of mandates. Of the ten most successful candidate lists (of these five municipalities), in seven of the municipalities the value of the coefficient of variation was over 0.2. We can thus conclude that in terms of parties, a larger number of voters selected different candidates from different candidate lists and voted for a smaller party as a whole. All of other municipalities of the administrative district can be considered so small that voters rather inclined toward a particular candidate selection and did not support an entire candidate list with their votes.

Based on the analysis of the preferential votes of the Administrative District of Trhové Sviny, it can be summarized that voters mostly lean toward supporting candidates of the lists of political entities instead of supporting the entire candidate lists. The question remains whether the votes of voters is a reflection of the composition of municipal councils. The electoral system used for municipal elections in the Czech Republic is a disadvantage for candidates from lower spots on the candidate lists. Candidates at the top of candidate lists obtain a mandate provided that candidates in the unelectable spots do not receive at least ten percent more votes than the average number of votes per

candidate. From the observed 62 political entities, only 26 experienced minor shifts on the candidate list. It arises from an analysis of the election results from the previous election period, and subsequent comparison with the results of municipal elections in 2014, that most of the elected candidates come from the top positions of the candidate lists, and also points to the fact that in many cases these are candidates who were in the council during the previous election period. Based on this analysis, we can deduce that the composition of municipal councils not only reflects the wishes of the electorate, but also meetings of party entities and the subsequent compilation of candidate lists.

3. Discussion

On the basis of the preferential votes analysis, it is not possible to derive a relationship between the size of a municipality and predominant method of voting. It is not demonstrable that the environment of larger municipalities leads voters to support entire lists of political entities. The same conclusion can be derived in terms of the nature of a political entity. Again, we see the irrelevance of the consideration of the relationship between the method of voting and the nature of the party. Political parties that have long been politically established and relevant on the national level do not lead voters to vote for them in the form of supporting and entire list – not even a politically plural environment contributes to increased support of entire lists of some entities of local party systems.

In view of the nature of the form of voting, the preferential votes analysis is a useful tool, even despite the fact that in the municipalities of the Administrative District of Trhové Sviny, its conclusions do not lead to a demonstrable relationship between the aforementioned characteristics. Due to this fact, from a candidacy management perspective the results do not lead to a certain causality which would allow for the method of voting behaviour of the electorate in a selected municipality to be predicted. It must therefore be assumed that the electorate increasingly selects different candidates from different candidate lists. In cases where there was evidence of majority support for a party through voting for an entire list, the voting behaviour is very likely a result of the local contextual nature. A certainty resulting from the knowledge of the electoral

system is its disproportionality, which leads to overrepresentation of candidates in the top echelons of the list.

Conclusion

In terms of election success, an appropriate choice of candidacy in the election of municipal councils in the Czech Republic is, among other things, dependent on knowledge of how the electorate votes. Through coefficient of variation method, the preferential votes analysis allows for the predominant method of voting to be determined. The example of the municipalities of the Administrative District of Trhové Sviny has shown that the electorate in most cases chooses candidates from various lists of running political entities. In terms of parties for which this claim does not apply, it is not demonstrable that support of the entire lists relates to the size of the municipality, the nature of party or the degree of plurality of the local political system. It is thus clear that knowledge alone of the voting method does not allow for voting behaviour to be understood. When considering candidacy strategy, despite significant limits which knowledge of the form of voting has, the preferential votes analysis cannot be condemned, in particular in relation to considerations regarding the voting behaviour of the electorate in small towns in the Czech Republic.

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APPLYING CONSUMER NEUROSCIENCE TO MERCHANDISING PRACTICES

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Keywords:
consumers – neuromarketing – merchandising – brain – behavior

Abstract:
The aim of this research was to apply neuromarketing techniques and evaluate its potential contribution in enhancing merchandising performance, in this particular case, of DM stores in Sarajevo, Bosnia and Herzegovina. The theoretical part overlaps the basic roots and principles of neuromarketing, upgraded by overview of consumer behaviour, and further on, the glance to merchandising. The second part is the empirical part, explaining the scope of the research in the form of observation supplemented with short interviewing, focus group conducted and the interview with DM employee. Overall result of data gathered and processed showed that neuromarketing tools and techniques can in many areas enhance the merchandising performance of retail store in general and consumers' satisfaction.

Introduction

Talking about marketing today is a great challenge. It is much more than philosophy, technique, tool or discipline. For decades, marketing scholars and experts have been trying to reach the audience in the best manner possible and to tap into the mind of the consumers worldwide.

Influencing emotions is important component of communication and promotion tools. Consequently, the roots could be found in psychology. Even in the 20th century Barneys [2, 48] indicated that propaganda was not science like chemistry, but definitely has got some new frameworks after mass psychology (psychology of the human masses) had

been introduced. Barney's work was one of the first time the term "science" was introduced when talking about propaganda, advertisement and influence on consumers' purchase decisions.

Even though the promotion and communication tools have been used and effective for decades, there has been still a "black box" in customers' heads and scholars and marketers needed to tap in. More and more marketers had realized that traditional marketing methods faced tremendous issues in measuring subconscious, emotional aspects and intuition in communication with consumers [12, 22]. It has been more than 10 years already passed since the term "neuromarketing" hit the boardroom, a perfect blending of marketing and neuroscience. However, with the blossom of technology, it has got the new meaning and way of treatment that point out amazing opportunities and discoveries. Certainly, it helps and supports older disciplines within marketing and gives important contribution to their findings. It can be said that it gives the new angle to the discoveries. Moreover, discoveries of processes in human brain while making purchase decision can be interesting for opening new paths and alternatives within merchandising. Thus neuromarketing can play important role in improving merchandising practices.

The aims in the background of this research are as follows:

- Observe and define the behaviour categories of DM customers;
- Define the pillars based on which DM customers make purchase decision;
- Determine the influence of prices on purchase decisions;
- Analyse the effectiveness of merchandising in observed DM stores;
- Explain the brain reactions in process of buying and purchase decision;
- Find the roots of the consumer behaviour in the brain processes;
- Determine the benefit that merchandising can have from neuromarketing;
- Make proposals for DM in their merchandising and further directions of customer research processes.

Due to the limitation of this paper, the author is going to present just the part of the collected results and aspects that have risen during the research process itself.

1. Methods, literature overview

Methodology used for the purpose of this research was both quantitative and qualitative. The research itself was conducted in three phases.

The very first stage includes three important steps. Those steps are the basis for any further research development and building. Since the neuromarketing is the matter very hard to research without expensive equipment and high financial funds, it was challenging to choose the techniques and tools that would bring closer the point of neuromarketing. However, during preparation phase and choosing of these approaches, I contacted Professor Nick Lee, director of the Research Degrees Program at Aston Business School and one of the top neuromarketing experts at the moment via the e-mail. He elaborated that the neuroscience does not have to be about the expensive equipment and that things can be done simply by behavioral studies. In addition, he said that the key is in explanation, meaning to try to find if there are some brain- related explanations for certain behaviors. To be more precise, three techniques were chosen: observation, focus group and interview. As it can be noticed, all three are qualitative research methods. The reason for the decision like this lays in the fact that this study is about how consumers feel, react to certain product, company, or merchandising. The third and final stage of the research process was the implementation phase of above mentioned techniques.

2. Results

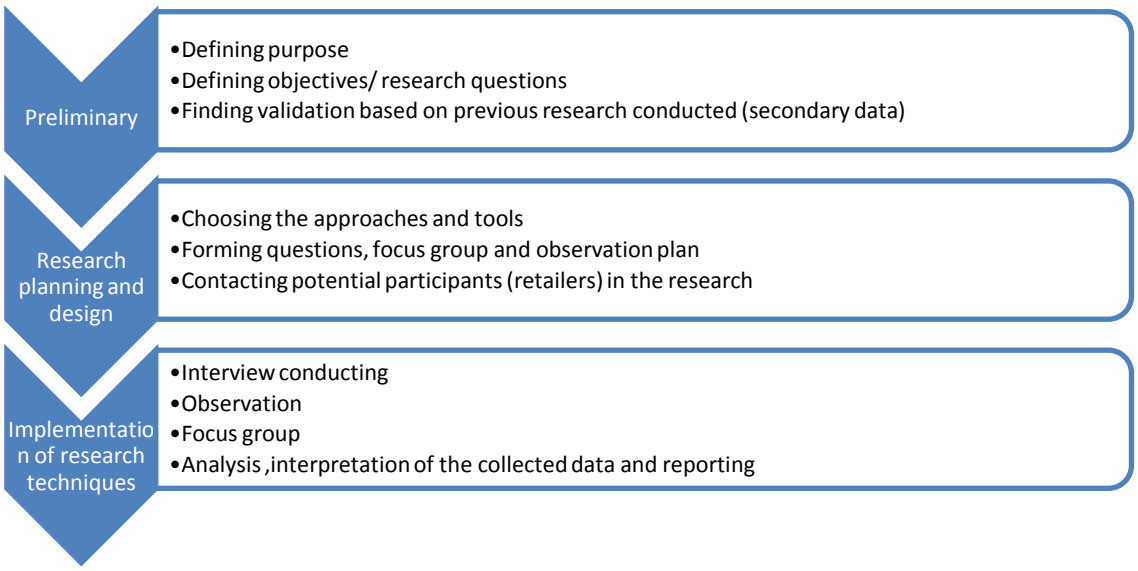
Outcomes of the research were presented in several areas upon the goals and research questions. Those are:

- Behavioral categories,
- Prices' influence,
- Purchase decision making.

2.1. Behavioural categories

After careful consideration, observation, coding and categorizing, several categories based on similar behaviour have been formed. Categories refer to the different behaviours' patterns that could be noticed during the observation, which were similar in the number of features.

FIG. 1: Figure caption



Source: author

TAB. 1: Table caption

Category number	Category name
1	*Traffic towards the right side*
2	*Targeted/ Planned purchase customers*
3	*Hesitance in the beginning and coming back afterwards, plus changing the decision*
4	*Purchase for fun and relaxation*
5	*Reaction to segregated shelves that are called POS in dm*
6	*Purchase of the products on sales promotion and discount*
7	*Distracted buyers*
8	*Long shopping experience*

Source: author

2.2. Prices' influence

Mrs Čović-Mezet, assortment manager at DM indicated that they do price changes for several reasons: sales promotions every two weeks, seasonal discounts, delisting because of novelties or package changing, reducing prices for the purpose of getting rid of the stocks or following market trends.

The effect of prices can be applicable in the process of brain connected with reward system. In 2008 there was a study about the effect of prices and congruence of neural

activity and rewarding. As Alčaković and Arežina [1] said, if subjects knew they were drinking expensive wine, they would like the taste more and activity in the brain reward system was growing. Therefore, marketing activity referred to the price and increased the perception proportional to the price level. Before the act of purchasing, nucleus accumbens is activated and it correlates with product preferences, while high prices for example activate the insula because of the anticipation of loss [7].

2.3. Purchase decision making

Starting from the visual effects in the store, to disposition and behaviour of staff, everything conspires to provide attractiveness for customers.

Why do customers prefer one brand over other is the question that can be addressed to brain scientists and consequently to neuromarketers. Part of the brain responsible for the preference judgements is called ventromedial prefrontal cortex (VMPFC) and it is located in the front part of the cortex of human brain [7]. What is particular for this area is that in the blind testing, there is no difference in response, while in open testing, when subjects know about the brand, hippocampus and the DLPFC showed activity according to the brand preference [7].

The importance of sense stimulation was supported by the claim within the focus group, when the one of ladies said that she got attracted by the products wrapped in decorative paper and later on she stressed out that she got amazed by nicely decorated windows of the shops. In 2008, there was a research in which the fMRI was used to measure the difference activity when the customers were exposed to attractive and unattractive packaging [8].When something happens, it evokes some neural activity in the cortex, but the stimulus needs to be strong enough to keep the neurons in cortex active and make for neural adequacy half second later [13, 149]. Speaking more understandable, somehow our brain, below our awareness, spends few milliseconds deciding whether we should be aware of some event or not.

Gerald Zaltman, NeuroFocus Advisory Board member, explains that if a TV ad is showing a person tasting aroma of fresh coffee, it can trigger olfactory senses in watchers [14, 47].

Not only brand preference in the form of information and ambiguity influence the buying decision. Huge impact is made by the emotions, memories and senses. This explains why DM customers, especially women, during their shopping process taste the smell a lot, for instance. The memories are triggered by the senses and probably at most, the sense of smell. It seems that higher level of brain activation when assessing the brand/ logo means that the brand is more important to the person [6, 388].

After seeing the product, visual cortex in the back of the head activates, during checking the product (turning around) the mind triggers memory circuits in the left inferotemporal cortex, slightly above and forward of the left ear [5].

The researchers say that act of deciding whether to buy a product or not lasts 2.5 seconds [5]. That means that in the first 2.5 second of the contact with the product, the brain decides whether the purchase will happen or not. Eser et al. [5] elaborated that when product was registered as "preferred" by the brain, the right parietal cortex switched on, this time above and slightly behind the right ear.

3. Discussion

Because of the exploratory nature of the study, the result of it can be considered as observational. The test population should be larger in order to avoid low number of respondents for certain stimulus, or low number of subjects as representative of certain behavior category.

The lack of the equipment is certainly due to its unavailability and high costs. However, the usage of any brain scans would make the whole research process wider and it would place it on the higher level.

Conclusion

Neuromarketing has both, advocates and critics, but the inevitable is that advanced neuroimaging technologies will bring changes into the market and marketing persuasion [15]. Forbes wrote that Uma R. Karmarkar (an assistant professor at Harvard Business School who sports PhDs in both marketing and neuroscience) expected that brain data would play a key role in the future research about the consumer choice. The inevitable

potential of neuromarketing is to "hit on the subconscious biases", which has been unable to be discovered by traditional advertisement and marketing research methods [9].

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SPACE PROTECTED THROUGH COMPETITION AS EXEMPLIFIED BY THE TATRA NATIONAL PARK

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Keywords:
natural resources – sustainable development – space

Abstract:
National parks are the highest legal form of area-based environmental protection – not only do they serve as a type of space, but also as a subject. That is why the authors have performed an empirical analysis of the functioning of the Polish national park most eagerly visited by tourists, i.e. the Tatra National Park. The study involved a subject literature analysis, an analysis of legal acts related to area-based environmental protection forms and an analysis of the financial-accounting documentation of the Tatra National Park. Additionally, the authors have determined the degree in which the Tatra County municipalities have been realising the tourist function, using CSO data. The results point at the need for a complex approach to space.

Introduction

Competitiveness is a universal process related to all sorts of human activity – not only one's professional life, but also so-called free time. Space is crucial both for the development of economic processes as well as for fulfilling basic needs, e. g. residential or recreational ones. When governing space, one also establishes the desirable functions which will be realised within. One additional element involved in spatial governance has to do with working towards attracting the proper users for a given space – mostly through territorial marketing – or even with modifying space in order to meet the requirements and expectations of potential users. The effects of transforming space are inseparably related to changes in the natural environment, i. e. human influence on ecosystems. This makes transforming space difficult, and introduces the risk of failure, while the results quite often turn out different from those planned and involve

unexpected and not always positive changes. The close relation between space and the natural environment makes any modification of space hard to undo. The competitiveness factor of space and the manner of managing the goods in question is related not only to the natural features of the area, but also to the law in force in a given area and the attitude towards space expressed by the local community. Local government actions and the abilities of local government representatives related to a bottom-up use of local potential – including environmental values – are crucial for space. The goal of this article is to show protected space as a good subjected both to the competition process and to the management process. The space in question has been studied in respect to the limitations related to establishing a national park and the activities undertaken by the Tatra National Park (TNP), as influencing its competition capacity.

1. Protected space and competitiveness – the macrosystem perspective

Competition is a feature of market-based economy. Space is subject to the competition process at least for two reasons: it is a limited good with no available substitute and is inseparably related to the environment. The limited character of space with the growing number of its users working towards the realisation of various – often mutually exclusive – functions inevitably leads to a competition for the good in question. On the other hand, those in charge of managing space compete with each other for desired investors, residents and other types of users.

The existence of mutual relations between economy and the natural environment is unquestionable. That is why it has become necessary to approach the management process in a manner suitable for environmental economy, i. e. through evaluating the relations in the society-environment-economy macrosystem. B. Poskrobko indicates that humans should study the relations between 5 values: the environment, the capital, knowledge, labour and time. [2, 17] Despite the difficulties in a multi-dimensional perception of the role of the natural environment, the economy has reevaluated itself – new management goals have been established and it has been acknowledged that economic, social and environmental goals should be kept in balance. One of the elements of the above-mentioned reevaluation was the establishing of management

principles in areas considered environmentally valuable, which was directly forced through by the constant increase in the share of legally protected areas in the general area of the state. The need to equally address all the components of the above-mentioned macrosystem marked the beginning of the implementation of sustainable development. Starting with the premise that sustainable development takes into account economic, environmental and social needs to an equal degree, it is interpreted as a system of functional proportions in the studied spatial unit. Thus the existing disproportions have been considered a serious barrier for development. [4, 92]

The relations between space and the environment require a closer look at the meaning behind environmental management. According to B. Poskrobko and T. Poskrobko environmental governance is related to "designing, implementing, controlling and coordinating the processes of governing the environment. The processes dealing with the use, protection and development of the environment take place in the social, economic and environmental spheres. This means that the governing of such processes has to involve many actions, from ecological education for the society, through a pro-ecological reorientation of the economy, to recommendations regarding the manner of governance in each specific ecosystem." [3, 15] All the above-mentioned actions are an integral part of the functioning of space protected through area-based environmental protection forms: one of the priorities is to conduct ecological education based on environmentally valuable areas. There are also acts determining the limitations and restrictions in force in a given area, which modify – without excluding – the economic processes which occur in a protected area. This is where the idea of governing a protected space comes into play. This serves as yet another argument for the thesis of the need to perceive space in the context of the competition process.

2. The national park – a space and a subject

Working towards the protection of unique ecosystem resources – i. e. the part of space which serves as a vehicle of national heritage – the legislator created a closed catalogue of area-based environmental protection forms. These forms differ from each other both in the restrictions they introduce and the manner of implementation or functioning they entail. The highest form of area-based legal protection in Poland is the national park,

encompassing areas with exceptional environmental, scientific, social, cultural and educational values, with an area larger than 1 000 ha, on which the entire environment and landscape values are subject to protection.

23 national parks have been established in Poland. The space of national parks should be evaluated not on the basis of the number of hectares of their area, but rather using the number of people visiting them – 11 mln of people. The share of national park areas is very small compared to the total area of Poland, but the interest of tourists with this form of protection is very high. It should be stressed that national parks are a constant and long time participant of economic life – never in the history of Polish national parks has a park been closed down, and only four Polish parks have been functioning for less than 20 years (Ujście Warty, Bory Tucholskie, the Narew Park and the Magura Park).

The Environmental Protection Act includes a list of activities prohibited within a national park. These can be conventionally divided into restrictions related to:

- real estate (including a prohibition on construction or reconstruction of buildings and technical infrastructure),
- fauna and flora (including a prohibition on hunting, scaring off animals, picking mushrooms etc.),
- the inanimate components of the environment (including a prohibition on altering hydrographic conditions, harvesting rocks and minerals, destroying the soil),
- tourism (including prohibitions regarding pedestrian movement, cycling, skiing and horseback riding outside of delineated tourist routes and skiing routes, a prohibition on camp fires and camping, climbing and cave exploring, as well as organising recreational or sports-related events),
- human economic activity (including a prohibition on manufacturing, trade, agriculture, car traffic and advertising).

The above-mentioned groups should not be considered exclusive. For example, tourism is related to the use of real estate or economic activity. The division only serves to ease the identification of restrictions in using national park space.

The national park is not only a space but also a subject. By force of an act the national park functions as a state legal person and conducts its autonomous financial economy based on an annual financial plan. It is thus not only the manager of its own space, but also a rightful investor. It is worth pointing out that all investment programmes are subject to evaluation regarding their goal, economic efficiency and effectiveness – A. Becla, S. Czaja and A. Zielińska address this issue in the context of influencing the natural environment. [1, 78-83] When it comes to investments undertaken within national parks, the value of the project for environmental protection is considered a priority. This does not mean that economic indicators are ignored, as national parks are required to utilise auctioning procedures formulated in the Public Procurement Act from January 29, 2004 (2007 Journal of Law, No. 223, item 1655, uniform text as amended).

3. The Tatra National Park – case study

The Tatra National Park was established in the year 1954 by virtue of an ordinance of the Council of Ministers (1955 Journal of Laws, No. 4, item 23). Initially, its area equalled 21.400 ha, while the park itself was located within the borders of the Nowy Targ County and the Zakopane city county. The contents of the legal act also included a segment limiting human activity and all economic activities, their character, scope and manner of execution within the TNP – they had to be strictly adapted to natural protection requirements and function in accordance with its goals. Despite almost 60 years of functioning, the area of the TNP has not been subject to significant change. The ordinance of the Council of Ministers from April 1, 2003 regarding the Tatra National Park (2003 Journal of Laws, no. 65, item 599), currently in force, indicated that the area of the Park equals 21.164 ha. A detailed terrain inventory undertaken using state-of-the-art Geographic Information System methods determined the area of the TNP to equal 21.197 ha.

Due to the various organisational-legal forms assumed by national parks between the years 2008-2012, the empirical studies have been performed in the years 2008-2010 for the state budgetary unit and the auxiliary enterprise of the Tatra National Park (AE); in 2011 for the state budgetary unit (auxiliary enterprises have been decommissioned on

January 1, 2011, with their functions, property, liabilities etc. taken over by their parent budgetary units) and in 2012 for the state legal person.

From among all investments undertaken by these units, concerned with the attractiveness of the space in question (including infrastructure investments) as well as activities aimed at maintaining the existing infrastructure, the following are should be pointed out:

- yearly renovations and maintenance of routes and facilities used for tourist movement (rain shelters, bivouac sites, entrance barriers etc.),
- establishing a network of sanitary cabins localised near the routes,
- modernising educational structures (including the revitalisation of the manor-palace complex in Kuźnice and formulating a modernisation project for the Environmental Education Centre),
- purchasing new museum exhibits and additional equipment for scientific labs, as well as creating an exhibition hall,
- building the Forest Garden of Senses (the garden includes plantations showcasing vegetation levels, information tablets with descriptions written in the Braille alphabet, a telescope enabling the observation of the Giewont mountain, a walking route with different types of surfaces typical for the Tatras, a Tatras animal trail, sandstone statues of a chamois, a family of marmots, a stag with a hind, a wolf, a bear, a doe, as well as a camp fire site).

It should be pointed out that the investments selected above are complemented by actions related to tourist safety (e.g. improving communications between park services) and aimed at improving their skills e.g. through realising the "Tatras Academy – developing the ecological attitudes of various types of Tatra users" project. The above proves that the TNP (regardless of its organisational-legal form) undertakes a number of activities significant for its space. At the time when auxiliary enterprises were still operational, this organisational-legal form was used to perform most of the works significant for the space of the park. In order to provide the scale of these activities the costs incurred by the TNP Auxiliary Enterprise in the period in question have been represented in Table 1.

TAB. 1: The costs incurred by the TNP Auxiliary Enterprise in PLN, in the order of the type of activity undertaken (as of December 31 of given year).

Specification	2008	2009	2010
Protecting the natural resources of parks	5 297 868.03	4 008 569.45	4 186 421.61
Educational and tourist activity	2 009 585.97	2 195 342.40	3 229 198.80
Scientific-research activity	80 964.86	42 990.05	37 729.64
Other activities	5 454 620.20	5 463 411.65	6 201 865.07
Administration costs	2 536 151.95	2 565 732.84	3 772 563.00
Summary	15 379 191.01	14 276 046.39	17 427 778.12

Source: own elaboration based on the financial-accounting documentation of the TNP Auxiliary Enterprise

TNP budget expenditures in the years 2008-2010 ranged between 6.0-7.3 million PLN per year. After the decommissioning of the auxiliary enterprises the amount reached almost 18 million PLN in 2011 and in the next year exceeded the 20 million PLN threshold. All the above-mentioned activities require the use of financial funds. It should be stressed that an analysis of TNP accounting books indicates that the park's budget subsidies and income do not cover all its expenditures. The park thus has to acquire funds from other sources, mostly from the National Environmental Protection and Water Management Fund, the Regional Environmental Protection and Water Management Fund, the Forest Fund and EU funds. The TNP is so popular that it does not compete for its users – there are more than enough of them. Taking into account competition involving space, it is environmental education the activities of the park compete for with the offers of other subjects. Through successfully undertaking education-related tasks the TNP educates people (both tourists and residents) helping them become qualified users who represent the type of behaviour which is safe for the environment and for themselves – which is especially important in high-mountain conditions. The effects of infrastructure investments and other activities undertaken by the TNP are not limited to its space. This is is related to the specific nature of the Tatra County municipalities and the role tourism plays in their development. The park is territorially connected with four municipalities: Zakopane, Kościelisko, Poronin and Bukowina Tatrzańska. The Biały Dunajec municipality, with no areas protected by means of legal protection in the form of the national park in question, is also considered

a Tatra municipality. Complex presentation of TNP requires characterizing the level of tourism function carried out by the municipalities territorially connected with the park. For this reason Baretje and Defert index were calculated – the results are presented in the tables below.

Formula 1. Baretje and Defert index

$$Tf\,(t) = \frac{number\ of\ beds\ in\ the\ area\ x\ 100}{number\ of\ population\ in\ the\ area}$$

Source: [6, 58]

TAB. 2: Baretje and Defert index for the municipalities connected with TNP

Specification	2008	2009	2010	2011	2012	2013
Zakopane	32.04	33.71	32.24	31.83	46.49	44.49
Koscielisko	12.72	13.41	15.64	14.12	23.29	22.75
Poronin	4.09	4.81	5.16	9.34	26.07	27.45
Bukowina T.	10.73	9.99	10.10	12.53	32.14	32.36
Biały Dunajec	4.01	2.56	1.63	1.62	12.23	10.88

Source: own elaboration based

This unquestionably proves that all space-related TNP activity is crucial for the Tatra municipalities. On the other hand, it should also be pointed out that the manner in which the residents of the Tatra County treat their environment, the decisions they make when establishing the functions of each area, as well as their ecological knowledge and behaviour influences the TNP environment.

Conclusion

The national park is an area-based legal protection form and as such it is inseparably connected with space and the processes occurring within. Parks competes for the users of its space and their different functions: the investor, the resident, the tourist. It is thus justified to work towards a complex representation of the consequences of introducing legal protection in a given space. The example of national parks brings into attention both the influence of the most restrictive limitations in terrain use, as well as the results of the activity of a national park as a subject participating in the economic cycle.

Protected space plays various roles, both active and passive, in the process of competition. The object of competition in space (as a subject) includes: the tourist, especially the qualified tourist; funds from the National Fund For Environmental Protection and Water Management the Forest Fund and EU funds and employees fulfilling the statutory tasks of a national park. In a passive sense space is the subject of a struggle between the investors and other potential users who wish to utilise it, often in a mutually exclusive way. The competition capacity of protected space comes not from its size, but rather from its unique traits. National parks are a space governance model based around the priority of protecting natural values. The restrictions existing within national parks do not remove users from their space – instead, they modify the behaviour of the users. It must be explicitly pointed out that the statutory limitations are not equivalent to isolating the space in question, as the goal of the park and its tasks clearly show that they serve the harmonious functioning of humans and nature, and not the exclusion of humans from the protected areas.

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SEVERAL IMPACTS OF EUROPEAN INTEGRATION ON THE ECONOMY AND MANAGEMENT OF REGIONS AND ENTERPRISES FROM A MILLENIUM GENERATION PERSPECTIVE

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Keywords:
European integration – questionnaire – analysis – project evaluation

Abstract:
This paper attempts to bring an innovative element in the chronic discussion about impacts of European integration on the economy and management in the EU member states and regions, both on the public level as well as the private business level. A homogenous group of college students close to graduation and with IT, economics and EU policies specializations was presented with a questionnaire in order to collect quantitative as well as qualitative information about their perspectives. The obtained data was on first impression surprising, but after a deeper scrutiny and explanatory research, generated clear messages. The future managers and specialists in enterprises and regional and state representation in the EU perceive the European integration and its interaction with economy a management, in a particular manner.

Introduction

There is an abundance of scientific and academic literature analyzing the impact of modern European integration on the economy and management of regions, a myriad of primary and secondary data were processed and a scale of conclusions and opinions, along with recommendations, were presented. However, virtually all of this quantitative and qualitative information was collected and methodologically and scientifically approached from the point of view of the EU key institutions and EU member state organs, while the perspective of enterprises, especially Small and Medium-Sized ("SME") was reduced just to random case studies. Despite the proclaimed bottom-up

approach [14] and focus on the new generation and its mastering of information systems and information technologies ("IS/IT") [7], their attitude and input is neglected.

Such a situation is deplorable, and inconsistent with the Europe 2020 growth strategy [2], along with correct findings that the market mechanism does not generate, *per se*, innovation [4], which is critical for the current economy and management. Hence, the authors of this paper decided to partially fill this vacuum and thusly inquired of a homogenous group of representatives, from the millennium generation, about their opinions and suggestions regarding the ramification of the modern, post-Lisbon European integration on the economy and management of regions and enterprises. The current strategic planning, with respect to the economy and management of regions and enterprises in the EU, should be tailored in a manner compatible with, or at least reflecting, the preferences and expectations of the new generation of managers, IT-specialists, and even technocrats and state employees. Close-minded and archaic approaches cannot be afforded, if the EU and its regions and enterprises want to be competitive on the global market in the ensuing decades. The lack of legitimacy and the deviation from the youth potential are not acceptable in the long term. Hence, the cornerstone objective of the paper is to yield and explain the information about the perspective of future experts and decision makers regarding selected aspects and consequences of the dynamic reciprocal interaction of the European integration and the economy and management on various levels. An analytical assessment has a strong potential for practical implications, because these respondents have a potential to shape both the European integration and the economy and management, especially via the bottom-up approach. Their perspective matters, and before making any policies on European, regional, local or even on the individual business, especially SME, level, this very critical and neglected perspective needs to be considered.

1. Methods, literature overview

The scientific and academic literature, economic and political reports and social studies offer a great deal of information and well argued conclusions about the positive and negative sides [13] of the modern European integration and their consequences on the economy and management of regions [14] and SMEs [1], and vice versa [9]. It is well

known that these conclusions are hardly, if at all, reconcilable, and the collected quantitative and qualitative data, their analysis and resulting conclusions are always marked by subjective factors, often well pronounced. The points of the EU key institutions, of EU member state organs, and of top politicians often clash, and scholars are absorbed in dealing with this asymmetry on the current top level. This attitude is unsatisfactory and violates the strategy creation concepts and common sense. Strategic planning of the economy and management needs to be future oriented, and recognize that the analysis of both objects and subjects should go first and those policies should follow [1]. The relevant subjects in this context are, to a lesser degree, top institutions and representatives of EU or states with their interests [5], and, to a stronger degree, EU citizens and especially those who influence the economy and management of EU businesses, including SMEs, which generates a significant part of the national income within the EU and creates more work places than large firms [3]. Since no special studies were conducted, processed, and reported in this respect, an active approach based on the explicit data collection, realized by a questionnaire survey [12] was selected. It was critical to identify a relatively homogenous group of respondents, with a higher level of potential to be, or to work in, the suggested positions in the near future.

These subjects to exercise such an influence in the near future are most likely fresh graduates from appropriate colleges. Thus, a group of 69 soon to be graduates from the Czech University of Life Sciences Prague, specializing in Economics and Management, Informatics, Public Administration and Regional Development, etc., were questioned in 2014. In order to increase the homogeneity of this group, and the potential competency to achieve expected decision making positions, only students from the EU studying these programs that were lectured and examined in English were chosen. Each student obtained a hardcopy of the questionnaire, anonymously completed it while identifying him- or herself by a unique code, and 60 duly completed questionnaires were returned, i.e. a limit of 50 respondents providing data for general statistical purposes was met.

The questionnaire allowed for collecting explicit data, with the respondents´ consent, and to guarantee their anonymity, and thus there were no issues related to implicit data collection methods [15] and the legality of the survey as such. The questionnaire

consisted of three parts, the first one targeting their perception of globalization and its impact on the economy and management of regions and enterprises, the second one targeting their general EU perceptions, and the third one doing targeting their perception of selected EU projects directly impacting regions and businesses. Each of these three parts included over ten suggested statements to be evaluated and commented. The respondents used a scale of intensity of their (dis)agreement of 1-10, with 1 for an absolute rejection of the suggested statement and 10 for an absolute endorsement. Particular attention was paid to the extreme values and to the arithmetic mean. Considering the low amount of respondents, other statistical calculations were not performed. The quantitative data was completed by qualitative comments, i.e. respondents were asked to add explanatory notes, and approximately in 40% they did it. Almost half of their numeric evaluations were backed by truly interesting notes, i.e. both qualitative as well as quantitative aspects were reflected.

2. Results

The first part of the questionnaire covered the respondent's perception of globalization and examined, among else, their general attitude towards the external factors and their interaction and impact with respect to the economy and management on various levels. For purposes of this paper, and due to the restricted space, only replies to several of the suggested statements are reported and commented on.

TAB. 1: Globalization and its impact and interaction with respect to the economy and management on various perspectives from respondent's perspective

	Highest evaluation	Lowest evaluation	Arithmetic Mean
Globalization is great, has positive impact on the economy and mgmt, and on SMEs	10	3	6
Internet needs to be regulated by public organs, otherwise serious negative consequences for mgmt ...	10	1	5
Internet needs to be regulated by public organs, otherwise serious negative consequences for mgmt..	7	1	3

Source: Authors.

Respondents added comments such as *Globalization can destroy unique cultures* or *It depends for whom* or *There should by a system of Internet regulation, but not really of the content.*

The second part of the questionnaire covered the respondent's perception of European integration in the large sense and examined, among else, their general attitude towards the key and rather macro-economic EU factors and their interaction and impact with respect to the economy and management on various levels. Again, only replies to several of the suggested statements is reported and commented on.

TAB. 2: European integration and its impact and interaction with respect to the economy and management on various perspectives from respondents' perspective

	Highest evaluation	Lowest evaluation	Arithmetic Mean
Knowledge of European integration is critical for economic and mgmt decisions	10	3	6
EU is wonderful for youth generation and positively influences economy and mgmt.	10	3	7
EU should have more powers in order to positively influence economy and mgmt.	7	1	4
EU should disappear, is bad for economy and mgmt.	10	1	3

Source: Authors.

Comments included *People need more information about the EU to be interested and to make better decisions,* or *Absolutely no more power for EU* or *No military power for EU* or *Too much bureaucracy* or *EU should not really disappear, but it should not have so much power.*

The third part of the questionnaire covered the respondent's perception of specific and, heavily in academic, as well as non-academic, press, discussed EU projects, and examined their perception, while focusing on the alleged or true interaction and impact with respect to the economy and management on various levels. Only replies to several of the suggested statements are reported and commented on.

TAB. 3: Shenghen, Eurozone, Erasmus, TLD .eu and their possible impact and interaction with respect to the economy and management on various perspectives from respondents' perspective

	Highest evaluation	Lowest evaluation	Arithmetic Mean
Shengen is great for economy and mgmt.	10	5	8
Eurozone is great for economy and mgmt.	10	2	6
Erasmus is great for economy and mgmt.	10	9	10
TLD .eu is great for economy and mgmt.	8	5	5

Source: Authors.

Comments included *EURo and EUROZONE should be managed more carefully than it is now* or *Student exchange program is amazing for understanding other cultures, but not for studying* or *I have never heard about TLD.eu.* This is very alarming in the light of the well proclaimed priorities and the glorified saviour effect of TLD .eu ") [8], especially for businesses " [9].

3. Discussion

Vox populi, vox dei. The current European integration and economy and management within its borders on the famous single, internal market should reflect, or at least consider, the opinions of the future stakeholders and likely decision makers, which will keep shaping it from the bottom up [6]. Certainly, broader research is needed, questions should be improved and narrowed, the pool of respondents expanded, specific hypotheses established. Nevertheless, as a starting point the performed questionnaire inquiry serves in a satisfactory manner. Namely, the collected quantitative data demonstrates a large information asymmetry and disharmony of semi-conclusions from respondents with a similar background and with a reasonable awareness. Respondents are making, based on (allegedly) similar information, radically different conclusions.

Nevertheless, their comments followed by unofficial interviews and think-tank discussions, are a rich source for rather surprising, nevertheless coherent, consistent and well argued conclusions. Firstly, respondents clearly embrace a pragmatic approach to

globalization, and they include it between the economy and management parameters with positive, negative and side effects, i.e. they do not worship and glorify globalization. Secondly, respondents have a distant, although a rather pro-attitude, to European integration, and they seem to be interested in studying it and shaping it so it can be closer to them and the sustainability and competitiveness are enhanced. Thirdly, respondents strongly prefer lean models, perhaps the famous lean six sigma methodology, on the private as well as public level. Fourthly, excursions in non-economic domains are not welcome, although social aspects are not rejected. Respondents strongly desire two-way communication, about European integration, economy and management, and individual projects.

Conclusion

The future is inherently uncertain [11], but it is clear that the economy and management of regions and enterprises is, at least so far, linked to the European integration and their shape, destiny, and perhaps even existence are undergoing a close scrutiny. Unfortunately, the voices heard in these heated discussions are seldom, if at all, of the ultimate and true stakeholders and future decision makers. Interestingly, these young people are more responsible and pragmatic than many of the European integration and economy and management matadors. Their opinions matter, and in addition meet the criteria of academic scholar analysis, as well as of Plain common sense. The mega projects and black-and-white visions with shortcuts to the sustainable development and highest competitiveness are evaporating fictions of chimerical dimensions. The lean models and pragmatic approach should prevail. In addition, the millennium generation is excellent in communications and enjoys sharing information and ideas about it. This is a fantastic potential and it would be not only irresponsible, but even foolish to miss it. A future search and discussion is needed, and the well proclaimed bottom up approach should be implemented across the society.

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SELECTED ELEMENTS OF MARKETING MIX IN THE OPERATION OF SERVICES COMPANIES ON THE REAL ESTATE MARKET – RESULTS OF OWN STUDIES

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Keywords:
real estate market – services company – real estate agent – marketing mix elements – advertising on the real estate market

Abstract:
Services companies are distinguished from other economic entities by the subject of activity. Estate agency services are a prospective branch of economy. This results from broad possibilities of development for this sector and high demand for companies that offer estate agency services due to increasing interest in such services. The aim of this paper is to present the real estate market in Poland from the angle of enterprises that provide estate agency services, and to show, on the basis of a survey, which marketing elements are used by the agencies examined and how they are perceived by their customers.

Introduction

Services constitute a specific sphere that is characteristic of the modern society. This sector is a fast developing area which at the same time generates a significant part of GDP [8; 9]. Provision of services is a process aimed at creating value for the customer in the form of a service with certain quantitative and qualitative parameters. This process is a group of related tasks whose joint result constitutes value for the customer [3, 15]. Services companies are distinguished from other economic entities by the subject of activity. Agency services can be regarded as playing an important role for the functioning of the real estate market, as estate agency is a prospective branch of economy with broad possibilities of further development. Bringing a service of

appropriate quality to the market and adapting it to identified, broad preferences of the customer may be the key to and determine the company's success.

The aim of the paper is to present the real estate market in Poland from the angle of enterprises that provide estate agency services, and to show, on the basis of a survey, which marketing elements are used by the agencies examined and how they are perceived by their customers.

1. Real estate market in Poland and its specificity

The real estate market in Poland is a relatively young market which is constantly evolving, adapting itself to the provisions of law and tendencies that appear on it. According to data from the Central Statistical Office of Poland [7, 11], in 2010 around 257 thousand transactions of real estate purchase/sale were recorded with the value of turnover at around PLN 34 billion. The number of transactions of real estate purchase/sale recorded in 2010 was over 23% higher compared to 2009, whereas the value of the transactions grew by over 5%. In 2011, around 285 thousand transactions of real estate purchase/sale were recorded with the value of turnover at around PLN 49 billion. According to data obtained from the Register of Real Estate Prices and Values, in 2012 around 324 thousand transactions of real estate purchase/sale were recorded with the value of turnover at around PLN 71 billion. Data from the Central Statistical Office of Poland shows that the number of such transactions is growing year by year, which increases demand for the services of specialists handling transactions on the real estate market, including enterprises providing estate agency services.

The real estate market is a place which needs specialists that indirectly and directly influence the course, number and quality of transactions. Services companies providing estate agency services are entities that more and more often participate in market transactions, which may result from increasingly difficult procedures of changing the owner of a real estate [6, 9-19]. According to a Report of National Register of Real Estates, „Functioning of agency on the Polish real estate market" [2], the motives of customers using services of enterprises offering estate agency mainly include lack of time to individually look for a potential buyer of a given real estate, knowledge of

a particular real estate agency and lack of appropriate knowledge about the real estate market and provisions of the law applicable to the future transaction.

The increase in the number of services companies offering estate agency is also caused by deregulation related with the profession of real estate agent as of 1 January 2014, which removed the barriers to practicing this profession, which previously required the possession of a license. Currently, practically any entrepreneur can conduct business activity of estate agency.

2. Research methodology

The survey was conducted on 188 respondents, who were customers of selected 8 services companies offering services of estate agency, among other things, on the real estate market in Częstochowa. It was conducted in June 2014, and the survey questionnaire, placed on the Internet, was anonymous, which encouraged customers of real estate agencies to express their own opinions. The responses collected show that 110 questionnaires were fully completed, 13 were not finished, and 65 were only opened without responding to the questions contained in them.

The aim of the survey was to attempt to find out which marketing elements are used by real estate agencies in Częstochowa and whether the marketing elements used impact the choices of potential customers of a given company. The findings may verify the existing process of managing services companies through verification of e.g. the way the enterprises analysed manage their marketing, which should meet the expectations of potential customers.

3. Marketing elements used by services companies offering estate agency in the opinion of their customers – results of own studies

Following the statement of R. Lauterborn [5], that the classical formula of marketing mix („4P's": product, price, distribution (place), promotion) [4, 89] focuses only on the viewpoint of the entrepreneur, while the assessment by the potential customer of the company is more important, we can propose a „4C's" formula for services companies:

1. Customer value/needs and wants, which are satisfied by a service of estate agency,
2. Cost to the customer, cost connected with a service of estate agency,
3. Convenience, which should be adapted to the customer's needs and at the same time comply with the existing provisions of law,
4. Communication, or the need for information, should be in line with customers' expectations and use particular distribution channels to be delivered to the market.

Providing a service of estate agency is a comprehensive, often long-term support of a customer, therefore it is important to appropriately manage a services company whose aim is to provide a service of appropriate quality. Appropriate quality of a service can be understood as the highest quality of a service that is adapted to the customer's needs and preferences. One of the ways to achieve such quality may be appropriate promotion of the service and reaching the appropriate, possibly the largest, number of potential customers.

TAB. 1: Forms of promotion of services companies operating in the real estate business (n=100), (possibility of choosing more than 1 answer, maximally 3 answers)

Forms of promotion of real estate agencies	Number	% of answers
Online advertising	74	25.43
Advertising using billboard/large outdoor screens	63	21.65
Brochures, folders, corporate gadgets	49	16.84
Advertising in the press	46	15.81
Advertising on cars	30	10.31
Advertising on the radio	14	4.82
Personal presentation of the offer	8	2.74
Other, including: sponsoring, events	4	1.37
Advertising on TV	3	1.03
In total:	291	100

Source: own study based on a survey

The survey conducted shows that all the customers examined used services of a selected real estate agency, and nearly 35% of respondents declared that they had used services of the same company more than once, which may indicate that they had been satisfied with the service provided to them earlier.

The survey shows that customers of services companies usually notice advertisements of services companies placed on the Internet and on billboards located in strategic places in a city – such a response was given by respectively 74% and 63% of all the customers surveyed, which accounted for over 25% and 21% of all the responses provided. Apart from that, customers quite often notice real estate agencies promoting themselves using brochures distributed by their employees, and gadgets advertising the company – such a response was indicated by nearly half of the respondents. Another form of promotion that is quite often noticed by potential customers is advertising in the press – such a response was given by 46 out of 100 respondents. TV advertising is practically unnoticed, which can be ascribed to the size of the city examined. The same applies to sponsoring of agencies or personal presentation of offers by employees of agencies (table 1).

The survey also shows which forms of promotion used by services companies are, according to their customers, appropriate and which ones do not attract customers' attention or, if they do, don't fulfil their role. According to the surveyed customers of enterprises offering services of estate agency, the most appropriate form of promotion is online advertising, as it is through the Internet that customers obtain information about a potential service provider and their offer, whether it is from portals with ads or the website of a real estate agency. A good source of advertisements, according to the surveyed customers of real estate agencies, is also advertising in the press, as those interested confirm that while looking for offers on the real estate market and services of agents they check the press, including specialist press offering ads connected with the real estate market. In the case of Częstochowa, it is usually the local newspaper with ads „Pośrednik". Advertising on billboards or large outdoor screens, according to the customers surveyed, does not encourage them to use services of the agency advertising itself in this way, because it reaches them when they not necessarily need it. Moreover, according to those surveyed, these advertising media are used by large real estate

agencies that have a database of customers to whom these advertising messages are directed.

Conclusion

The results of the survey conducted show, on the one hand, the directions of the activity of services companies in the area of promotion and advertisement, whereas on the other hand, they reveal expectations of their customers, therefore we can find out which activities of services companies are consistent with preferences of their customers and fulfil their functions.

On the basis of the presented results of own survey we can conclude that services companies operating on the real estate market promote their estate agency services using promotion forms desired by their customers. The survey reveals that the following promotion forms are both used by the surveyed companies and preferred by their customers: online advertising, which is noticed and preferred by most customers, and advertising in the press, which is noticed and preferred by a large group of customers of the companies. The analysis of the survey results also shows some discrepancies between customer-preferred forms of promotion and those actually used by the companies offering services on the real estate market. According to the surveyed customers, advertising on billboards or large outdoor screens does not encourage them to use services of the agency that advertises itself in this way, because it reaches them when they don't necessarily need it. At the same time, this form of advertising is quite often noticed by customers of services companies.

The 4C's formula shows that every element of marketing mix is a response to customers' needs [1, 30], including customers of services companies. The process of managing a services company should be adapted to customers' needs and expectations because strong competition on the real estate market that results from a large number of enterprises offering estate agency services requires the use of such forms of promoting enterprises and their services that will reach the largest group of potential customers.

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WHAT ABOUT ESTIMATES OF ELECTION PREFERENCES?

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Keywords:
estimation – confidence interval – hypergeometric distribution – random sample – election

Abstract:
A task very often met in in practice is computation of confidence interval bounds for the relative frequency within sampling without replacement. A typical situation includes pre-election estimates and similar tasks. In other words, we build the confidence interval for the parameter value in the parent population of size on the basis of a random sample of size. There are many ways to build this interval. In our paper we compare different methods for building of estimations and we discuss when the considered methods are suitable. In the second part we discuss the common claims related to pre-election polls. We will apply all of the considered methods to real data and mutually compare the achieved results.

Introduction

A frequent task undertaken in public opinion polls is that of estimating election preferences of political parties, which is, estimating a proportion of voters who are going to vote for party "xy" (all of our text will strictly avoid references to any particular parties). From the viewpoint of statistics it means finding a point or interval estimate of an unknown parameter value for hypergeometric distribution – in principle estimating the relative frequency within sampling without replacement. In such types of problems we usually work with approximations, most often those using the normal distribution. In this paper we are, however, going to show that this approach may often lead to inaccurate results. Moreover, agencies always publish only point estimates, completely ignoring interval estimates, which are more informative, especially in this case, even though the interval estimates are easy to find. Our task therefore is to

estimate an unknown parameter value M or P in a parent population of size N on the basis of a random sample of size n. There are several approaches to such estimation. In this paper we are going to mutually compare several methods and suggest our own very simple, accurate and efficient method for finding the confidence interval bounds of the unknown parameter value, even without using any specialized statistical software.

We are mainly concerned with the statistical aspects of this area. In other words, our paper focuses on whether the methods usually used are, under all circumstances, adequate for estimating pre-election preferences. We chose Czech Senate elections as a source for our examples. However, the Lower House elections could be analyzed in an identical way. In the latter, voters can use preferential votes, but those do not affect the actual result (number of seats won by the party) or the methodology to be applied. It is an alliterative attribute – a citizen either does or does not vote, and for the resulting frequency count it is irrelevant whether the vote is "regular" or preferential. A presidential election would be a completely different story. For that type of election the main issue would be implied by analysis of checking the sign-up sheets, but this is a topic suitable for a different kind of a paper. This means that regarding potential errors we only focus on statistical properties of the estimates (if a correct theory is not used, it would be useless to consider other kinds of errors). In other words, it is the only component of the total error – a discrepancy between the normal distribution (routinely used for the construction of interval estimates) and the exact construction based on the actual distribution of the sample relative frequency (binomial and hypergeometric).

1. Methodology

Let us first focus on the construction of confidence intervals for relative (and possibly absolute) frequencies within the sampling without replacement. We derive a $100(1-\alpha)\%$ confidence interval for parameter P (relative frequency) as

$$P' < P < P'' \qquad (1)$$

where P is the relative frequency, P' is the lower bound of the confidence interval, and P'' is its upper bound. The confidence interval for absolute frequency M is given by the formula

$$M' < M < M'' \tag{2}$$

where M is the absolute frequency, M' is the lower bound of the confidence interval, and M'' is its upper bound. Values P', P, P'' and M', M, M'' are governed by relations

$$P = \frac{M}{N},\ P' = \frac{M'}{N} \quad \text{and} \quad P'' = \frac{M''}{N} \tag{3}$$

Value $1-\alpha$ stands here for the confidence level (most often it is $1-\alpha = 0.95$, that is, $\alpha = 0.05$, hence we speak about the 95% confidence interval). Let us denote by α_1 probability $\mathbf{P}(P < P') = \alpha_1$ and by α_2 probability $\mathbf{P}(P > P'') = \alpha_2$, where $\alpha_1 + \alpha_2 = \alpha$. Usually it is $\alpha_1 = \alpha_2 = \frac{\alpha}{2}$. The lower bound of the confidence interval M' (for the absolute frequency), or the lower bound P' (for relative frequency) is given by solving the following equation (for given m and α_1; here m is the "success" count in a sample of size n)

$$\sum_{x=m}^{n} \frac{\binom{M'}{x}\binom{N-M'}{n-x}}{\binom{N}{n}} \square\ \alpha_1, \quad \text{or} \quad \sum_{x=m}^{n} \frac{\binom{N\cdot P'}{x}\binom{N\cdot(1-P')}{n-x}}{\binom{N}{n}} \square\ \alpha_1 \tag{4}$$

This expression equals $1-F(m-1)$, where F is the distribution function of the hypergeometric distribution with parameters M', N, and n; or parameters NP', N, and n. The upper bound M'' or P'' (for the relative frequency) of the confidence is obtained by solving the following equation (for given m and α_2; here m is the "success" count in a sample of size n)

$$\sum_{x=0}^{m} \frac{\binom{M''}{x}\binom{N-M''}{n-x}}{\binom{N}{n}} \square\ \alpha_2, \quad \text{or} \quad \sum_{x=0}^{m} \frac{\binom{N\cdot P''}{x}\binom{N(1-P'')}{n-x}}{\binom{N}{n}} \square\ \alpha_2. \tag{5}$$

This expression equals $F(m)$, where F is the distribution function of the hypergeometric distribution with parameters M'', N, and n; or parameters NP'', N, and n.

Setting $\alpha_1 = 0$ (i.e., $\alpha_2 = \alpha$), we obtain the *right-hand confidence interval* $0 \le P \le P''$.

On the other hand, setting $\alpha_2 = 0$ (i.e., $\alpha_1 = \alpha$), we obtain the *left-hand confidence interval* $P' \le P \le 1$. If $\alpha_1 = \alpha_2 = \frac{\alpha}{2}$ we get the *bilateral confidence interval* $P' < P < P''$. Solving the presented equations is rather complicated, which explains why no "fully adequate" tables of values P' and P'' have been published in the literature yet. Moreover, sufficiently detailed tables (for values of N, n and m) would be too large. Hence we use in our examples nomographs published in [5].

Methods we briefly describe below can be used for determining the lower and upper bounds of the confidence interval:

- tables – see [4],
- normal approximation – see [1], [3] and [6]
- normal approximation with correction to discontinuity – see [3] and [7],
- binomial approximation – see [3] and [2],
- Goal Seek procedure in MS Excel spreadsheet.

2. Simulations

For each method, we performed a simulation. On the basis of the obtained results we can conclude that:

- If the P parameter value is close to 0.5 (it is even sufficient for it to be between 0.1 and 0.9 (with respect to the sizes of the parent population and the sample), the achieved results are very similar to each other and the methods may be deemed comparable. It is nearly irrelevant which of them is used. No substantial difference exists between the values from tables and those from MS Excel.

- If parameter P fulfills the condition $P < 0.1$ or $P > 0.9$ (both meaning essentially the same situation), the tabled values should be used, or alternatively the Goal Seek procedure in MS Excel.
- The Goal Seek procedure in MS Excel provides good results in all cases, regardless of the value of P. This procedure has another advantage – cost savings on software, because no specialized statistical software is necessary for it. MS Excel is more or less standard installation on any PC, so costs due to its use are practically none. Another argument in favor of the MS Excel procedure is its simplicity and availability.

So much it is about statistics. Let us now have a look at applications of this theory to real data.

3. Results

We will apply all of the above-considered methods to selected data from pre-election estimates (of election preferences) for political parties. We are not aiming at providing a different (better) estimate than those given by agencies for whom this activity is their professional subject. We are rather going to show that in certain situations the methods that are routinely used achieve misleading results; we also want to suggest under what conditions one method or another is applicable. We will also comment on the methodology used. The particular results we are going to discuss were obtained from public sources. We refer to a methodology published by one of the agencies that deliver pre-election estimates. It should be noted here that some agencies do not even bother to publish any methodology. For obvious reasons we are not going to mention any agency names here.

We will now present Tables and Figures showing point and interval estimates for the Senate election outcomes. The data will be processed three times: once under an assumption of 100% participation, and then for the first and second rounds.

3.1. 100% voting participation

Number of voters in the district $N = 101,951$, sample size $n = 962$, number of "positive votes" $m = 173$.

TAB. 1: Absolute frequency – 100% voting participation

Absolute frequency	lower	midpoint	upper	difference
method	M'	M	M''	M''-M'
tables	15,918	18,334	20,940	5022
approximation 1 – normal	15,870	18,334	20,798	4928
approximation 2 – normal with correction	15,918	18,334	20,940	5022
approximation 3 – binomial	15,904	18,334	20,958	5030
MS Excel	15,918	18,334	20,940	5022

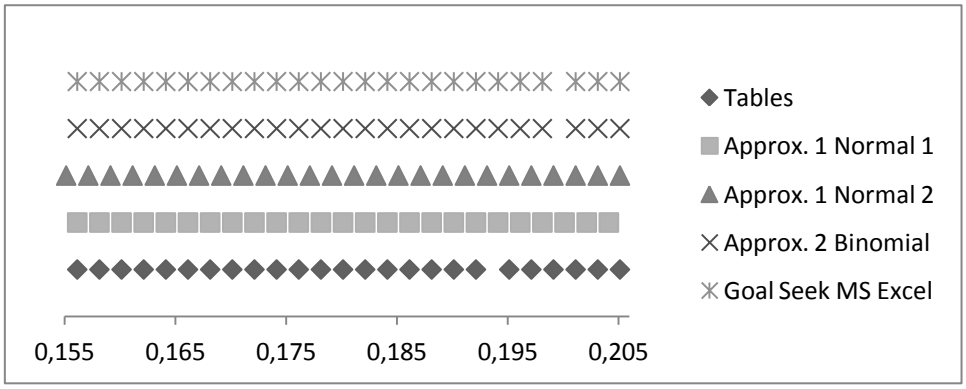
Source: our own calculations

TAB. 2: Relative frequency – 100% voting participation

Relative frequency	lower	midpoint	upper	difference
method	P'	P	P''	P''-P'
tables	0,156	0,180	0,205	0,049
approximation 1 – normal	0,156	0,180	0,204	0,048
approximation 2 – normal with correction	0,155	0,180	0,205	0,050
approximation 3 – binomial	0,156	0,180	0,205	0,049
MS Excel	0,156	0,180	0,205	0,049

Source: our own calculations

FIG. 1: Comparison of methods for a 100% voting participation



Source: our own calculations

Comment: For a 100% participation in the election, differences between the methods used would have no practical significance. The largest difference can be observed for

approximation by the normal distribution. The interval for the absolute frequency (15,870; 20,798) is narrower than that of the actual values (15,918; 20,940), and shifted to the left. The relative error amounts to 1.04% here.

3.2. Actual voting participation in the first round

Number of voters in the district $N = 38,915$, sample size $n = 367$, number of "positive votes" $m = 66$.

TAB. 3: Absolute frequency – actual voting participation in the first round

Absolute frequency	lower	midpoint	upper	difference
method	M'	M	M''	$M''-M'$
tables	5,528	6,998	8,670	3,142
approximation 1 – normal	5,474	6,998	8,522	3,048
approximation 2 – normal with correction	5,528	6,998	8,670	3,142
approximation 3 – binomial	5,531	6,998	8,667	3,136
MS Excel	5,528	6,998	8,670	3,142

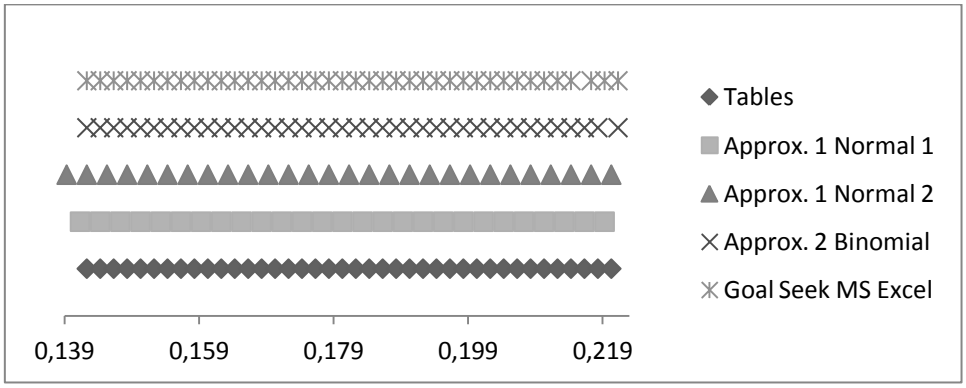
Source: our own calculations

TAB. 4: Relative frequency – actual voting participation in the first round

Relative frequency	lower	midpoint	upper	difference
method	P'	P	P''	$P''-P'$
tables	0.142	0.180	0.223	0.081
approximation 1 – normal	0.141	0.180	0.219	0.078
approximation 2 – normal with correction	0.139	0.180	0.220	0.081
approximation 3 – binomial	0.142	0.180	0.223	0.081
MS Excel	0.142	0.180	0.223	0.081

Source: our own calculations

FIG. 2: Comparison of methods – the first round of election



Source: our own calculations

Comment: This situation is similar to that of 100% participation – the worst estimate is again based on approximation using a normal distribution. The difference between the real values (5,528; 8,670) and approximations (5,474; 8,522) is 2.88%.

3.3. The last example is based on the actual voter participation in the second round in the Náchod District (15.38%).

Number of voters in the district $N = 15,680$, sample size: $n = 148$, number of "positive votes" $m = 27$.

TAB. 5: Absolute frequency – actual voting participation in the second round

Absolute frequency	lower	midpoint	upper	difference
method	M'	M	M''	$M''-M'$
tables	1,948	2,861	3,979	2,031
approximation 1 – normal	1,887	2,861	3,835	1,948
approximation 2 – normal with correction	1,948	2,861	3,979	2,031
approximation 3 – binomial	1,952	2,861	3,978	2,026
MS Excel	1,948	2,861	3,979	2,031

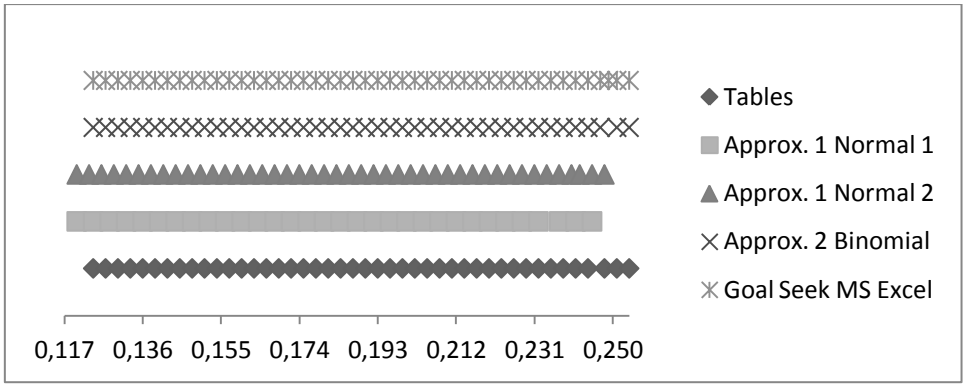
Source: our own calculations

TAB. 6: Relative frequency – actual voting participation in the second round

Relative frequency	lower	midpoint	upper	difference
method	$\boldsymbol{P'}$	$\boldsymbol{P}$	$\boldsymbol{P''}$	$\boldsymbol{P''-P'}$
tables	0.124	0.182	0.254	0.130
approximation 1 – normal	0.120	0.182	0.245	0.124
approximation 2 – normal with correction	0.117	0.182	0.248	0.131
approximation 3 – binomial	0.124	0.182	0.254	0.129
MS Excel	0.124	0.182	0.254	0.130

Source: our own calculations

FIG. 3: Comparison of methods – the second round of election



Source: our own calculations

Comment: Here the difference between (1,948; 2,031) and (1,887; 1,948) is (in the relative expression) as high as 7.17%.

All three examples considered above neglect the fact that the survey was aimed at estimating the nationwide outcome; 2,795,405 voters were registered for the Senate elections held on October 12 and October 13, 2012, out of which 101,951 were registered in the Náchod District, representing less than 4%.

Conclusions

First we will present our conclusions concerning the methodology. If an agency restricts itself to the point estimate, no discussion of the method is necessary at all. The probability of any agency estimating the exact numbers of votes (and percentages of votes for this or that party) is zero. More significant is the question of how close an estimate is to the actual outcome. Hence constructing an interval estimate would be a much more correct approach. However, the political parties themselves would undoubtedly be unwilling to accept it. Nobody wants to hear their election preferences are in the interval from 3% to 7% with a probability of 0.95 – an important aspect here is the 5% limit for entering the Parliament. If interval estimates were used, the relevance of the method used would become more pronounced. We can see that clearly form the simulations, in which the problems brought by individual methods are indicated. Regarding the pre-election estimates themselves, a number of shortcomings observed in the pre-election surveys are commented on in the application part. It is obvious we can

hardly expect a good-quality estimate under such circumstances. The sample does not comply with the claimed properties and therefore it is not representative. Hence any conclusions drawn from the data collected for that sample are misleading. Moreover, the application shows that in the selected election district in the second round of the election, the relative error is 7.17%, which is rather high. We could continue with our analysis in other districts. However, no more information than that described above would be achieved. In conclusion, we therefore have to observe that the pre-election surveys presented by agencies must be taken with more than a grain of salt.

Acknowledgment:

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INTERNAL DRIVING FORCES OF COLLABORATION ON INNOVATION ACTIVITY

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innovation – collaboration – open innovation

Abstract:
In the contemporary network economy innovation is increasingly considered as a collective rather than individual process. Co-operative arrangements in the framework of innovation contribute significantly to improvement of innovation performance. The aim of the paper is to investigate the internal driving forces of collaboration on innovation activity. The research sample covered 201 enterprises from Polish NUTS 2 region - Lubelskie voivodeship. The results of the analysis indicate that collaboration on innovation activity is stimulated by many internal factors, however, only performing internal R&D and importing activities, as well as using external sources of funds for financing innovations proved to be statistically significant.

Introduction

Interorganizational collaboration on innovation has grown in importance in the contemporary economy. Innovation is no longer regarded as an individual but as a network process. The complexity of innovation process implies that entering the networks of collaboration seems to be an inevitable step to improve the effectiveness of innovation activities.

Given the above mentioned circumstances, the aim of the paper is to examine the determinants of interorganisational collaboration on innovation activity. The paper is structured into three sections. The first portrays the role of the interorganisational collaboration on innovation activity and its key drivers basing on the literature overview

and outlines the research design of the study. The second one describes the results of empirical analysis of the factors that stimulate the propensity to collaborate on innovation activity. The discussion of the results and suggestion for future research are presented in the third section. The paper is closed with a brief summary of the main findings.

1. Methods, literature overview

The results of many studies confirm that collaboration has a positive impact on innovation performance [2; 11; 1; 12; 13; 7]. The benefits enterprises could obtain from the interorganisational collaboration on innovation activity are, besides gaining access to new sophisticated knowledge and complementary resources and skills, possibility to absorb already created technologies, risk sharing, increased elasticity, or chance of acquiring wider range of information which are inevitable to improve innovation performance [10, 425].

The importance of cooperation on innovation activity is particularly stressed in the open innovation era [6]. Chesbrough [3, 2] defines open innovation as the "use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively". In the relevant literature there is an ongoing discussion over the relationship between the openness of firms' innovation strategies and their characteristics. In the Tab. 1 we present the key driving forces of collaboration on innovation activity identified in empirical studies.

Apart from the factors identified in the literature it can be expected that collaboration might be stimulated also by other driving forces such as the level of internationalisation or the sources of funds for innovation activity.

The above discussion led to formulation of the key hypothesis of the study:
Hypothesis 1: Collaboration on innovation activity is stimulated by: firm size, internal R&D activity, participation of foreign capital, technological intensity of the sector, the level of internationalization, and the use of external sources of funds.

TAB. 1: Driving forces of collaboration on innovation activity in empirical studies

Factor	Study	Key results
Internal R&D activity	Laursen, Salter (2004) [8]	Firms that conduct internal R&D are more prone to use information from universities in innovation process
	Tether, Tajar (2008) [14]	Firms that conduct internal R&D activity are more likely to use external sources of information in the innovation process
	Clausen (2013) [4]	Firms that conduct internal R&D activity are more likely to follow the open approach to innovation.
Size of the firm	Lichtenthaler (2008) [9]	Larger and diversified companies tend to adopt the open innovation models to a greater extent
	Matras-Bolibok A. (2014) [10]	Large enterprises tend to collaborate on innovative activity more intensively than small or medium ones
Foreign capital	Dussauge *et al*. (1992) [5]	Foreign owned firms tend to collaborate in order to adapt their global products to local markets
	Tether (2002) [15]	Foreign owned firms are most likely to have arrangements on innovation activity
Technological intensity of sector	Tether (2002) [15]	The propensity to collaborate on innovation increases with technological intensity of the sector in which firm is active

Source: own compilation

To test this hypothesis we analysed statistical significance of differences between two subsamples of randomly selected 201 enterprises from Lubelskie voivodeship (NUTS 2 level region) that implemented innovations in the year 2011 with and without collaboration. The data came from the survey conducted by Statistical Office of Lublin by the order of Marshal's Office of the Lubelskie voivodeship as a part of research project "Intellectual Capital of Lubelskie voivodeship 2010-2013".

2. Results

The Tab.2 summarises the key features of the analysed sample of enterprises divided into two groups: undertaking and not undertaking collaboration on innovation activity. The data presented in Tab. 2. show that the structure of core business activities in each of the compared subsamples of enterprises was clearly different. Nearly a half (45%) of enterprises that implemented innovations in collaboration with other firms or R&D units belonged to the services sector, while the shares of trade and manufacturing sectors

TAB. 2: General characteristics of enterprises collaborating and non-collaborating on innovative activity

Feature		Innovation implemented	
		in collaboration	without collaboration
Number of enterprises in the sample		66	135
Core business activity:	services	45.45%	31.11%
	trade	25.76%	20.74%
	manufacturing	24.24%	40.74%
	other	4.55%	7.41%
Level of technology:	low	1.52%	0.75%
	medium-low	10.61%	16.42%
	medium-high	57.58%	58.96%
	high	30.30%	23.88%
Level of informatisation	low	18.18%	24.44%
	medium	62.12%	57.78%
	high	19.70%	17.78%
Share of enterprises:	with foreign capital participation	10.61%	7.41%
	exporting	77.27%	72.59%
	importing	84.85%	62.22%
	conducting internal R&D activity	77.27%	56.30%
	cooperating with R&D units	39.39%	28.89%
Sources of funds for innovations	equity and retained earnings	87.88%	83.70%
	bank loans	36.36%	21.48%
	leasing	18.18%	4.44%
	EU funds	33.33%	20.00%
Average employment (persons)		255	115
Average yearly turnover (thousands of EUR)		22 046	12 869

Source: own elaboration.

oscillated around 25% each. In turn, the majority (41%) of firms that implemented innovations without collaboration operated in the manufacturing sector, whereas 31% operated in services and 21% in trade sectors. These results suggest that manufacturing firms were less willing to implement innovations in collaboration which might be attributable either to reluctance in revealing the details of applied technologies to other firms or to difficulties in finding an adequate support from the potential counterparts.

The subsample of collaborating enterprises was characterised with a higher share of high-tech firms and a lower share of firms operating in medium-low technology industries. Consistent with our expectations collaborating firms, in general, were more frequently:

- using advanced IT solutions,
- owned or co-owned by foreign capital,
- exporting and importing,
- conducting internal R&D activity,
- cooperating with R&D units,
- using equity, bank loans, leasing, and EU funds for financing of innovations.

Than the firms that did not collaborate on implementation of innovations. It is also apparent that the collaborating enterprises were generally operating on a larger scale, as indicated by the higher average values of employment and yearly revenues.

The magnitudes of the aforementioned differences between the two subsamples of enterprises varied strongly across the analysed features. Therefore, in the next step of the analysis we verified statistical significance of comparable variables with the unpaired t-tests for difference of means after checking for homogeneity of variances with the Levene's test (Tab. 3).

TAB. 3: Results of t-tests for differences of means for selected features of the compared groups of enterprises

Feature	Innovation implemented		Mean difference	
	in cooperation	without cooperation		
	Mean		Value	p-value
Level of technology (1 - lowest, 4 - highest)	3.17	3.06	0.11	0.284
Level of informatisation (1 - lowest, 3 - highest)	2.02	1.93	0.08	0.395
Exporting activities (1 - yes, 2 - no)	1.23	1.27	-0.05	0.479
Importing activities (1 - yes, 2 - no)	1.15	1.38	-0.23	0.000
Internal R&D activities (1 - yes, 2 - no)	1.23	1.44	-0.21	0.002
Sources of funds for innovations (1 – yes, 2 – no):				
- equity and retained earnings	1.12	1.16	-0.04	0.438
- bank loans	1.64	1.79	-0.15	0.034
- lease	1.82	1.96	-0.14	0.009
- EU funds	1.67	1.80	-0.13	0.052
Cooperation with R&D units (1 - yes, 2 - no)	1.61	1.71	-0.11	0.148
Average employment (persons)	254.82	115.33	139.48	0.102
Average yearly revenues (thousands of EUR)	22 046	12 869	9 177	0.412
Foreign capital participation (1 - yes, 2 - no)	1.89	1.93	-0.03	0.447

Source: own elaboration.

The results shown in the Tab. 3 indicate that at the 5% level of significance the firms that collaborated on implementation of innovations were statistically significantly more frequently performing importing and internal R&D activities, as well as using bank loans and leasing for financing innovations than non-collaborating entities. It is also worth to point out that their relatively higher propensity to use the EU funds as source of funds for innovations would be statistically significant at the 5.2% level. The differences between all other examined features, however, appear to be statistically insignificant.

3. Discussion

The results of our research indicate that enterprises implementing innovations in collaboration were generally different from non-collaborating ones in the manner consistent with the findings of previous empirical studies presented in the Tab. 1. Our findings suggest therefore that collaboration on innovation activity seems to be stimulated by internal R&D activity, firm's size, participation of foreign capital, and technological intensity of the sector. However, only the first of the aforementioned driving forces turned out to be statistically significant. Additionally, the present study provides evidence that firms collaborating on innovative activity are statistically significantly more prone to conduct import activities and use external sources of funds. Given the above discussion, we recommend that further research in this field should be based on larger samples of enterprises, preferably covering a broader geographical areas, which could improve the statistical power of results.

Conclusion

The conducted analysis partially supports the key hypothesis of the paper. Enterprises collaborating on innovation activity were more frequently conducting internal R&D activity, exporting and importing, owned or co-owned by foreign capital, using advanced IT solutions, cooperating with R&D units, using equity, bank loans, leasing, and EU funds for financing of innovations than the firms that did not collaborate. The firms that collaborated on innovation activity were statistically significantly more frequently performing internal R&D and importing activities, as well as using external

source of funds for financing innovations than non-collaborating entities. The differences between all other examined features, however, appear to be statistically insignificant.

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SLACK-BASED MEASURE MODEL FOR CLASSIFYING EFFICIENCY WITHIN EU NUTS 2 REGIONS

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Abstract:
Nowadays, topics about measuring and evaluating of competitiveness and efficiency have enjoyed economic interest. The aim of this paper is to evaluate the relationship between the effects – outputs, and efforts – inputs; and to recognize competitive/uncompetitive position of NUTS 2 regions within the EU based on Slack Based Measure model in reference period 2004-2012. Efficiency measuring is based on factors of inputs – driven forces of competitiveness, and factors of outputs – direct or indirect outcomes of a competitive society and economy. Using of SBM model allows to determine the boundaries of growth for each of evaluated regions. SBM model expressed the distance from the efficient frontier, thus it is possible to identify regions which are in their steady state and limits of steady state and to recognize strengths and weaknesses of regions.

Introduction

It is generally accepted that the *level of economic development* is not uniform across territories. On the contrary, it substantially differs. This plays an important role in many research studies that made to assign appropriate evaluation of economic and social development in European area as a whole [2], and also new European Member States [5]. As human activities are related to economic development and are affected by territorial development, the way of measurement of the *conditions of territorial development* is really essential and important in the determination of a country's socio-economic policies [3]. Therefore the issue of socioeconomic advancement but also disparities of territories are closely linked to the setting and evaluation of

competitiveness, especially in the *European Union* (EU) area. At a time when EU Member States have to deal with increased pressures on public balances, stemming from demographic trends and globalisation, the improvement of the efficiency and effectiveness of public spending features high on the political agenda, because rational use of available sources is one of the preconditions for competitiveness.

1. Data and methodology

Database consists of indicators that are part of *Regional Competitiveness Index* (RCI) approach. RCI pillars are grouped according to the different dimensions (input versus output aspects) of regional competitiveness they describe, resp. '*inputs*' describe driving forces of competitiveness, also in terms of long-term potentiality, and '*outputs*' are direct or indirect outcomes of a competitive society and economy [1]. RCI data file consists of *66 indicators in RCI2010* approach and *73 indicators in RCI2013* approach. All RCI indicators are not used in the paper, because they were not available for the whole reference period for each evaluated unit. In this paper, only *23 indicators* are used – *6 for inputs* and *17 for outputs*. *Input indicators* represent (1) Motorway Transport - Length of Motorways (MTLM), (2) Air Transport of Freight (ATF), (3) Air Transport of Passengers (ATP), (4) Hospital Beds (HB), (5) Infant Mortality Rate, (6) Early Leavers from Education and Training. *Output indicators* represent (1) Employment Rate (ER), (2) Long-term Unemployment Rate (LtUR), (3) Unemployment Rate (UR), (4) Male Employment (ME), (5) Female Employment (FE), (6) Male Unemployment (ME), (7) Female Unemployment (FU), (8) Gross Domestic Product (GDP), (9) Compensation of Employees (CoE), (10) Employment in Sophisticated Sectors (EISS), (11) Human Resources in Science and Technology - Core (HRSTc), (12) Patent applications to the EPO (EPO), (13) Total R&D Expenditure (GERD), (14) Human Resources in Science and Technology (HRST), (15) High-tech Patent Applications (H-TI), (16) ICT Patent Applications (ICT), (17) Biotechnology Patent Applications (BioT). Evaluated *decision making units* (DMUs) are presented by 58 NUTS 2 regions within the group of EU13 countries, i.e. countries that joined to the EU in 2004 (CY, CZ, EE, HU, LT, LV, MT, PL, SI, SK), 2007 (BG, RO) and 2013 (HR). *Reference period* includes years 2004, 2007, 2008, 2009 and 2012, whereas years are divided into groups according to the different period of economy cycles they describe. Years 2004 and 2007 characterize a growth period; year 2008 symbolizes leap

year between growth and crisis period; years 2008 and 2009 represent a crisis period, and 2012 is possible to consider as post-crisis period.

With respect to input and output aspects of RCI, its methodology seems to be suitable way for measuring regional efficiency by *Data Envelopment Analysis* (DEA) method. In data envelopment analysis, there are several methods for measuring efficiency, besides the basic DEA models, certain modifications exist. One of them is *Slack-based measure* (SBM) model designed by Tone [8]. Efficiency is measured only by additional variables *s*+ and *s*–. The model formula, provided *constant returns to scale* (CRS), is (1):

$$\min \ \rho = \frac{1-\frac{1}{m}\sum_{i=1}^{m}(s_i^- / x_{iq})}{1+\frac{1}{r}\sum_{k=1}^{r}(s_k^+ / y_{kq})}, \qquad (1)$$

subject to

$$\sum_{j=1}^{n} x_{ij}\lambda_j + s_i^- = x_{iq},$$

$$\sum_{j=1}^{n} y_{kj}\lambda_j - s_k^+ = y_{kq},$$

$$\lambda_j, s_k^+, s_i^- \geq 0, \ j = 1,2,...,n, j \neq q; k = 1,2,...,r; i = 1,2,...,m.$$

The variables *s*+ and *s*– measure the distance of inputs $X\lambda$ and outputs $Y\lambda$ of a virtual unit from those of the unit evaluated *Uq*. The numerator and the denominator of the objective function of model (1) measures the average distance of inputs and outputs, resp. from the efficiency threshold. Efficient units are those whose score of efficiency equals to 1, units with score of efficiency less than 1 are SBM inefficient. In order to review efficient units, it is necessary to use super efficiency models. The super SBM model is based on the SBM model. After removing from the population unit *Uq* which is being evaluated, it seeks to find a virtual unit *U** with inputs *X** and outputs *Y** which will be SBM efficient after the removal. Apparently, inputs into unit *U** will be higher or equal to those into the evaluated unit *Uq* and all outputs will be lower or equal to those of *Uq*. The super efficiency rate is defined as the distance between the inputs and outputs of both units – *U** and *Uq*. The distance is shown in variable δ. The super SBM model can be formulated as follows (2):

$$\min \ \delta = \frac{\frac{1}{m}\sum_{i=1}^{m}(x_i^* / x_{iq})}{\frac{1}{r}\sum_{k=1}^{r}(y_k^* / y_{kq})}, \qquad (2)$$

subject to

$$\sum_{j=1}^{n} x_{ij}\lambda_j + s_i^- = x_i^*,$$

$$\sum_{j=1}^{n} y_{kj}\lambda_j - s_k^+ = y_k^*,$$

$$x_i^* \geq x_{iq},\ y_k^* \leq y_{kq},\ \lambda_q = 0,$$

$$\lambda_j, s_k^+, s_i^- \geq 0,\ j = 1,2,...,n,\ j \neq q; k = 1,2,...,r; i = 1,2,...,m.$$

The input-oriented super SBM model is derived from model (2) with the denominator set to 1. Numerator of variable δ can be interpreted as the average rate of inputs increase of unit *U** in comparison with inputs of unit *Uq*. Likewise, it is possible to interpret the denominator. The higher the value, the more efficient the unit.

2. Efficiency analysis results

Policy makers need a clear sense of its current competitive position and its functioning and latent factors of competitiveness: the starting point. By understanding both its position and factors of competitiveness, the policy makers can better understand the potential development options and limitations for territories and plot a development trajectory towards a desired end state, thus use sources in effective way [4]. With regard to these facts, scores of efficiency for all NUTS 2 regions and average efficiency separated for each EU13 country are calculated in TAB. 1; also total and internal ranks of each region in all evaluated years are seen in TAB. 1.

TAB. 1: Slack-based Super Efficiency Model

DMU	2004	Rank	2007	Rank	2008	Rank	2009	Rank	2012	Rank	Average efficiency	Average rank	Internal country absolute rank
BG31	0,336	51	0,435	52	1,002	46	0,625	48	0,158	**56**		50,6	6
BG32	1,096	25	1,044	38	1,102	31	1,007	43	1,038	40		35,4	2
BG33	1,024	39	1,183	22	1,627	6	1,441	9	1,755	4	0,966	16,0	1
BG34	0,085	55	0,286	54	0,140	55	0,137	55	0,219	54		54,6	5
BG41	0,273	53	1,007	44	1,045	38	1,072	38	1,017	42		43,0	3
BG42	0,876	47	0,028	**57**	0,198	54	0,180	54	0,416	50		52,4	4
CZ01	1,682	5	1,608	8	1,793	4	1,646	4	1,784	**3**		4,8	2
CZ02	1,107	24	1,131	28	1,141	25	1,103	31	1,165	26		26,8	5
CZ03	0,525	49	1,009	42	0,232	53	1,006	44	0,498	49		47,4	8
CZ04	0,305	52	1,184	21	1,171	20	1,206	19	1,222	23	1,358	27,0	3
CZ05	1,966	**3**	2,917	**3**	2,542	**2**	2,617	**2**	1,858	**2**		2,4	1
CZ06	1,067	32	1,048	36	1,080	34	1,178	21	1,134	27		30,0	6
CZ07	1,131	21	1,220	19	1,133	27	1,081	36	1,173	25		25,6	4
CZ08	2,283	**2**	1,105	31	1,083	33	1,074	37	1,123	28		26,2	7
EE00	1,426	7	1,183	23	1,168	22	1,300	12	1,249	21	1,265	17,0	1
CY00	1,157	15	1,080	35	1,129	28	1,171	22	1,433	13	1,194	22,6	1
LV00	1,727	4	1,137	27	1,833	**3**	1,247	16	1,188	24	1,427	14,8	1
LT00	1,280	9	1,000	46	1,029	40	1,085	33	1,052	39	1,089	33,4	1
HU10	1,173	14	1,032	40	0,588	48	1,034	41	1,054	37		36,0	1
HU21	1,010	42	0,504	50	0,418	49	0,067	**58**	0,676	48		49,4	4
HU22	1,011	41	0,863	47	0,668	47	0,224	53	0,780	46	0,561	46,8	2
HU23	0,085	**56**	0,004	**58**	0,021	**57**	0,333	52	0,748	47		54,0	3
HU31	0,991	46	0,417	53	1,008	45	0,341	51	0,172	55		50,0	6
HU32	0,007	**58**	1,012	41	1,017	42	0,414	50	0,343	52		48,6	5
HU33	1,008	44	0,136	55	0,262	51	0,134	**56**	0,090	**58**		52,8	7
MT00	1,153	17	0,528	49	0,003	**58**	1,046	40	1,097	33	0,765	39,4	1
PL11	1,069	30	1,002	45	0,024	**56**	1,081	35	1,645	8		34,8	5
PL12	1,146	18	1,302	17	1,168	21	1,146	26	1,863	**1**		16,6	1
PL21	1,056	35	1,129	30	1,156	24	1,119	29	1,269	17		27,0	9
PL22	1,054	36	5,999	**1**	2,552	**1**	1,858	**3**	1,397	14		11,0	8
PL31	0,659	48	1,345	14	1,437	8	1,148	25	1,017	43		27,6	14
PL32	0,376	50	1,339	15	1,213	17	1,148	24	1,722	5		22,2	2
PL33	1,079	26	1,250	18	1,159	23	1,188	20	1,537	10		19,4	7
PL34	0,084	**57**	1,356	13	1,337	11	1,225	18	1,704	7	1,433	21,2	4
PL41	1,009	43	4,143	**2**	1,414	9	1,523	7	1,642	9		14,0	6
PL42	1,047	37	0,743	48	1,063	37	0,832	46	0,826	45		42,6	16
PL43	1,182	13	2,912	4	1,703	5	5,739	**1**	1,053	38		12,2	13
PL51	1,140	19	1,094	32	1,009	43	1,082	34	1,011	44		34,4	15
PL52	1,134	20	1,161	25	1,118	30	1,124	28	1,062	36		27,8	12
PL61	1,072	28	2,001	6	0,345	50	0,760	47	1,095	34		33,0	11
PL62	1,121	23	1,160	26	1,075	36	1,500	8	1,706	6		19,8	3
PL63	1,072	29	2,111	5	1,088	32	1,138	27	1,245	22		23,0	10
RO11	1,238	10	1,394	11	1,190	18	1,004	45	0,330	53		27,4	7
RO12	1,236	11	1,857	7	1,239	16	1,067	39	1,108	31		20,8	2
RO21	1,028	38	1,087	33	1,019	41	1,085	32	1,109	30	1,018	34,8	1
RO22	1,061	33	1,047	37	1,030	39	1,011	42	1,095	35		37,2	4
RO31	1,514	6	1,130	29	1,180	19	1,113	30	1,103	32		23,2	3
RO32	1,000	45	0,495	51	0,236	52	0,468	49	0,349	51		49,6	6
RO41	1,060	34	0,098	**56**	1,008	44	0,127	**57**	0,143	**57**		49,6	8

RO42	1,073	27	1,009	43	1,299	13	1,570	6	1,031	41		26,0	5
SI01	1,225	12	1,312	16	1,256	15	1,303	11	1,251	20	1,491	14,8	2
SI02	2,838	**1**	1,406	10	1,459	7	1,394	10	1,462	12		8,0	1
SK01	1,356	8	1,598	9	1,289	14	1,252	15	1,254	19		13,0	3
SK02	1,068	31	1,174	24	1,078	35	1,299	13	1,329	15	1,243	23,6	1
SK03	1,128	22	1,085	34	1,137	26	1,151	23	1,112	29		26,8	4
SK04	1,153	16	1,185	20	1,344	10	1,572	5	1,286	16		13,4	2
HR03	1,022	40	1,040	39	1,127	29	1,246	17	1,264	18	1,238	28,6	2
HR04	0,217	54	1,393	12	1,314	12	1,265	14	1,467	11		20,6	1

Source: own calculation and elaboration. 2014

TAB. 1 depicts the abridged version of the efficiency, resp. super efficiency report, where efficiency scores of all 58 NUTS 2 regions are reported. This 6-input and 17-output SBM model shows that 45 regions in 2004, 45 regions in 2007, 46 regions in 2008, 44 regions in 2009 and 44 regions in 2012 are efficient using these 23 dimensions. The score of efficiency of these efficient units equals to 1. Furthermore, we observe that the score of all other regions in each year could not be determined as efficient. The score of efficiency of these inefficient units is lower than 1, resp. between 0 and 1. Because of number of efficient units and need for classification of all evaluated regions, it was necessary to calculate score of super efficiency. SBM model of super efficiency is calculated only for SBM efficient regions and score of super efficiency is higher than 1, whichever the higher the value, the more efficient the unit. Based on these results, it is possible to sort NUTS 2 regions according to their efficiency, resp. super efficiency. The darker grey colour displayed the more efficient the unit; and otherwise. Across all five years, Polish NUTS 2 region PL22 Śląskie and Czech NUTS 2 region CZ05 Severovýchod achieved the best results within the whole EU13 NUTS 2 regions. The worst results were recorded in Hungarian NUTS 2 regions HU23 Dél-Dunántúl and HU33 Dél-Alföld.

3. Results' discussion

Regions with scores of efficiency less than 1 but greater than 0, and thus they are identified as inefficient. These regions can improve their efficiency, or reduce their inefficiencies proportionately, by reducing their inputs or increasing their outputs. This raises the question: which inputs and outputs are needed to be changed by calculated proportions? These input reductions or output augmentations are called slacks. Here, we observe that none of the efficient NUTS 2 regions have any slacks. Slacks exist only for

those regions identified as inefficient. However, slacks represent only the leftover portions of inefficiencies; after proportional changes in inputs or outputs, if region cannot reach the efficiency frontier (to its efficient target), slacks are needed to push region to the frontier (target). These input and output slacks for inefficient regions in all reference years are reported in Appendix – TAB. 1. Based on aggregate information in TAB. 2 (see Appendix) is possible to say that in the case of input, the highest need for input reduction is for ATP indicator, the lowest need for input reduction is for IMR indicator. In the case of output, the highest need for output increasing is for CoE indicator, the lowest need for output increasing is for GERD indicator. Based on minimum (MIN) and maximum (MAX) values is possible to state that the highest need for input reduction is largely in 2004-2007 and the lowest in 2007-2008; the highest need for output increasing is largely in 2008-2009-2012 and the lowest in 2004-2007.

Conclusion

What is the background of competitiveness? What are the crucial factors behind competitive differences and gap among regions? These are the kind of questions that motivate to study of aspects of EU13 countries competitiveness, see e.g. topic about the factors determining driving forces of competitiveness in EU countries [7]. The competitiveness of territory resides not only in the competitiveness of its constituent individual entities and their interactions, but also in the wider assets and social, economic, institutional and public attributes of the country itself. The notion of competitiveness is as much about qualitative factors and conditions as it is about quantifiable attributes and processes. The causes of competitiveness are usually attributed to the effects of an aggregate of factors rather than the impact of any individual factor. The sources of competitiveness may also originate at a variety of geographical scales, from the local, through regional, to national and even international [4]. Current economic situation determined by persisting effects of the crisis is causing the governments of countries and the local governments to streamline their processes in terms of collecting revenue from the budget and then redistributing it on the principle of performance and economic efficiency. Comparative analysis of efficiency in public sector is thus starting point for studying the role of efficiency regarding economic governance of sources utilization by public management for achieving medium/long-term objectives of economic recovery and sustainable development of economies.

Results of Slack-based Super Efficiency Model could be and starting point for further research in the field of study the dynamic changes in regional productivity and efficiency by advanced DEA approach – the Malmquist Productivity Index (MPI). By this approach will be possible to get results about contribution of internal (technical) and external (technological) efficiency changes to regional productivity as a whole, e.g. in the process as [6].

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Appendix:

TAB. 1: Input and output slacks for input oriented SBM Model in years 2004, 2007, 2008, 2009 and 2012

2004	**Input Slacks**						**Output Slacks**															
DMU	*MTLM*	*ATF*	*ATP*	*HB*	*IMR*	*ELET*	*ER*	*LtUR*	*UR*	*ME*	*FE*	*MU*	*FU*	*GDP*	*CoE*	*EiSS*	*EPO*	*HRSTc*	*GERD*	*HRST*	*H-TI*	*ICT*	*BioT*
BG31	0,0	42,9	1112,2	0,0	7,6	10,1	2,6	0,6	0,7	3,7	1,8	0,0	1,5	13,7	6543,5	760,8	3,3	0,0	0,4	2,1	0,4	0,3	0,3
BG34	0,0	55,5	814,8	0,0	10,6	16,5	0,0	2,2	0,9	0,1	0,1	1,7	0,0	19,9	10447,7	1115,5	3,9	2,3	0,8	6,0	0,3	0,3	0,1
BG41	0,0	55,7	0,0	0,0	1,4	0,0	11,4	0,7	1,5	13,9	8,9	2,1	1,1	39,7	6694,9	120,3	13,7	0,0	0,4	6,3	1,9	2,7	0,9
BG42	0,0	56,6	0,0	0,0	4,7	22,9	7,3	3,4	5,9	9,1	5,4	5,6	6,2	36,8	13983,8	1171,9	18,2	4,5	1,2	15,6	1,4	0,8	0,6
CZ03	0,0	6,0	1095,9	13,3	0,0	0,0	1,6	1,5	1,0	0,0	3,6	1,8	0,0	28,4	4591,8	219,4	18,6	6,1	1,0	13,5	3,5	5,5	1,3
CZ04	0,0	19,1	3396,5	112,0	0,0	0,4	0,9	0,1	0,8	0,0	2,0	1,5	0,0	22,0	10874,3	1066,6	14,1	8,2	1,3	18,8	1,7	2,5	0,8
HU23	0,0	26,5	0,0	91,4	0,0	6,2	10,3	7,0	10,3	8,5	11,8	11,5	8,7	15,1	13809,3	1686,1	5,2	4,3	1,0	10,7	0,0	1,2	0,7
HU31	0,0	27,3	0,0	0,0	2,3	7,6	27,0	5,6	8,3	28,2	25,6	8,2	8,5	36,8	14741,1	1611,2	25,4	7,2	1,8	20,4	0,7	2,9	2,6
HU32	0,0	27,8	135,8	133,9	0,0	9,8	6,2	7,0	9,3	5,0	7,2	9,6	8,8	14,4	12099,1	1401,0	0,0	4,0	0,5	7,8	1,2	1,1	0,3
PL31	32,6	0,2	35,0	62,9	2,0	0,0	0,9	2,8	0,4	2,0	0,0	0,0	0,8	14,9	8791,4	712,0	6,4	1,8	0,5	5,7	0,8	0,1	0,4
PL32	16,3	2,3	442,3	51,8	1,7	0,0	1,2	0,2	0,2	0,0	2,6	0,3	0,0	10,2	5927,5	665,3	5,4	1,7	0,7	2,1	0,2	0,6	0,5
PL34	0,0	0,0	16,2	0,0	0,0	0,5	4,7	1,4	2,4	2,9	7,1	4,3	0,0	22,1	14097,9	1583,2	8,8	3,2	1,1	11,1	1,1	1,3	0,6
HR04	318,6	26,5	0,0	0,0	1,1	0,0	21,1	0,8	1,1	21,2	20,8	0,0	2,4	37,6	6208,4	444,6	46,0	4,6	1,1	11,2	0,0	2,9	2,3
2007	**Input Slacks**						**Output Slacks**															
DMU	*MTLM*	*ATF*	*ATP*	*HB*	*IMR*	*ELET*	*ER*	*LtUR*	*UR*	*ME*	*FE*	*MU*	*FU*	*GDP*	*CoE*	*EiSS*	*EPO*	*HRSTc*	*GERD*	*HRST*	*H-TI*	*ICT*	*BioT*
BG31	0,0	0,0	1377,9	0,0	4,7	9,9	2,9	0,0	1,8	6,0	0,0	1,5	2,1	28,0	12374,9	1057,6	5,9	3,0	0,6	9,9	0,3	0,0	0,5
BG34	0,0	0,0	722,3	0,0	4,2	9,7	1,7	1,3	1,9	3,6	0,0	1,5	2,5	12,7	6657,2	856,6	2,9	0,9	0,3	2,9	0,6	0,7	0,0
BG42	0,0	6,9	0,0	0,0	3,4	10,5	2,8	0,6	2,3	5,6	0,0	2,2	2,5	34,9	12985,7	863,3	19,2	2,8	0,5	11,7	2,4	3,0	0,0
HU21	0,0	42,1	5674,7	0,0	2,0	0,5	18,2	0,6	0,6	16,2	20,3	0,9	0,0	38,9	7553,3	363,0	42,0	7,4	1,3	23,7	1,7	0,0	3,8
HU22	0,0	0,0	117,7	60,3	0,0	4,6	8,8	2,5	4,9	7,7	10,0	5,0	4,7	25,5	20894,7	1765,6	10,9	8,0	0,9	21,6	2,4	1,7	1,1
HU23	0,0	7,5	0,0	0,0	0,0	8,6	23,9	1,0	1,0	24,6	23,0	0,3	1,6	35,6	23475,8	2137,8	1,8	8,7	1,1	21,7	0,6	0,0	1,0
HU31	0,0	0,0	3226,1	0,0	0,4	5,3	32,6	0,3	0,6	36,0	29,1	0,0	1,3	31,5	15479,9	1313,9	3,0	8,0	1,0	21,5	0,0	0,3	1,3
HU33	0,0	4,7	1400,7	0,0	0,0	2,4	15,5	0,8	1,1	15,0	15,8	0,9	1,1	35,4	17953,1	1412,6	7,0	6,9	0,6	17,8	1,8	2,4	0,0
MT00	0,0	2,3	0,0	0,0	0,9	24,0	24,9	1,3	1,4	15,0	35,5	1,3	1,1	0,0	12050,6	1290,7	6,3	3,2	0,8	14,6	3,1	3,4	0,0
PL42	0,0	0,0	0,0	8,6	0,0	0,0	37,9	0,0	0,7	43,4	32,1	0,0	1,4	22,8	4195,4	463,8	16,3	0,0	1,1	7,8	0,2	0,4	0,5
RO32	0,0	0,0	1457,5	0,0	0,0	3,6	31,4	3,8	7,5	34,7	27,5	5,8	9,5	18,2	3795,6	590,2	14,5	0,0	0,4	12,4	0,7	0,0	1,2
RO41	0,0	0,0	1439,9	0,0	4,4	7,2	0,9	0,0	1,4	0,0	1,9	0,3	2,5	18,9	9286,6	533,6	5,3	4,4	0,5	15,6	0,3	0,0	0,6
2008	**Input Slacks**						**Output Slacks**															
DMU	*MTLM*	*ATF*	*ATP*	*HB*	*IMR*	*ELET*	*ER*	*LtUR*	*UR*	*ME*	*FE*	*MU*	*FU*	*GDP*	*CoE*	*EiSS*	*EPO*	*HRSTc*	*GERD*	*HRST*	*H-TI*	*ICT*	*BioT*
BG34	0,0	0,0	381,6	0,0	1,8	8,7	0,0	0,0	0,5	0,0	0,0	0,3	0,8	15,7	8826,3	981,2	4,6	0,9	0,3	2,5	0,3	0,4	0,0
BG42	0,0	7,2	0,0	0,0	2,1	9,4	3,5	0,0	1,4	7,1	0,0	0,8	2,3	32,1	15307,5	1125,1	6,4	2,7	0,4	9,7	0,0	0,3	0,1
CZ03	0,0	19,5	6742,3	0,0	0,0	0,1	1,5	0,6	1,1	0,0	3,3	1,8	0,4	33,5	9225,9	445,6	23,1	6,4	0,7	10,9	3,7	2,4	1,7
HU10	0,1	24,2	1597,4	0,0	0,3	2,8	29,1	0,1	1,9	29,3	28,4	2,5	1,3	33,6	1740,7	568,2	35,5	5,1	1,3	13,1	0,6	0,0	5,3

HU21	0,0	27,5	4376,4	0,0	0,6	0,0	20,3	0,0	0,4	19,1	21,6	0,5	0,4	39,4	12519,9	673,3	45,8	6,8	1,4	21,7	10,8	0,0	4,5
HU22	0,0	23,7	1456,1	144,5	0,0	6,0	1,1	0,3	1,2	0,0	2,3	1,8	0,5	17,7	21092,5	1527,8	5,4	5,2	0,7	11,4	0,8	1,6	1,0
HU23	0,0	54,6	6103,2	57,1	0,0	7,6	14,5	3,1	1,5	17,3	11,6	0,0	3,2	23,2	3366,1	285,0	12,0	2,2	0,4	6,2	2,2	0,0	0,0
HU33	0,0	39,6	5331,3	0,0	2,3	1,2	14,1	1,3	0,0	13,9	14,2	0,0	0,2	29,4	6469,6	374,9	11,5	3,0	0,4	10,1	0,0	1,8	0,0
MT00	0,0	3,2	0,0	0,0	3,6	20,5	16,7	0,0	0,7	6,6	27,6	0,4	0,6	0,0	10289,0	933,4	18,0	3,0	0,6	9,1	0,3	1,9	0,0
PL11	0,0	24,7	12894,8	0,0	0,5	0,0	0,6	0,4	0,2	1,3	0,0	0,5	0,0	22,0	11066,9	261,3	12,5	2,0	0,5	6,2	1,8	0,0	1,2
PL61	0,0	0,2	0,0	0,0	0,4	0,0	16,2	0,8	0,0	16,0	16,0	0,0	0,0	10,8	181,4	58,3	2,7	0,6	0,5	8,3	1,6	0,0	0,5
RO32	0,0	0,0	1277,5	0,0	0,2	0,0	29,4	1,8	4,9	30,0	28,4	3,8	6,3	20,0	4751,8	752,4	12,7	0,0	0,2	13,9	0,0	1,4	1,7
2009	**Input Slacks**						**Output Slacks**																
DMU	*MTLM*	*ATF*	*ATP*	*HB*	*IMR*	*ELET*	*ER*	*LtUR*	*UR*	*ME*	*FE*	*MU*	*FU*	*GDP*	*CoE*	*EiSS*	*EPO*	*HRSTc*	*GERD*	*HRST*	*H-TI*	*ICT*	*BioT*
BG31	0,0	2,1	1634,6	0,0	3,7	3,7	5,0	0,0	6,6	5,2	4,7	8,2	4,9	28,5	9296,6	781,3	7,5	4,4	0,4	13,2	0,0	0,6	3,0
BG34	0,0	0,0	0,0	0,0	4,9	11,1	0,0	0,0	1,2	0,2	0,0	1,3	1,2	15,0	8232,0	1034,3	3,8	1,1	0,3	6,0	0,6	0,8	0,7
BG41	0,0	2,7	0,0	0,0	2,9	10,9	1,6	0,0	1,4	3,5	0,0	1,0	2,2	29,7	14736,2	1046,9	10,5	3,4	0,6	13,1	2,4	3,1	0,3
BG42	0,0	28,6	4438,1	0,0	0,0	3,9	21,1	0,1	1,6	19,2	23,1	3,2	0,0	40,9	12948,9	742,8	34,5	8,1	1,3	24,9	7,5	0,0	3,6
CZ03	0,0	15,4	1409,4	0,0	0,0	3,0	18,5	0,0	0,4	20,3	16,8	0,0	0,9	29,8	21711,0	1654,9	0,0	7,8	1,0	20,8	1,3	0,3	0,8
CZ04	0,0	29,2	4111,3	0,0	0,0	5,9	22,7	0,0	0,6	25,1	20,0	0,0	1,4	30,5	13817,7	1055,6	7,0	5,0	0,9	15,4	1,6	1,8	2,0
HU23	0,0	32,1	3394,8	0,0	1,2	5,4	23,4	0,0	0,4	24,2	22,5	0,0	1,3	28,1	12797,6	857,1	1,1	5,6	0,2	14,9	0,2	0,3	3,9
HU31	0,0	29,3	4678,0	0,0	0,1	4,4	23,2	0,0	0,8	23,2	23,0	1,6	0,0	26,9	8601,9	571,2	11,8	5,3	0,0	16,9	4,5	5,5	3,1
HU32	0,0	17,4	1981,6	0,0	0,6	1,7	17,0	0,0	0,2	16,5	17,2	0,4	0,0	29,9	17695,4	1297,5	0,2	6,2	0,1	14,9	0,0	0,9	1,6
PL31	0,0	0,0	0,0	176,9	1,1	0,0	30,4	0,0	1,5	33,9	26,4	1,0	2,3	22,4	4414,4	498,6	15,4	0,5	1,3	10,7	0,9	0,8	0,2
PL32	0,0	0,0	517,2	0,0	0,9	0,0	16,3	0,0	0,2	17,1	15,3	0,0	0,6	18,5	3052,9	118,7	15,5	0,8	0,6	10,4	0,7	0,0	0,5
PL34	0,0	0,0	2644,3	9,7	0,0	0,0	31,4	0,8	9,2	32,9	29,4	8,9	9,8	19,8	2538,6	495,7	16,4	0,0	0,8	14,4	0,4	0,0	1,9
HR04	0,0	0,0	2050,3	0,0	3,7	6,9	1,4	0,4	1,1	0,0	3,0	0,0	2,5	18,7	9473,9	698,2	6,2	3,9	0,5	13,4	1,0	1,1	0,5
2012	**Input Slacks**						**Output Slacks**																
DMU	*MTLM*	*ATF*	*ATP*	*HB*	*IMR*	*ELET*	*ER*	*LtUR*	*UR*	*ME*	*FE*	*MU*	*FU*	*GDP*	*CoE*	*EiSS*	*EPO*	*HRSTc*	*GERD*	*HRST*	*H-TI*	*ICT*	*BioT*
BG31	0,0	0,0	3189,2	0,0	0,3	4,2	13,6	0,0	2,7	17,1	10,3	2,9	2,6	18,5	5557,1	721,0	4,8	3,6	0,5	8,3	0,0	0,7	2,0
BG34	0,0	0,0	1403,4	0,0	5,2	12,6	2,6	0,3	0,8	5,5	0,0	0,0	1,6	16,6	5628,3	649,9	10,7	1,8	0,4	5,6	2,0	5,0	0,0
BG42	0,0	0,0	0,0	0,0	0,0	3,8	10,3	0,4	1,7	15,6	5,3	0,0	3,6	24,6	12728,9	883,1	3,4	4,8	0,6	13,2	0,4	0,7	0,3
HU21	0,0	3,0	1767,0	0,0	0,0	2,0	1,8	0,2	1,1	0,0	3,9	2,0	0,0	42,7	14171,9	721,7	15,4	8,9	0,6	18,1	1,1	1,5	1,2
HU22	187,0	9,0	1378,0	0,0	0,8	0,9	23,8	0,9	2,0	22,5	25,3	2,9	1,0	30,9	17321,4	1397,7	19,8	10,5	2,0	28,3	6,4	0,0	1,8
HU23	0,0	8,8	0,0	0,0	1,3	5,6	14,6	2,0	3,6	17,1	12,3	3,4	4,0	31,3	26175,9	2075,9	0,0	10,2	1,1	23,4	1,8	0,7	1,0
HU31	0,0	10,7	0,0	0,0	0,8	4,6	24,4	2,1	2,4	26,3	22,5	2,7	2,0	41,9	30054,1	2095,4	1,3	9,4	1,2	20,6	1,1	1,2	0,3
HU33	0,0	11,4	493,1	0,0	0,0	7,7	32,4	0,8	0,1	35,4	29,4	0,0	0,2	41,7	22938,4	1606,5	3,1	10,7	0,9	23,3	0,8	1,1	2,4
MT00	0,0	36,0	5125,7	0,0	0,0	10,4	17,1	3,1	0,5	18,2	15,9	0,9	0,0	30,0	10109,1	630,7	0,8	3,5	0,2	9,9	0,0	0,6	2,4
PL42	0,0	11,8	688,2	0,0	0,0	3,5	11,7	0,6	0,3	11,9	11,4	0,5	0,0	35,9	22587,6	1496,0	2,1	7,5	0,4	14,0	0,0	0,8	0,1
RO32	0,0	0,3	0,0	413,0	0,4	0,0	21,8	0,0	1,3	23,2	19,8	0,0	3,0	17,2	3575,3	338,4	14,6	0,5	1,4	4,5	0,8	0,6	0,0
RO41	0,0	0,0	358,4	0,0	1,7	3,3	6,3	3,2	6,7	9,1	3,5	6,1	7,1	18,9	3836,4	0,0	13,5	2,2	0,4	12,7	1,0	2,6	0,3

Source: own calculation and elaboration. 2014

TAB. 2: Characteristics of indicators in inefficient regions – sums, i.e. required rate of input decreasing/output increasing

SUM	**Input Slacks**						**Output Slacks**															
Year	*MTLM*	*ATF*	***ATP***	*HB*	***IMR***	*ELET*	*ER*	*LtUR*	*UR*	*ME*	*FE*	*MU*	*FU*	*GDP*	***CoE***	*EiSS*	*EPO*	*HRSTc*	***GERD***	*HRST*	*H-TI*	*ICT*	*BioT*
2004	367,5	346,5	7048,7	465,2	31,5	74,1	95,0	33,3	42,8	94,5	96,9	46,6	37,9	311,7	128810,6	12557,7	169,1	47,8	11,8	131,2	13,1	22,3	11,4
2007	0,0	63,6	15416,8	68,9	19,9	86,3	201,5	12,1	25,0	207,7	195,2	19,6	30,4	302,3	146702,8	12648,8	134,8	53,3	9,2	181,2	14,1	11,9	10,1
2008	0,1	224,5	40160,7	201,5	11,9	56,2	147,0	8,4	13,8	140,7	153,3	12,4	16,0	277,4	104837,5	7986,4	190,2	38,0	7,3	123,0	22,1	9,9	16,0
2009	0,0	156,7	26859,6	186,6	19,1	57,0	212,0	1,2	25,2	221,3	201,4	25,7	27,1	338,7	139317,0	10852,7	129,8	52,1	8,1	188,9	21,0	15,3	22,1
2012	187,0	90,9	16874,9	443,6	13,7	58,3	191,4	18,1	27,5	209,7	172,7	23,2	32,5	375,8	179596,0	12524,8	105,8	74,3	10,9	195,6	15,8	15,3	11,6
MAX	367,5	346,5	40160,7	465,2	31,5	86,3	212,0	33,3	42,8	221,3	201,4	46,6	37,9	375,8	179596,0	12648,8	190,2	74,3	11,8	195,6	22,1	22,3	22,1
MIN	0,0	63,6	7048,7	68,9	11,9	56,2	95,0	1,2	13,8	94,5	96,9	12,4	16,0	277,4	104837,5	7986,4	105,8	38,0	7,3	123,0	13,1	9,9	10,1

Source: own calculation and elaboration. 2014

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