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Mechanism of Use of Public and Private Partnership in Order to Develop Innovative Economy

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Abstract:

The article presents the fundamental and effective tool to achieve strategic goals of the innovation economy under today's conditions – this is the use of the mechanism of public and private partnership (PPP). Nowadays, the place of a country is determined by a set of macro-technologies, which it is able to update and maintain using the huge flow of innovations and the continuous technological upgrading of the advanced sectors of the economy. It is noted that unlike the West, where the PPP is used to attract private investments in the major infrastructure projects, in Russia, this model addresses not only the economic, but also the political and social challenges. For this reason, a simple imitation of a positive or negative experience is impossible without taking into account the Russian specifics. Today, in Russia, the PPP development is hindered not only by the legislative gaps. There is an acute problem of absence of the efficient financing mechanisms even in those cases when the sufficient funds are available. The overall situation in the country does not contribute to the implementation of the long-term projects, which are not supported by the political component. Such situation mainly occurs not due to the high value of the borrowed money and the reluctance of banks to lend for long periods, but due to the general ambiance of the private business being afraid for the successful implementation of the complex long-term projects. The authors propose a model of the integrated assessment of the government and business interactions within the PPP projects, as well as the approaches to assessing the integral effect of the PPP projects implementation, which includes the project's effects not only for the private businesses and public investors directly involved in the project, but also for the regional population and other commercial structures operating in the given region.

Keywords: innovative economy, innovations, state, business, partnership, public and private partnership (PPP), PPP projects efficiency, algorithm and method of assessment.

JEL Classification: O30, Q55.

1. Introduction

Today, innovative economy is "an economy that is based on knowledge" (Harin, Mayboroda 2003). Strategic potential of any developed country is currently determined by presence of creativity and level of political, technical, scientific elite rather than by universal education. Today, knowledge is the base of the modern paradigm, which has its own dynamics in social systems (Paoli 2011). The investments in intellectual and information sphere of human capital as the current stage of steady sustainable development of countries and cities become most actualty. A number of studies (Toffler E., Fukuyama F., Bell, D., Naisbitt J., etc.) showed that the most developed countries of the modern world have economic domination, due to the innovative economy based on the progressive (in terms of techno-economic development) State.

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This paper sets a goal to give a scientific evidence of the theoretical and methodological approaches from the national perspective of formation and development of public and private partnerships as a process, which forms the equal relationships between State, business and civil society institution, in order to achieve social and economic stability and national security in the period of formation of an innovative economy. In this case, the basis of public and private partnership is the participation of partners in the single scheme of the final products creation and in the production chain of added value creation (Zeldner 2012). The urgency is provided by the fact that the study and application of international experience enables to take maximum advantages that provide a process of cooperation and integration by combining forces and means, reducing the risks of each of the partners in the PPP and providing a synergistic effect that occurs under the partnership.

2. Method

During the study the existing domestic and foreign examples were reviewed and systematized, organizational models, the composition of the partners' economic benefits, revealing of the specifics of public and private partnership were analyzed (Klinova 2011, Hayrapetyan 2009). Public and private partnership, as a form of interaction between business and the state, does not weaken the role of the state, but reinforces the institutions and mechanisms of partnerships that are aimed at the socialization of public relations. This form is based on the reduction of direct government influence on the economy, the transfer of operational functions to the private sector, while maintaining and strengthening the regulating function. The state acts as a specific agency for the realization of public interest services and goods. A certain part of public goods can be produced by the State itself, and other goods - by involving the private sector. Business is involved in the management of state assets to improve quality during realization of the state projects. "*An effective and humane society requires two components of the mixed system - a state and a market. Both halves are required for the effective functioning of a modern economy – it is impossible to applaud with one hand*" (Drozdenko 2009).

A systematic approach, cause-consequence analysis, logical-mathematical modeling, the theory of innovation are the methodological basis of the study. Theoretical basis are composed by works of leading Russian and foreign researchers and experts in the sphere of management and economics.

As a result of systematization and analysis of materials it was identified, that grounding of the forms and methods of interaction between the state and business with a focus on their innovative development is necessary. PPP may be said to be an organizational and institutional alliance between business and state in order to realize socially important programs and projects in a wide range of sectors of industry and innovation sphere. Public and private partnership makes it possible to avoid on the one hand the threat of direct control of the state, and on the other hand - the "market failures". The basic argument in support of the use of PPP is the fact that each of the private and public sectors have its own unique advantages, when combining of which there is an opportunity to work as efficiently as possible and to achieve maximum results in the spheres where "market failures" or inefficiency of state management are particularly noticeable, namely, environmental issues, social services, creation of infrastructure.

Careful analysis of the literature gave the opportunity to learn the most studied areas and to identify problem areas in the field of development and in the field of interaction between the State and business. These problems require its further development, including the issues of search for effective mechanisms for realization of partnership relations in innovation sphere. More attention was paid to the issues, concerning to which scholarly discussions are being hold, some of them have already been well studied, and some problems have not been solved.

3. Results

3.1. Studies of modern trends of national economy formation in Russia

Ervin Laszlo, a well-known systems analyst and futurologist, called the twentieth century - the century of the bifurcation (from the French bifurcation - splitting, branching). The changes that are in progress at the present time have no analogues in history (World Economic Forum, 2007). According to academician N.N. Moiseev, the algorithms of civilization are changing. The twentieth century, that became the thing of the past, didn't implement the "technological expectations", invested in it. In particular, clean, cheap and reliable sources of electricity and the necessary facilities for its storage failed to be created. Instability of the world system increased dramatically. At the present time, it is important to understand which path the further world development will keep. The path of "dialogue of civilizations", suggested by

the Iranian president Khatami, or the path of the "war of civilizations" predicted by the American politologist Huntington. The selection time, namely "the era of bifurcation" becomes the main bifurcation in the today's human history and means the analysis and forecast of all possible events sequence scenarios, "the Future designing" and efforts to create it, being the principal direction of the modern politicians and scientists. The end of the last century showed that the focus on high technologies and the products quality increase due to the great number of innovations encouraged the production of an "economic miracle", the rapid take-off of the countries that had been industrially backward before. The crisis of the "new economy", the basis of which was the computer industry and telecommunications systems, showed that the "computer revolution" is held under the same laws as the previous industrial revolutions.

Currently, globalization that means close interaction of world economies, supernational structures, avoiding restrictions on the movement of capital, ideas, people, and goods is the main microprocessor in the world economy. Today in Russia there is no necessary volume of production of food products and many products of high-tech sectors, so the country cannot refuse import of many goods. Import flow of necessary goods is generally "balanced" by export of such resources as gas, oil, and some other non-renewable mineral resources, i.e. today, the Russian economy is the Tube Economy (Lyasnikov, Dudin, Sekerin, Veselovsky, Aleksakhina, 2014). Under current conditions of globalization, as the analysis shows, this situation may continue in a limited period of time based on the fact that the cost of mineral resources extraction in Russia is much higher than in other exporting countries, which in the context of globalization will be the competition.

In modern world, the country's position is determined by the set of macro-technologies, which this country can update and maintain, using the flow of innovation and continuous technological upgrading of advanced industries. At the same time the possibility "to buy", "to steal", "to master" foreign technologies, as foreign and domestic experience proves is rather limited and takes a lot of money. The Soviet Union possessed up to the world standard 12 of 50 macro technologies that existed in the world then. Today, Russia does not have any complex technologies that would comply with the technical, organizational, scientific and technical support, which may belong to the concept of macro-technologies. There are some samples, enterprises, pilot projects, but the system has been completely lost. The epoch of innovation has become a difficult test for the technologies, educational systems, social institutions and countries as a whole. Today it is impossible to provide the transition to the innovation economy without making any radical qualitative and quantitative changes during the Russian innovation process.

Innovative economy today - is the economy, which is based on knowledge and has its own paradoxical laws different from laws existing within traditional market. It was established and clearly demonstrated by Brian Arthur, a Nobel laureate in Economics. Cooperative, synergistic effect, associated with the ability to create single information and technology environment with exchange of ideas, knowledge and qualified personnel, exceeds the traditional economic factors.

3.2. Public and private partnership in the implementation of the economy innovative renewal strategy.

Today, the state together with private capital should create the base of innovative development in the economic sphere, as a guarantee of the national security foundations. Public and private partnership (PPP) should help to ensure that economic policy will not become a display of another extreme, opposite to that one, when the country obtained the market system with incapacitated state. Then, in the mid-1990s, American economist of Russian origin V. V. Leontiev with other Nobel laureates (in particular, Arrow, K., Tobin, J) applied to the President of Russia Boris Yeltsin with a letter. The scientists, in particular, appealed to increase influence of the state for regulation of the work of private and public organizations and enterprises to resolve problems of structural defects of the Russian economy.

At the beginning of the XXI century, after weakening in the 1990s, of the state's role in the domestic economy, there occurred the problems of its transformation into a market relations subject of equal worth, it affected the ratio of the duties and rights of the parties first rather than quantitative contribution. On the one hand, there is a dominant view that it is not possible to raise the question of the equality of the state and business in PPP projects, because a state as a sovereign is a special subject of civil law, and therefore its role is obviously leading (Dixon, Pottinger, Jordan, 2005).

Attempts to implement PPP in Soviet Russia were realized during the so-called New Economic Policy (NEP) in the 20s of the last century. One of the key points of the NEP was to attract foreign capital into the country and to gain benefit from the exploitation of natural resources by providing concessions "under carefully control". Lenin understood that it was impossible to improve the economic situation

without concessions, without the "agreements with the bourgeois power" (Lenin 1979) or, as we would say today – without one of the forms of PPP. Concessions must become a form of state capitalism, the profitability of which for the state is determined by the measure and the conditions for their provision. For example, in 1921 the government spoke of the necessity of the alliance with Germany in the form of concession, because "there is absolutely no fuel in Germany". These proposals were implemented by the construction of gas pipelines to the Warsaw Pact countries first (Poland, Czechoslovakia, East Germany), and later to the EU countries (Gnezdova 2014).

These days, the requirements to the level of education, vocational training is increasing, also at the same time, the state's role in the development of the productive forces. Welfare of the country is provided by intellectual potential, not the quantity, but the quality of human capital. Today, the state is obliged not only to promote scientific and technological development, introduction of new technologies, but also to keep the system of higher education and vocational training which is common for everybody, and to keep infrastructure of social and public sphere. This duty of the state serves to save, increase human capital, which is turn into a major factor for the production, recovery and preservation of competitiveness of each national economy (Renda, Schrefler 2006). Therefore, educational institutions, health centers and hospitals and social housing are the main objects to be included in the PPP programs, which are based on concession contracts and management models. Potentially PPP must provide society with significant benefits compared with management of infrastructure or direct economic activities of the state in this area. However, the complexity of the projects of public and private partnership, underdevelopment of legal environment, lack of knowledge and relevant experience of the power officials, the general nature of the contracts and long terms of their implementation determine the main problems of the PPP use. For this reason, most of the projects were unsuccessful, were early terminated or implemented under the conditions of a substantial revision of contracts.

Many major concessions of toll roads, railways and other transport projects at the stage of development of business plans and feasibility study remained not implemented or were revised due to overstatement of the planned level of transport flow. Similar phenomena can be seen in the housing and utility sector. Delight of the international success of the concession projects at the initial stage were replaced by disappointment and frustrated hopes.

In Russia, it is the social sphere that is constantly in the focus of the state's attention. Support and encourage of the PPP development by the state to overcome the negative trends in this sphere (low quality, reducing the availability of social services) are considered in the programs of social and economic development of the country. The business in the sphere of production and marketing of services that have sustained massive demand has a strong interest in participating in the "social" projects. However, the Russian experience in PPP use in the social sphere is quite limited.

It should be noted that unlike the West, where PPP is used to attract private investment in major infrastructure projects, in our country this model solves not only economic but also political and social problems (Treasury 2008). On this basis simple copying of positive or negative experience is impossible without taking into account Russian specifics. In the Russian practice the partnership of state power and the private sector was limited by investment contracts under which private developers undertakes an obligation to build, remodel or upgrade some socially significant objects, the right ownership of which belongs to the state or municipality for the right to construct their own commercial real estate. On this basis, the following signs of PPP may be mentioned:

- state and the private sectors are the parties of the partnership;
- relations between the parties should be recorded in official documents: agreements, contracts;
- equal nature of relations between the parties;
- common goals and a clearly defined state interest of the parties;
- combination of the contributions of the parties to achieve the partners' common goals;
- the parties of the partnership distribute revenues and risks between themselves.

In modern Russia, not only legislative gaps hinder the development of PPP. The problem of lack of effective financing mechanisms is especially acute (even if funds are available). The overall situation in the country does not favor realization of long-term projects that are not supported with political component, because the cost of borrowing money and the unwillingness of banks to lend for long periods are not so much high, as the general mood of the private sector, that is afraid for the implementation of complex, long-term projects, and that is doubtful of preserving stability for even the short term period. With such sentiments of the business there is no question of tens of years - namely, for such a period PPP projects

are usually calculated for. In addition, 30-40 years is a period of global technological development cycle, ideally agreeing with the horizons of strategic investment. The mechanisms of PPP can be a basic construction to attract non-budgetary investments in the development of various types of infrastructure and non-manufacturing sectors (Yakunin 2007).

In Russia, the public and private partnership is still the state of infancy and development of appropriate tools. The practice of their practical application is only at outset. However, today it becomes clear that high-quality realization of global infrastructure projects by only state or business is not possible. It is possible to achieve specific results and high quality only if investment policy is balanced and combines the strong points of the public and private sectors. In modern Russia the rich potential of public and private partnership and of concession forms of economic management that can give a sufficiently high level of growth in social and economic development of the country is applied not to the full extent.

Formation of PPP projects causes the need to determine by public partner the mechanisms of consideration and their selection taking into account their compliance with the financing schedule (Table 1) (Gerrard 2001).

Table 1 - Methodological approach to development of public and private partnership projects

GOAL	PROBLEMS	RESULTS
1. Identification of PPP priority projects		
Selection of PPP projects, development strategies and resource potential map of the region	▪ Select PPP projects; ▪ Determine socio-economic importance and investment attractiveness for private investors; ▪ Determine the technical and economic characteristics and operating conditions.	Identification of the needs of the most effective implementation of which is achieved as a result of state and business partnership formation.
2. Development of principal stages of PPP project and definition of financing scheme		
Setting of the principle stages of realization of project and plan of action on each stage	▪ Identify requirements to technology of works on the basis of certain; quantitative and qualitative indicators of the project; ▪ Determine the size of needs and financing, sources of income and investment return mechanism.	Division of the project implementation process into the system of stages and determination of the exact time of the works at each stage.
3. Selection of PPP form		
Determination of possible forms of cooperation between public authorities of the region and private businesses	▪ Determine the organization and legal form and the organizational structure the enterprise being established within the project; ▪ Determine the rights and obligations of public and private partnership; ▪ Identify the optimal structure of risk distribution between partners.	Identification of the types of contracts under the project and the development of the agreement of PPP.
4. Calculation of PPP project performance indicators		
Confirmation of positive integral project performance	▪ To assess the effects of the project participants and consumers; ▪ To determine the integral efficiency.	Determination of PPP project performance indicators values.

Today, the most common form of PPP projects in foreign countries is the concession. The concession is considered as a system of relations between the state (the concedent) and a private legal entity or private person (concessioner) that occur as a result of right of use of state property granted by the concedent to the concessioner on a return basis, for a fee, under the contract, as well as the right to carry out monopolistic business activities, proper only to the state (Hofmeister and Borchert 2007).

In the Russian practice all the forms of PPP, except for concessions are implemented. At the same time it must be admitted that the concession is the most advanced, promising and complex form of

partnership. First, it, unlike other contractual relationships, has long-term nature, which allows both parties to implement strategic planning of their business activity. Second, in concessions the private sector has the most complete freedom in making administrative, economic and managerial decisions due to which they are strikingly different from their joint enterprises. Third, the state under the concession contract and legal standards has a large number of levers of influence for the concessioner who breaks conditions of the concession, or in case of the need to protect the public interests. Fourth, the state transfers to the concessioner the right to possess and use the object of his property, reserving the power of disposition (Gilroy, Poole, Samuel, Segal 2007).

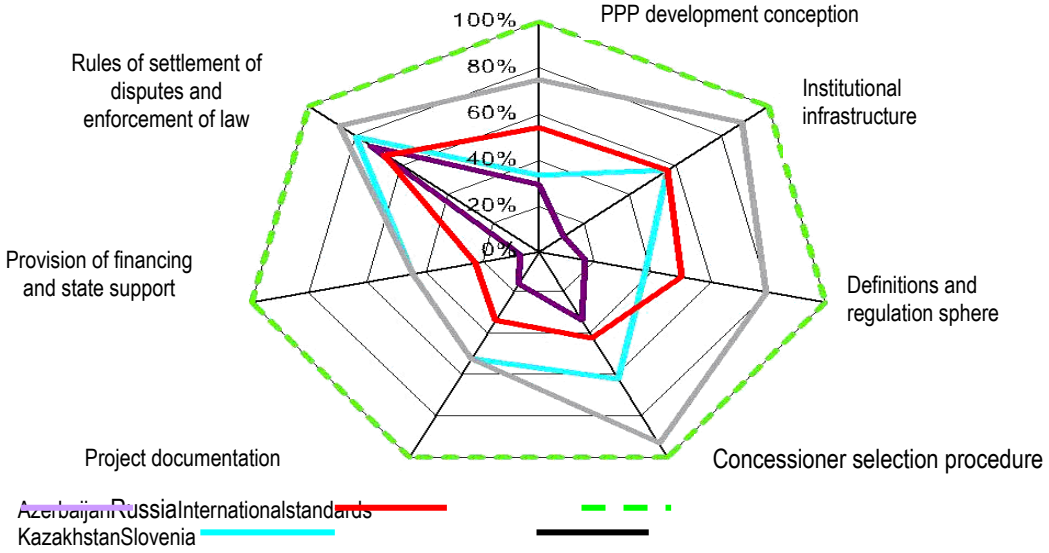

Figure 1 - Degree of conformity of concessional law with advanced international standards

The figure shows a comparative analysis of the condition of status of the Russian legislation on concessions, as compared to some other countries and international advanced standards, within the study of legislation in the 29 countries of Central and Eastern Europe, including the CIS countries, compared with the recommendations UNCITRAL, conducted by the European Bank for Reconstruction and Development. As you can see, the Russian concession legislation needs a long way of improving, especially in terms of the rules that govern the provision of financing and government support measures, as well as observance of norms of the project documentation.

3.3. A model of integrated assessment of integration of the state and business in PPP projects.

The PPP model can be formulated as an economic-mathematical problem - it is the interaction of the resources of the large economically strong partner (the state) and the resources of the partner that is substantially less according to the financial capacity, but more rapid in actions (business). The partners combine their efforts and resources in limiting conditions and for specific purposes (Safonov 2012). Competent economic analysis of the projects affects the assessment of the performance of business interaction within the public and private partnership. Prior to the assessment of the Efficiency social significance of the project should be determined. The social significance of the project depends on the influence of its implementation results at least on one of the internal or external financial, product and labor markets, and on the social and environmental conditions (Ernazarov 2011).

The study suggests evaluating the performance in two stages (Figure 2). At the first stage it is offered to calculate the performance indicators of the overall project. The purpose of this stage is to aggregate economic assessment of the project decisions to create the necessary conditions for the search of investors. For socially significant projects their social performance is assessed first. If social performance is low, such projects are not recommended for implementation and they cannot pretend to the state support. If social performance is sufficient, commercial performance should be assessed. If commercial performance of the socially significant projects is insufficient it is recommended to consider the use of various forms of support that would improve the commercial performance of the project up to

the required level. On the basis of this, there is the subject of a public and private partnership and the choice its implementation methods.

The second stage of the assessment is carried out after the determination of the financing scheme. At this stage, the composition of participants is specified and the financial reliability and effectiveness of participation of each of them in the project is determined (regional and sectoral performance, the effectiveness of participation of companies and shareholders in the project, fiscal performance). For socially significant projects the regional performance should be determined and if it is satisfactory, further calculation is the same as for local projects.

Thus, the following algorithm for constructing an optimal model of the PPP project in terms of its performance is suggested.

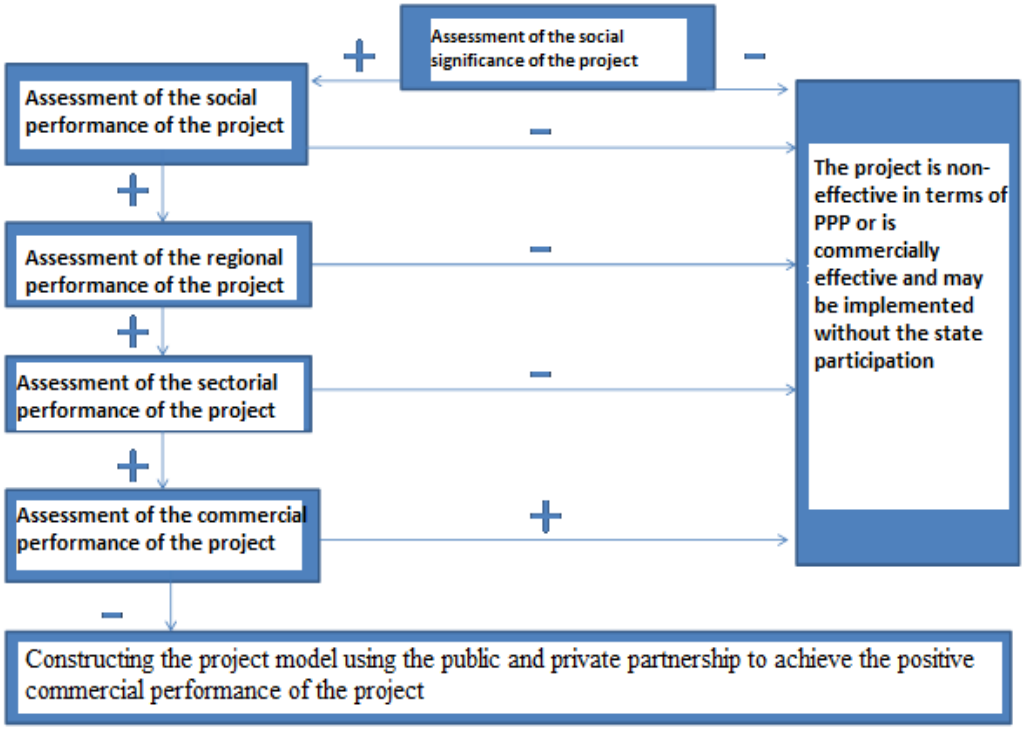

Figure 2 - Algorithm for constructing an optimal model of the PPP project in terms of its performance

The existing practice of implementation of joint projects of the state and the private sector shows that the main problem in the process of assessment of the performance of ongoing measures is coordination of interests, opposing their goals with each other:

- receiving income growth and maximizing return on capital invested;
- increase in the revenue side of the budget;
- increase of the income level;
- provision of transparency of foreign economic relations and effective participation in the international division of labor.

The assessment of the integral effect of the implementation of PPP projects, including not only the effects of the project for private businesses and public investors, directly involved in the project, but also for the people of the region and other commercial structures is a key feature .

Integrated indicator of the performance of PPP projects affects three sectors of economy - private, state and public. As part of the effect for the private sector direct and indirect effects are given. The indirect effect reflects external effects of the project that are associated with an increase of income and a reduction of expenses of the third-party commercial organizations related to the implementation of the project. An effect for society includes two types of effects – one for private persons who are wage workers, and private persons who are consumers of the PPP products. Thus, there is a division of the integral effect of PPP projects in the regional industrial complex into five elements: direct commercial, indirect commercial, budget, labor and consumer effects (Figure 3).

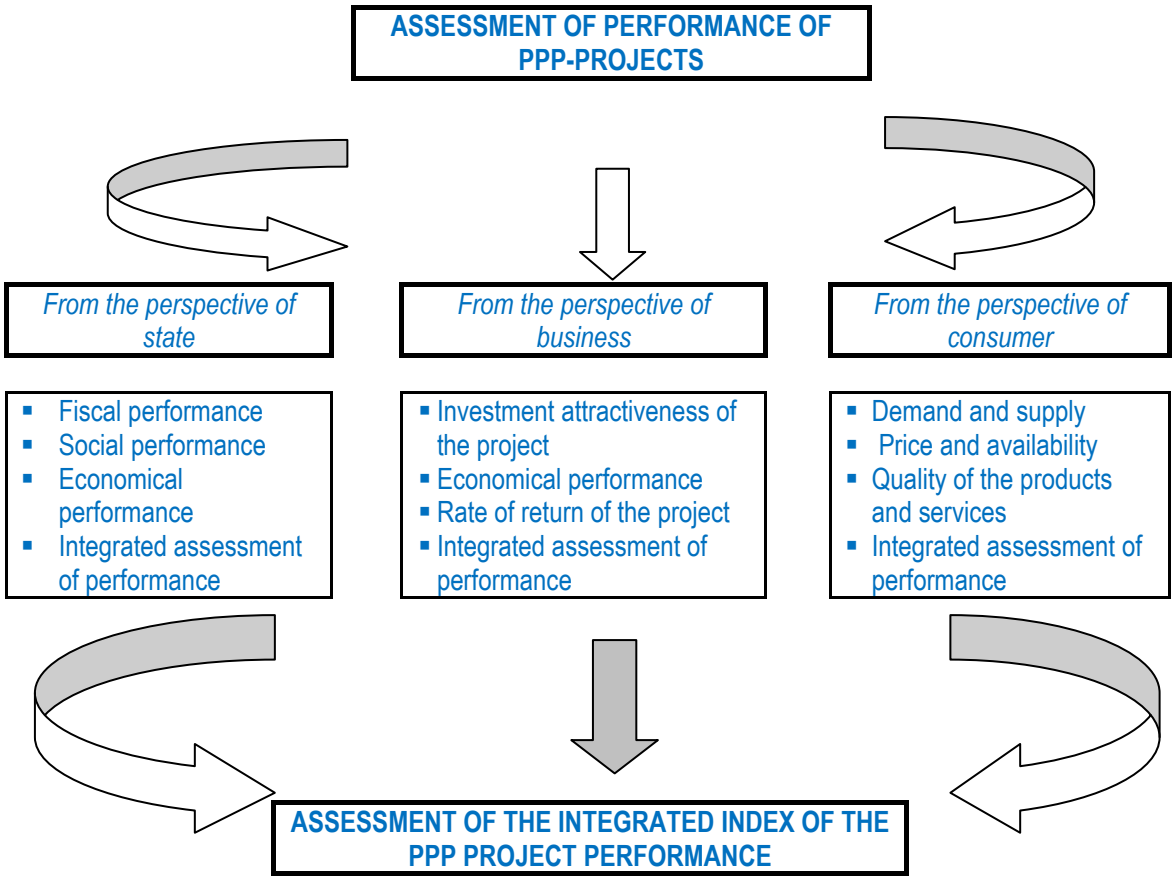

Figure 3 - Algorithm of the integrated assessment of the PPP project performance

4. Discussion

The present study shows that partnership relations of business and the state require alignment of interests of the two main institutions of modern society and economy. The state needs growth and improvement of the quality of services rendered by the socially oriented sectors to the population and economic agents. The private sector wants to get and increase profits regularly. Moreover, far-sighted thinking business chooses its priorities aimed not only at increasing the size of the profits, but in the interests of constant income getting from projects. In this case, all aspects of the project are interested in its successful implementation as a whole. High reliability of the obtained results is based on the works of the following authors: Buchanan J., Keynes J., Stiglitz J., Sharp W., Varnavskiy V.G., Andryushekevich O.A., Denisova I.M., Vilisov M.V., Deryabina M., Scharinger J.L., Glukhov V.V., Gradov A.P., Mednikov M.D., Sokolitsyn A.S., Fyodorov E.A. and others. A special feature of the conducted study is an attempt to consider the development of public and private partnership in the sphere where the state shifts its focuses, gradually escaping the problems of construction and exploitation of objects, moving to control and administrative function. In this case, there is a redistribution of entrepreneurial risks to the business. At the same time the social significance of the PPP is formed, where as a result the society wins as a global consumer of public and better services within the development of innovative economy. Russia still needs to go through a very complicated process of the legal and economic qualification of many PPP forms. It is important to assess the institutional role of the state properly as the main controller, and also as a representative and a defender of public interests and needs, i.e. the things that in the European legal tradition are considered under the public law, public interest, public service, public and legal property relations and public and legal ownership. This category of relations does not stay within norms of the civil law. Meanwhile, it is the state and local self-government authorities that are intended to protect the public interests in such socially vulnerable areas as social and economic infrastructure, where PPP projects are most widely used.

Conclusion

Thus, the authors presented the study that shows that public and private partnership is the starting point for attraction of managerial and financial resources of the private sector to solve the problems that are related to the activities and the implementation the projects that are large in terms of time scale and capital investments in the sectors of education, health care and development of infrastructure. At the same time partnership relations are based on the provisions regulated not only by the civil law, but also by the norms of social responsibility and trust. However, achievement of the goals of the partnership is provided through the mechanisms of contract law, and particular investment projects. The innovative nature of the forms and mechanisms of public and private partnerships, high responsibility for the final results, scales of projects and extended normative legal base of relations of participants give evidence of the need to support and develop partnership, assessment of performance for each of the partners in the new interaction.

Conceptually, the study assigns a task to analyze the principles of assessment of the public-private partnership performance, which include: obligation of assessment, compliance of initial requirements with the project characteristics, alternativeness and flexibility in the selection and correcting of the forms of interactions and mechanisms of implementation, reasonable sharing of risks, the systematic increase of the requirements for quality of project results. After summing up all the indicators and capabilities of PPP, it may be concluded that the public-private partnership in the modern world with right and rational behavior can become a mechanism, a basis for the creation of high-tech corporate structures intended to provide the orientation of business and the state on solution of the problems related to the revival of the economy after the financial crisis. Therefore, the PPP must not be a simple composition of resources but partnership relations of the state and business that require the alignment of interests of two main institutions of modern society and economy (Tullock, Seldon, Brady 2005). It should be understood that each of the parties of the partnership has its own goals, solves its specific problems, the parties have different motivation and the fact how the partnership will be structured and what the PPP scheme is selected and specified by the relevant agreements depends on the consideration of these factors.

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Does Foreign Direct Investment Cause Economic Growth? Panel Data Evidence from Transition Economies

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Abstract:

The paper examines the causal relationship between foreign capital investments and economic growth for 27 countries known as the transition economies. In this study, these countries were categorized in two subgroups as Central West Asia (8 countries) and Central Eastern Europe (19 countries) as well as all of 27 countries as the causality was analyzed. The causality between foreign direct investment and growth was investigated by the Panel Granger Causality Analysis and Hurlin-Venet (2001) Panel Causality Analysis in categorized countries. The findings show that there is a causal relationship in the transition economies involved in Central Eastern European Classification from foreign capital investment to economic growth.

Keywords:foreign direct investment, economic growth, transition economies, panel causality.

JEL Classification: C23, F21, O40, O50, P24

1. Introduction

Foreign capital investment is the investment type foreign companies make in another country as necessitated by financial, political and social motives. Parallel to the spread of globalization foreign capital investments have also climbed throughout the globe. At the core of foreign capital investments lie financial factors yet political and social factors are equally effective in the determination of investments.

Liberal economy, globalization, financial deregulation, technological advancements, inexpensive raw material and labor force in developing markets, incentives, high demand collectively operate to gain foreign capital investments a more attractive character. The investee countries correspondingly strive to allure foreign capital investments to be able to improve their financial situation and social life, create employment opportunities, benefit from technological innovations, compete with other countries, multiply production capacity thus accelerate growth.

Currently not only investor countries but also investees are more inclined towards foreign capital investments by virtue of the advantages these investments offer for both parties. Relevant studies point out that foreign capital investments generally promote mutual growth. Various researchers underline that foreign investments have a positive effect on growth while other researchers maintain that the emergence of such positive effect depends on fulfilling certain conditions (Adewumi 2008). Amongst these conditions are structure of the country (capitalist, socialist or mixed), settlement of the country, sector, global financial and political situation. Triggered by these factors the velocity and direction of interrelation between foreign capital investments and growth may alternate. In order for these factors to leave effect on foreign capital investments and growth, the investor and investee countries are supposed to have homogenous structures.

Economies in transition consist of states with differing structures. To obtain consistent data from analyses it is deemed essential to classify the countries into two groups in which the member states are alike: Central Eastern Europe and Central Western Asia. The underlying reason is the divergences in the financial and political structures of group member states. Central Western Asia countries are eastern bloc members of the former Soviet Union. These are socialist countries which possessed a secluded financial and political structure for long years. Unlike Central Western Asia countries, Central Eastern Europe states have had further outward-oriented financial and political structure and integrated better with the capitalist system of Europe. As a natural consequence it is considered that interrelation between foreign investments and growth shall vary between both groups. Through the analysis conducted on the overall group of transition economies it is aimed to manifest that the interrelation changes with respect to homogenous groups.

In present study interrelation between foreign capital investments and growth has been assessed by making use of panel data analysis on transition economies. As regards a multitude of studies have been conducted on transition economies and recently panel data analysis in which transition economies are analyzed collectively has been employed. A closer look at the contents of these researches indicates that there are fixed and random effect panel model predictions, panel co-integration and panel causality analyses. Present research differs from earlier studies in its grouping of the countries and application of panel causality analysis method.

Section 2 of this research relates literature review which encompasses panel data analyses performed to examine the relationship between foreign direct investments and growth in transition economies. In the third section, research method is elaborated. Section fourth describes the information on the data used for analysis is presented. In the fifth section, findings are provided and explained. The research is ended with conclusion section.

2. Literature review

One of the researches focusing on the interrelation between foreign capital investments and growth in transition economies is Campos and Kinoshita (2002) work detailing 25 transition economies. In this research fixed effect panel data analysis has been employed and it has been detected that foreign capital investments have positive and meaningful effect on economic growth. In the co-study of Aleksynska *et al.*, (2003),17 transition economies have been put under microscope. Panel data analysis has been conducted and no causality relation could be detected between variables. Campos and Kinoshita (2003)however have searched through panel data method if there are regional differences of foreign capital investments and analyzed transition economies with respect to two different settlements (Central- Eastern Europe and Baltic and former Soviet Union members). They have concluded in their research that due to the characteristics of settlements, foreign capital investments affect the ratio of growth differently with respect to sector structure. In the research of Lyroudi,*et al.*, (2004)interrelation between foreign capital investments and growth in 17 transition economies has been examined via Bayesian analysis and no findings have been detected to prove any correlation. Merlevede and Schoors (2004) have explored via panel data analysis the interrelation between direct foreign capital investments and growth in 25 transition economies and concluded that in 25 transition economies, direct foreign capital investments and growth are correlated. In his research Nath (2004)has employed panel data analysis in 10 transition economies and concluded that economic growth is positively affected by foreign capital investments. Bevan*et al.*, (2004) have examined the interrelation between foreign capital investments and growth in 12 transition economies and detected that foreign capital investments have positive effect on countries' economies. Değer and Emsen (2006) in their study have employed fixed and random effect panel data analysis on 27 transition economies and foreign capital detected that foreign capital investments have positive effect on countries' economic growth.Johnson (2006) has also analyzed 25 transition economies via fixed effect panel data analysis. Likewise in present research transition economies have been put under microscope within two groups as Central Eastern Europe and former Soviet Union members and it has been concluded that foreign capital investments have weak effect on economic growth. Dhakal*et al.*, (2007) in their research have employed panel data analysis and detected that foreign capital investments in transition economies affect economic growth positively. In his researchStanisic (2008) has analyzed the interrelation between foreign capital investments and growth in transition economies on the sample of 7 transition economies. In that particular research correlation between variables has been assessed yet no meaningful explanation could be determined. In Ağayev (2010),panel causality analysis covering 25 transition economies, two-way causality has been detected between capital investments and growth. Damijan *et al.* (2011) has examined the reasons for the remarkable growth of transition economies' export performance.

3. Methodology

Recently different methods for panel causality analysis were redounded to econometrics literature. In our study, Panel Granger and Hurlin-Venet (2001) panel causality analysis were examined.

Panel Granger causality analysis is based on panel vector error correction model and used to examine the causal relation between the variables. This analysis can be expressed as three staged Granger causality analysis and unit root and panel co-integration analysis are applied to the variables to be used in the research. Research uses the Engle-Granger (1987) procedure. At the end of the analysis, if

a co-integration relation cannot be found between variables, a causal relation is researched with standard Granger causality analysis:

$$\Delta Y_{i,t} = \theta_{1i} + \sum_{k=1}^{p} \theta_{11ik} \Delta Y_{i,t-k} + \sum_{k=1}^{p} \theta_{12ik} \Delta X_{i,t-k} + u_{1i,t}$$

$$\Delta X_{i,t} = \theta_{2i} + \sum_{k=1}^{p} \theta_{21ik} \Delta X_{i,t-k} + \sum_{k=1}^{p} \theta_{22ik} \Delta Y_{i,t-k} + u_{2i,t} \quad (3.1)$$

Test hypothesis:

$$Ho: \theta_{12ik} = 0 \; Ho: \theta_{22ik} = 0$$

At the end of the examination, if θ_{12ik} and/or θ_{22ik} is not equal to zero, it is said that there is a causal relation between X and Y. This method is used to examine the short term relations. If a panel co-integration is found between variables panel vector error correction model is used for Granger causality analysis. This method is described as long term relation and model is estimated as below:

$$\Delta Y_{i,t} = \theta_{1i} + \lambda_{1i} ECT_{it-1} + \sum_{k=1}^{p} \theta_{11ik} \Delta Y_{i,t-k} + \sum_{k=1}^{p} \theta_{12ik} \Delta X_{i,t-k} + u_{1i,t}$$

$$\Delta X_{i,t} = \theta_{2i} + \lambda_{2i} ECT_{it-1} + \sum_{k=1}^{p} \theta_{21ik} \Delta X_{i,t-k} + \sum_{k=1}^{p} \theta_{22ik} \Delta Y_{i,t-k} + u_{2i,t} \quad (3.2)$$

The term defined as ECT in panel vector error correction models is an error correction term obtained from the error of co-integration equation (e_{it}).

$$Y_{it} = \beta_{it} X_{it} + e_{it} \; e_{it} \sim I(0) \quad (3.3)$$

The significance of θ_{12ik} and / or θ_{22ik} and λ_{1i} and/or λ_{2i} parameters is researched by joint F test. If θ_{12ik} (θ_{22ik}) and λ_{1i} (λ_{2i}) is not equal to zero, it can be said that X(Y) is the reason of Y(X).

Hurlin-Venet (2001) panel causality analysis is the scape of Granger (1969) approach for panel data models. Models become from as follows,

$$p \in \mathrm{N}^*, \; v_{it} = \alpha_i + \varepsilon_{it} \text{ ve } \varepsilon_{it}, \; i.i.d.(0, \sigma_\varepsilon^2)$$

$$Y_{it} = \sum_{k=1}^{p} \gamma^{(k)} Y_{it-k} + \sum_{k=0}^{p} \beta_i^{(k)} X_{it-k} + v_{it} \quad (3.4)$$

For this purpose, it is researched that the coefficient of $X_{i,t}$ is equal to zero for all k lag and i unit. Hurlin-Venet (2001) test is examined with 4 different consecutive hypothesis. The first hypothesis is homogenous non-causal hypothesis (HNC). With this hypothesis, the existence of causal relation between variables is researched. Test hypothesis is created as follows:

$$Ho: \beta_i^{(k)} = 0 \; \forall_i = 1,..., N; \forall_k = 1,..., p$$

$$H_1: \exists(i,k) / \beta_i^{(k)} \neq 0$$

Test statistic is calculated with the below formula.

$$F_{HNC} = \frac{(RSS_2 - RSS_1)/(Np)}{RSS_1 / [NT - N(1+p) - p]}$$

RSS_2, shows the sum of squares of residuals of restricted model obtained under zero hypothesis while RSS_1 is sum of squares of residuals of the unrestricted model. F_{HNC} test statistic has Fischer distribution with *Np* ve *NT-N(1+p)-p* degree of freedom. If zero hypotheses is not rejected at the end of the

analysis it is said that X is not the reason of Y in all units and test course ends here. If zero hypothesis is rejected the next stage of Hurlin-Venet (2001) test, Homogeneous Causality (HC) test stage should be started. In this test, it is researched that the coefficients of delayed explanatory variables $X_{i,t-k}$ are homogenous or not for each k lag. The hypothesis of the test is formed as while F test statistic is calculated as below:

$$F_{HC} = \frac{(RSS_3 - RSS_1)/p(N-1)}{RSS_1/[NT - N(1+p) - p]}$$

The RSS_3 in the formula is the sum of the squares of the residuals of the restricted model under zero hypothesis. At the end of the analysis the rejection of the zero hypotheses means that there is no causal relation from X to Y in all cross-section units. This result does not show that there is no causal relation but that only homogenous causal relation does not exist. After deciding that causality is not homogenous, in order to research whether there is heterogeneous causality or not, Heterogeneous Non-Causality (HENC) test will be made where there is no causality but the heterogeneity will be examined. The hypothesis in HENC test which is the third stage of Hurlin-Venet (2001) test course is created as:

$$Ho: \exists i \in [1, N]/\forall k \in [1, p]\beta_i^{(k)} = 0$$

$$H_1: \forall i = 1,..., N, \exists k \in [1, N]/\beta_i^{(k)} \neq 0$$

F test statistic which will be used to test HENC hypothesis is calculated as,

$$F_{HENC} = \frac{(RSS_{2,i} - RSS_1)/p}{RSS_1/[NT - N(1+2p) - p]}$$

$RSS_{2,i}$ in the formula, shows the sum of the squares of residuals of the restricted model defined under the zero hypothesis for i unit. At this stage, a second approach for the test course is also defined. In this approach, test statistic for the sub groups of the units is calculated. Model according to this definition is created as follows:

$$Y_{it} = \sum_{k=1}^{p} \gamma^{(k)} Y_{it-k} + \sum_{k=0}^{p} \beta_i^{(k)} X_{it-k} + v_{it} \begin{cases} \beta_i^k \neq 0 \, for \; i \in I_c \\ \beta_i^k = 0 \, for \; i \in I_{nc} \end{cases} \quad (3.5)$$

$$n_c = \dim(I_c)$$
$$n_{nc} = \dim(I_{nc})$$

I_c and I_{nc} index series express the sub groups defining the causal and non-causal relation. In the course described like this, F test statistic is calculated as follows:

$$F_{HENC} = \frac{(RSS_4 - RSS_1)/n_{nc}p}{RSS_1/[NT - N(1+p) - n_c p]}$$

RSS_4 which is in the formula for the calculation of the test statistic, is the sum of the squares of residuals of restricted model defined under zero hypothesis for sub groups. The zero hypothesis of HENC test being unable to be rejected shows that X variable is not the reason of Y variable for sub groups. The rejection of the hypothesis is a sign of causal relation between X and Y variables. At this stage, HEC hypothesis test where heterogeneous causal relation is examined which is the final stage of Hurlin-Venet (2001) test should be started. HEC hypothesis ensures the examination of heterogeneous relation for each *i* cross-section unit between *X* and *Y* variables.

4. Data

The paper analyses the panel causality relation between foreign capital investments and growth, data pertaining to years 1995-2009 on transition economies have been employed. Countries have been classified into three groups as Central Eastern Europe (19 countries), Central Western Asia (8 countries)

and all transition economies (27 countries). Data have been retrieved from European Bank for Reconstruction and Development (EBRD) database. Description of variables is available in Table 1.

Table 1- The definition of variables

Variables	Definition
FDI	Foreign Direct Investment (Billion dollars)
Growth	Growth rate

5. Analysis and findings

To examining panel causal relation between foreign capital investments and growth in transition economies by Panel Granger Causality and Hurlin-Venet (2001) approaches, panel unit root analysis has been used and this purpose, Levin, Lin and Chu (2002) panel unit root test has been applied. Table 2 presents the findings of this analysis:

Table 2- Panel Unit Root test results(Levin, Lin, Chu2002)

Groups	Variables	LLC*	
		Level	First difference
Central Eastern Europe	FDI	0.931 (0.82)	-6.22* (0.00)
	Growth	-1.22 (0.11)	-13.86* (0.00)
Central Western Asia	FDI	-0.22 (0.41)	-4.69* (0.00)
	Growth	-5.35* (0.00)	
All Countries	FDI	1.14 (0.87)	-7.82* (0.00)
	Growth	-5.13* (0.00)	

* *Note*: denotes the rejection of the null hypothesis of unit root at the 5% level.

As to the findings of Levin, Lin and Chu (2002) panel unit root test, in all groups, foreign capital investments are integrated in the first difference. The growth variable is integrated into one (1) in Central Eastern Europe while it is stationary in level in Central Western Asia and all countries.

In the second step of this analysis, we investigated the long-run relationship between foreign direct investment and GDP in the Central Eastern Europe group using the panel co-integration technique developed by Pedroni (1995, 1999). Pedroni (1995, 1999) refer to seven different test statistics. These are the panel v-statistics, panel rho-statistics, panel PP-statistics, panel ADF-statistics, group rho-statistics, group PP-statistics and group ADF-statistics. The results of the Pedroni panel co-integration test are reported in Table 3.

Table 3 - Panel cointegration test results(Pedroni 1995,1999)

Groups	Panel co-integration tests**	No deterministic trend	Deterministic intercept and trend	No deterministic intercept or trend
Central Eastern Europe	Panel v- Stat.	0.33	-2.58	1.67
	Panel rho-Stat.	-2.45*	-0.88	-2.28*
	Panel PP- Stat.	-2.75*	-3.89*	-2.81*
	Panel ADF- Stat.	-5.89*	-3.72*	-3.03*
	Group rho- Stat.	0.85	2.37	0.14
	Group PP- Stat.	-1.29	-0.57	-2.78*
	Group ADF- Stat.	-2.53*	-1.12	-2.05*

Note: * denotes the rejection of the null hypothesis of no co-integration at the 5% level; ** the variance ratio test is right-sided, while the others are left-sided.

The results of the panel co-integration test showed that there is a long-run relationship between foreign direct investment and GDP in the Central Eastern Europe group. In this paper, causal relationship between variables which were identified with panel co-integration has been examined via three-step Panel Granger analysis (Panel unit root, panel co-integration and Panel VECM). Table 4 presents the results of panel Granger causality.

Table 4 - The Results of Panel Granger Causality Test

Countries	Dependent Variable	Source of Causation (independent variable)				
		Short- run		Long-run		
Central Eastern Europe		ΔFDI	ΔGrowth	ECT (Error Correction Term)	Joint (ECT-FDI)	Joint (ECT-Growth)
	ΔFDI	-	7.53	83.65	-	2.92
	ΔGrowth	17.71*	-	-0.72	13.61*	-
Central Western Asia		ΔFDI	Growth			
	ΔFDI	-	2.65			
	Growth	0.63	-			
All Countries		ΔFDI	Growth			
	ΔFDI	-	0.69			
	Growth	4.28	-			

Notes: * denotes the rejection of the null hypothesis of no causality at the 5% level. Δ refers first differences.

According to the results, it can be seen that there is one-way causality relation from foreign capital investments to growth ratio in the Central Eastern Europe group. Moreover, panel Granger causality analysis also applied that for Central Western Asia states and all other countries and it has been that there is no causality between foreign capital investments and growth.

Panel causality relation between foreign capital investments and growth shall also be analyzed via Hurlin-Venet (2001) causality analysis aside from Panel Granger analysis. The findings of this analysis are pictured in Table 5.

Table 5 - The Results of Hurlin Venet (2001) Panel Causality Test

Tests	Groups / Variables	Central Eastern Europe [a]	Central Western Asia [b]	All Countries [c]
HNC	FDI → Growth	2.17*	-0.57	-0.19
	Growth → FDI	0.26	-0.43	1.12
HC	FDI → Growth	0.74	_	_
	Growth → FDI	_	_	_

Notes: * denotes the rejection of the null hypothesis at the 5% level according to tests. The critical values[a] are: 2.56, 2.01, 1.78 (%1, %5, %10); The critical values[b] are 4.54, 2.97, 2.43 (%1, %5, %10); The critical values[c] are 2.37, 1.92, 1.72 (%1, %5, %10).

Hurlin-Venet (2001) test is a panel causality method that comprising of sequential processes. In current study examining the causality between foreign capital investments and growth in transition economies, the presence of panel causality in Central Eastern Europe, Central Western Asia and all transition countries has been analyzed via Hurlin-Venet (2001) method. In present research one-way homogenous causality has been detected from foreign capital investments to growth as regards Central Eastern Europe states while for the other groups no evidence for causality.

Both Panel Granger and Hurlin-Venet (2001) panel causality analyses have shown that findings of both tests are parallel to one another. Only for Central Eastern Europe states there has been one-way (from foreign capital investments to growth) causality.

Conclusion

Foreign capital investments are transfer of resources exported from hosting countries to foreign countries. Relevant studies point out that both direct and indirect foreign transfers affect national

economies positively. Developing countries in particular meet their demand for capital and technology by means of foreign investments. Investor country seeks to find new, profitable markets while hosting country reaches the goods, services and technology it cannot manufacture by means of foreign capital investments. Based on this perspective it can be argued that foreign capital investments can provide mutual benefits for trading countries. Potential relation between foreign capital and growth is under the effect of investee countries' financial and political stability, global economic and political status and several other factors. Hence these factors should not be missed while determining the interrelation between growth and foreign capital investments.

In this research it has been aimed to analyze panel causality relation between direct foreign capital investments and growth by making use of data pertaining to 27 transition economies for the period 1995-2009. To conduct panel data analysis, homogenous countries have been classified into three groups as Central Eastern Europe (19 countries), Central Western Asia (8 countries) and all transition economies (27 countries). Panel unit root, panel co-integration and panel causality analyses respectively have been conducted on grouped states. For Panel causality, Panel Granger and Hurlin-Venet (2001) Panel causality analysis has been utilized. Conducted analyses have shown that only for Central Eastern Europe states there has been one-way (from foreign capital investments to growth) causality while for the other groups no evidence could be detected to verify causality.

The presence of causality between foreign capital investments and growth only for Central Eastern Europe states is meaningful once the financial and political structures of these countries are examined in detail. In Central Eastern Europe states foreign capital investments shall positively affect growth and in the members of this group it shall be feasible to witness a rise in development level.

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APPENDIX

The Countries in Groups

Central Eastern Europe	Central Western Asia	All Countries
Hungary	Azerbaijan	Hungary
Poland	Armenia	Poland
Slovenia	Georgia	Slovenya
The Czech republic	Kazakstan	The Czech republic
Slovak Republic	Kyrgyzstan	Slovak Republic
Estonia	Uzbekistan	Estonia
Lithuania	Tajikistan	Lithuania
Latvia	Turkmenistan	Latvia
Bulgaria		Bulgaria
Albania		Albania
Belarus		Belarus
Ukraine		Ukraine
Croatia		Croatia
Bosnia and Herzegovina		Bosnia and Herzegovina
Serbia		Serbia
Macedonia		Makedonia
Romania		Romania
Russia		Russia
Moldova		Moldova
		Azerbaijan
		Armenia
		Georgia
		Kazakstan
		Kyrgyzstan
		Uzbekistan
		Tajikistan
		Turkmenistan

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Development of Established and Cancelled Companies in Slovakia

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Abstract:

The existence ofthe company as abusiness entityislimited by rising andtermination of its business activity. There is therefore necessary to find out possible risk to make business during life cycle of the company. In presented contribution we followed up development of new established companies in Slovakia in time series, as well as according legal form of business, and consequently we compared the development with situation in chosen EU countries. During exploration of development of the numberof companies there have been usedprocessingandanalysis of collecteddata. By such comparison we found out position of Slovakia in EU from the view of duration time of business termination.

Keywords:life cycle of company, formation of company, business termination, Slovakia, Joint Stock Company, limited company

JEL Classification: M 13.

1. Introduction

The existence ofthe company as abusiness entityislimited by rising andtermination of its business activity - life cycle, which is reflecting theimpactof external and internal surrounding of company (activity ofcompeting companies, fiscal policy of the state, innovative activities, qualificationof manpower,etc.). It speaks about level ofdevelopment of the companyandits market position. Establishment ofthe company and decision aboutstarting businessis a serious decision. At the beginning ofthe business there isusuallya good idea.This is thendevelopedintoa business plan. Termination of company and its business have various reasons: termination of period forwhich the company isbased, achieving the purpose for whichthe company wasfounded, the decision of entrepreneur to liquidate company voluntarily, judicial decision, and consultation of shareholders, bankruptcyorrejection of the proposalonbankruptcy due to insufficientassets. Companies must therefore follow up possible business risksand find out solutions for theirprevention. Companies that manage the risks are much more successful in continuing their business.Conversely, it isalsoa lot ofbusinessesthat areunableto passthrough therisks. They mustthereforecease its activities, respectively cancel it.

2. Present state of problem solving

The existence ofthe company as abusiness entityislimited by rising andtermination of its business activity - life cycle, which is reflecting theimpactof external and internal surrounding of company (activity ofcompeting companies, fiscal policy of the state, innovative activities, qualificationof manpower,etc.). It speaks about level ofdevelopment of the companyandits market position.

Establishment ofthe company and decision aboutstarting businessis a serious decision. At the beginning ofthe business there isusuallya good idea.This is thendevelopedintoa business plan. The task of business plan is to prepare establishment, formation and development of the company. Termination of company and its business have various reasons: termination of period, forwhich the company isbased, achieving the purpose for whichthe company wasfounded, the decision of entrepreneur to liquidate company voluntarily, judicial decision, and consultation of shareholders, bankruptcyorrejection of the proposalonbankruptcy due to insufficientassets (Antošová 2014).

Termination ofthe companycan bewithout liquidation-in the case ofvoluntary cancellation of company and in case company hasits legalsuccessor,inthis case,itseconomic activitycontinuesand liquidationis notnecessary. Termination with liquidation - during not voluntarily company termination there is real material liquidation. In the process ofliquidationit is sellingthe company's assetsandthe money raisedwill be usedto coverliabilities.Information about liquidationshall be entered inthe Commercial Register.The liquidatorappointed by thestatutory bodyof the companymaybe only physical person. Entering ofcompanyinto liquidation is notified by the liquidator to all known creditors. He simultaneouslypublishes it in the Commercial Bulletin. The result ofthe liquidationshouldbe completepayment ofliabilities.Enterpriseexpires by deleting from theCommercial Register or cancellation ofa trade license (Svoboda 2013).

During their life cycles, many companies are confronted with crisis. Kraus *et al.* (2013) searched empirically test theoretical approaches in the case of 30 small and medium sized enterprises (SMEs) from Germany with aim to describe how these companies deal with crisis. The results show that the personal contact to stakeholders is an added value of SMEs because of their size in order to manage and overcome crisis. Finally, it is shown that crisis can be best overcome by focusing on the core business and growth of company (Kraus *et al.* 2013).

An important strategy for companies facing competitive disadvantages is followed by inter organizational agreements and cooperative business networks. Specially small and medium firms adopted collaborative network models as a way to overcome common problems. Wegner *et al.* (2005) speaks that over 1,000 small-firm networks (SFNs) are estimated to have been created in Brazilsince the year 2000 and they studied SFNs life cycle model, applying it to a sample of twenty-eight SFNs established in two regions of southern Brazil. The results revealed that 68% of the analyzed SFNs are declining or no longer in business. Among the active business networks, 21% remain at the development stage, and only 11% have achieved consolidation. Most SFNs analyzed fell into a stage of decline early on in the life cycle, incapable of reaching Consolidation (Wegner *et al.* 2015).

Gancarczyk (2015) discussed the international strategies of lead companies and the modularization of production networks as drivers of cluster evolution in developed countries, and to formulate propositions regarding the impact of those drivers on relationships with clusters in less-developed countries (Gancarczyk 2015).

Life cycle marketing strategy is emerging as a way for firms to enhance its activity by new product development efforts whilst managing ecological impacts. Such pursuits combining life cycle assessment and ecological marketing offer promise when it comes to assisting firms to decrease product based ecological impacts (Lockrey 2015).

Iotti and Bonazzi (2014) quantified cost of an industrial production, in its whole cycle, during a long-run period, which shows that innovative firms that have made investments to improve business efficiency, have lower production cost in the long run; these firms are able to gain efficiency in the production cycle and persist on the market (Iotti and Bonazzi, 2014).

Some companies are more successful in detecting risks early in their life cycle, and in decoupling risk factors from work processes before they impact their performance. Effective risk management in company involves an intricately linked set of variables, related to work process, organizational environment, and people. Some of the best success scenarios point to the critical importance of recognizing and dealing with risks early in their development, which could prevent bankruptcy of the company (Thamhain 2013).

3. Methodology

During exploration of development of the numberof companies there have been usedvariousmethods of processingandanalysis of collecteddata.Valuable sources of information wereprofessional publications,articlesanddatafrom the Statistical Officeand the data obtained from Internet sources.

Problem solving ineach area means cycle,composed of severalsteps.The cyclesbegins withdata collection,sorting and processingcontinues by formulation ofnew knowledge and itsclarifying. With aim to make survey there was thereforeusedmethodof comparison, trend of indicators development over time andpercentageanalysis. The aim was torecognize whatis positive and what is negative for business, what problems they could cause in the future, and also to note the positiveimpactof certain decisions. Timely andcorrect interpretationof economicand statistical indicators could be capable ofearly detection ofthe

direction offurther development ofthe analyzed areasand preventthe bankruptcyof enterprises.

Method of comparisonhadgreat importance during research in clarifying theprocesses of changein the development anddynamics of the developmentof enterprises, revealingtrendsandpatternsof their development. They were comparedbusinessesthroughout the region, as well as enterprises, depending on the legal form.It is notpermissibleforthe comparedphenomena to be confined toidenticalfeatures, but it is alsonecessary toidentify how theydiffer from each other. The samephenomenon maybesimilar tothesamepoint of view, but from other point of view it can be different, therefore there is necessary to understandtheperspectivefrom which thecomparisonis made.

Development trendswere investigated by trend analysis, which served for searching of individual indicators development in the context oftheir developmentin the past, whichcan servetoforecastfuture developments. Trend analysisshowsthe development phase, quantifyingthem, whileanticipatingtheir progressin the near time period, which means it compares thevalues of individualindicators and theirchanges over time. But during evaluation wehave totake into accountchanges thathave a directimpact on theanalyzedindicator, for example changes in the competitiveenvironment, changesin the tax system, changes in the marketand the impactof international agreementsorthe political situationat homeorabroadif this could affect the trend. Therefore,a comparisonwas made by comparing of position of Slovakia with situation in selected EU countries.

Throughpercentage analyze we wanted tofind out howthe situation has changedinthereporting period.From this analysis we can interpretthechanges in the structurerepresented byindividual enterprisesbylegal formsandaccording to the fieldof business.The advantageof this analysis means we can comparethe resultsof different years. By percentage expression we can compare theincrease or decrease invarious indicatorsofseveral countrieswithdifferent sizedeconomies.

The evaluation of companies' development can be made by six main factors. The main index factors are: economic activity, capital market, taxes, investors' protection and corporate governance, working and social environment and entrepreneurial opportunities. Different approaches in evaluations of companies are derived from complicated evaluation characteristics of companies focused on commodities, where the value of company is very often influenced by cycle of industry (Groh *et al.*, 2010).

As for the comparing of countries and business field we used market approach, evaluated by industrial benchmark (Lawrence 2006). During the countries evaluation the various risk profiles are created and those profiles are ranked on percentage scale from 0% to 14%. The corresponding percentage for each country is included into the evaluation of overall risk of country, geographical region and overall investment. The development of companies in the country is also considered from country's perspective. The particular evaluation will differ based on development stages of companies, such as whether the company is focused on preparation of bearings for further activity or if company is already performing operations with actual production.

Table1 **-** Evaluation techniques of companies

EVALUATION TECHNIQUES	APPROACH
The price of current investment	Market approach
Multiplications	Market approach
Net assets	Costs approach
Discounted cash-flow or revenues(evaluation of company)	Revenues approach
Discounted cash-flow or revenues(evaluation of investment)	Revenues approach
Industrial benchmark	Market approach

Source: Lawrence, CIM MES Survey, 2006

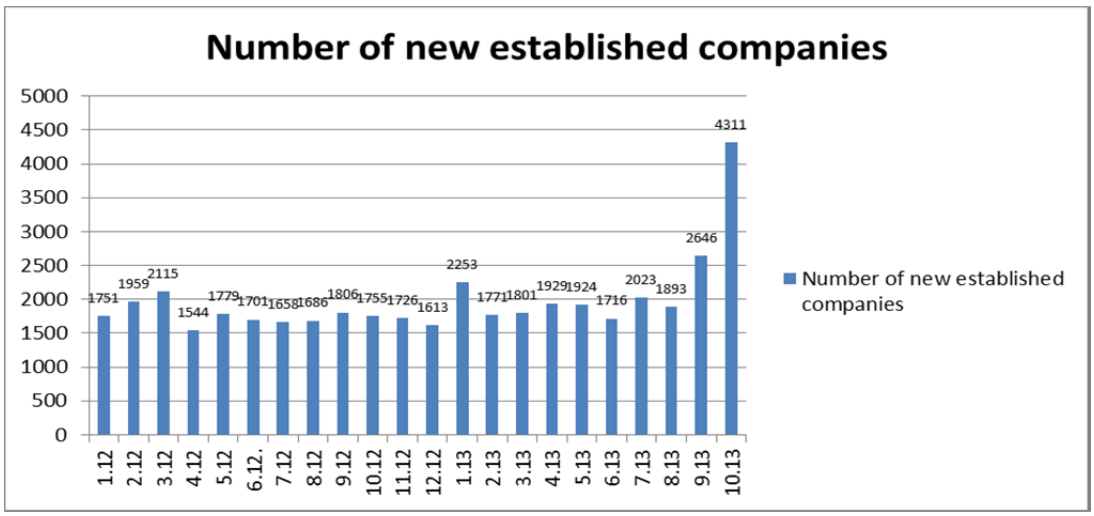
The analysis of companies' establishment and cancellation had been performed over selected European countries and selected industries over the period of years 2000 until 2013 and all presented results are in aggregated values. Selection of countries had been made due to the comparability from European perspective (Groh *et al.* 2010).

4. Development of formation and cancellation of companies in Slovakia

Within thebusiness risksand theirpreventionwe outline theanalysis ofenterprises in the SlovakRepublic. There isthe number of companiesthatmanage the risksandcontinue

itsbusiness.Conversely, it isalsoa lot ofbusinessesthat areunableto passthrough therisks. They musttherefore cease its activities, respectively cancel it.

Followingchartlistsnumber ofnewly establishedenterprises during eachmonth of the year2012 – 2013.



Source:www.finstat.sk

Figure 1 – Number of new established companies

Graph (Figure 1) of newly establishedfirmspoints usto the fact thatfromJanuary2012to the March,the number ofnewly establishedbusinesses was growing. In Aprilof that yearthe number of enterprisesdecreased slightlyto 27% tothenumber1544.FromaboutMayto December, until the end of the year, during these months, we have observeda slightrise and fall ofnumber of companies.2012 shows the highnumberof newly established companies. Specifically the number is 21,093 companies.

A significantincrease in the numberof enterprises is remittedfor January2013, presenting 2253,which isin comparison with Decemberof 2012a high number. From February to August 2013, we follow a slight increase in the number of newly established enterprises, but significant change comes in September and October. In September the number of enterprises is 2646. In the next month of 2013, the number of established enterprises increased by approximately 62%, which represents 4311companies. We speak of a rapid growth, as these are more than half of newly established enterprises compared to the last month of 2013.The reason forsuch a rapid rise inthe number of firms is legislative change in October. The change saysthere would not be able to establish limited company without real basic equity.

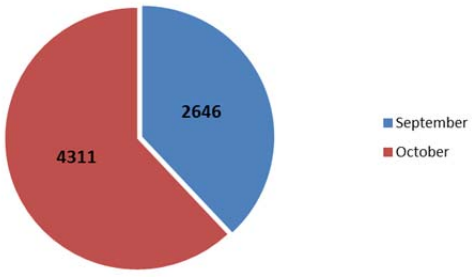


Figure 2 – Comparing of new established companies during September/October

Thus, from December 2013, there wasan obligation to repay basic equity to bank account. Fromthis fact, we found that entrepreneursare still hastened during October and November to establish limited company.The followingchart illustrates development in September and October, wherethe increase wassignificantly sharp.

Table 2 - Year comparison of new established companies according months (2012 vs. 2013)

Date	January	February	March	April	May	June	July	August	September
2012	1751	1959	2115	1544	1779	1701	1658	1686	1806

2013	2253	1771	1801	1929	1924	1716	2023	1893	2646

*Source:*www.finstat.sk

The following chartlistsasummaryof newly establishedenterprises ina given monthsin 2012-2013. From the Table 2 we see individualmonths fora givenyears, which allows usa clearercomparison of the numberof enterprises.

5. Development of the numberof newly formedlegal entitiesin the Statistical Register of organizationsin 2013 and2014

Development of the numberof legal entities is based on thestatistical register of organizations, where there are listed all legal entities, namely physical and legal entities - entrepreneurs. In comparing to 2012atrend in the numberof newly createdlegal entities showed growthin 2013, which was monitoredin each quarter in this year.Year 2013 speaks about decreasing trendin a certainrange, namely from19,600inthe 1st quarter to13,500inthe 4th quarter.

Physical entities - entrepreneurs, with a share of62.1%, prevailedin the general population of newly createdlegal entities. Companies, legal entities -aimed atmaking profitsamounted to34.4%. Dominant positionrepresented limited companies with the share of96.2%. Furthermore we mention sharesin individualsectionsfor the year2013, when companies have been established. In sectionConstruction it was recordedthe highest share-15.5%.In the sectionProfessional, scientificand technical activities, the share was 13.9%and 13.3% share of the section*Wholesaleand retail trade*;repair of motorvehicles and motorcycles.

The largest amountofenterpriseswere monitoredinsectionsProfessional, scientificand technical activities(18.7%); section Administrative andsupport services (15.9%) and also in section*Wholesaleand retail trade,repair of motor vehiclesand motorcycles*(15.2%).

Statisticsshows also that physical entities – businessescreateda largenumber directlyin the sectionConstruction,with a share of26.6%; in sectionWholesaleand retail trade;repair of motorvehicles and motorcycles,with a share of17.4%; and finallyin section*Manufacturing*with a share of14.4%. Thischaracteristic ofthe 3rd quarter of2014results from the information of statistical register of organizations. It recordslegal entities, namely physical and legal entities - entrepreneurs.

At theend of the 3rdquarter of2014, the Register of registeredorganizations registered 757,800legal entities, while physical entities – entrepreneursaccounted 58.2%, and legal entities, orientated to profitsamounted to33.1%. Comparedwith the 3rd quarterof the previous year 2013, there is an increase of legal entities in Register of organization about 10 thousand, and thedecrease of physical entities - entrepreneurs in the Register about 13,600.

In the 3rd quarter2014 there was created in the Register 10,400legal entities. Inthe previous year in the sameperiod, development of newlegal entities shows increase.Inthe general population physical entities are dominating, whose share presents78%.Rate of legal entities, focusingon profitsis 17% in given year.The share of85.8% belongsto limited companies, prevailingin the groupof new enterprises.

Now we listdifferent sections of thenewly formedlegal entities. The above-mentioned 3rdquarter of2014, the highest share was recordedpreciselyin section Constructionwith a share of21.7%. SectionManufacturingaccounted for14.5%shareand sectionProfessional, scientificand technical activities10.6%.

InsectionAdministrative and supportservices the share was 18.7%, section Professional, scientificand technical activitieswith17.9% share, Constructionwith 9.6% share, which originatedmostbusinesses.Insection Construction (25.7%), originatedmostly physical entities – entrepreneurs.

Development of the numberof cancelled legal entitiesin thestatistical register of organizationsin 2013 and3rd quarter2014. Summary number of legal entities cancellation in 2013exceeded63,000and rise by 9.4% compared to 2012.

The number of individual cancellations in individual quartersin 2013ranged from17,800 to 10,300. In the frame of whole populationof legal entities cancellation physical entities presented entrepreneursand businesses up to 91.6%and 7.8% of companies, where exceptionally limited companies presented till 86.7% ofthetotalnumber of enterprises thathave ceased to exist.

The largest share of cancellation in 2013 was monitoredin section Constructionwith a share of24.2%, in sectionWholesaleand retail trade;repair of motorvehicles and motorcycles,where theshare was25.3%, in the sectionManufacturingshowedwith a share of15.7%.

In sectionWholesaleand retail trade;repair of motor vehiclesand motorcycles(36.9%), section Professional, scientificand technical activities(13.3%)and in the section*Manufacturing*(11.1%)expiredmost of the companies.In the section Construction(25.6%), Wholesaleand retail trade;repair of motor vehiclesand motorcycles(24.5%)and in the sectionManufacturing(16.1%) was recorded the highest rate of cancellation of physical persons - entrepreneurs in 2013.

During 20149,700legal entities terminated their activity in Register of organizations. This presents an increaseof the development ofthe numberof such enterprises against 2013. Within thepopulation of theselegal entities, namely legal entities cancellation, physical entities – entrepreneurswho prevailed with 88% share. Enterprises recorded 11.2%share, while mostrepresented companies were limited companies,with a share of88.5% (of the total number of enterprisesthat terminated their activity).

Individual sectionshighlight the factthatthe highest rate of company cancellation wasin the 3rdquarter of2014monitoredin Section Constructionwith a share of24%in section Wholesaleand retail trade;repair of motorvehicles and motorcycles with share of22.6%, and finally section Manufacturingwith14.9% share. InSectionG(35.3%), sectionM(14.9%), sectionF(10.3%) most businesses terminated. InsectionF(26%), G (21.1%) and sectionC(15.9%) was recorded the highest rate of physical entities - entrepreneur - cancellation.

Over 90personal bankruptciesin Slovakiawere announcedin 1stquarter in2013. This is thehighestquarterlynumberof personalbankruptciessince 2006.Theirannual growthrepresents 36, which means increase of66.67%. TheBanská Bystrica regionwasdeclared region with highest rate of personalbankruptcies- yet 22(24.44%). Lowest number of bankruptcieswas recordedin the Košice region- only 4(4.44%). I results from last analysis ofCRIF-SlovakCreditBureau, ltd., that thehighestquarterlynumberwas recordedjustincorporatebankruptcies.

In the frameof personal bankruptcy, we recorded the second highest number. 14bankruptcies(15.56%) were deliveredin 1stquarter in2013 inregion Trenčín. Next regionswith the numberof bankruptcies10(11.11%), were regions: Bratislava Region, Trnava Region, Nitra Region, Žilinaand Prešovregion.

As wementionedabove, least number of bankruptcies in 2013 were declaredin the Košice region. When comparing2013with 2012, we can statethatlowestrecorded numberof personalbankruptciesin 2012was located in Trnava Region. They were recorded only twobankruptcies, representing 3.7%.Since 2007 we recorded ayear-to-yearincrease in the numberof personalbankruptcies. Incomparison with 2010, in 2011 wehave identifiedso farthe largest increase. This representsan increaseof up to55.66%.The main reasonis the inability of physical entities to meet theirfinancial obligations.Based on thestatistics we can indicatethat, althoughin recent yearsthe numberof defaulters(within thedebtorsto banks) did not increased significantly in spite amount ofnon-payment ofdebtsincreased.

Physical entities areunable torepayother obligationsthey are in situation of increasingindebtedness.Their creditorscanapplypledges.Throughexecutionthey seekreimbursement of claims.Borrowers are thus entering to theuncomfortable situation, in which they declarepersonalbankruptcy.

In 2014it wasagain marked record in numberof bankruptcy.Bankrupthas received407 subjects, which is 13more thanhas so far beenthehighest numberof2013 (394). Amongbankrupted companies prevailed legal entities with the number of336 (82.56%) including one association, 71 (17.44%) bankruptcy wasdeclaredon theproperty of physical subjects-traders. Overall, restructuring was permitted firstly to 30 subjects(3 of physical subjects-traders), butthatwas not successfuland subsequently bankruptcy had been declared ontheir property.

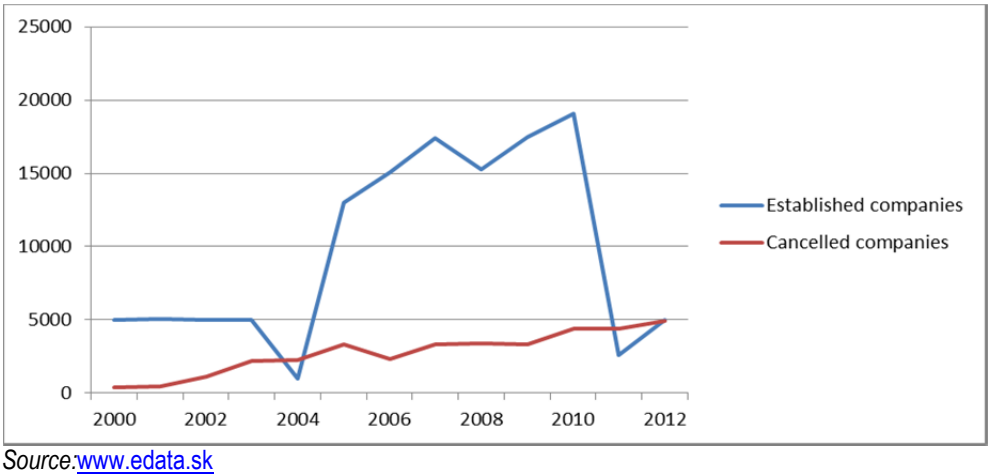
Most risky sectors were the same asin previous years, mainly trade, industry and construction. Mostsignificantlybankruptcieshave beenproclaimedin the Bratislava region, whichalsooperatesmostsubjects. Least number of bankruptcies in 2014 was in region Trenčína year earlierin the Trnava region. The numberof authorizedrestructuringin2014 (115)overcamerecord-breakingnumberof2013 (113) by 2 more restructuring. 98 restructuring (85.22%), have been granted to legal subjects (including one association) and 17 (14.78%) to physical subjects - traders.

6. Development of the numberof Slovak companiesaccording tolegalforms of enterprises

In the frame of following analysiswe comparedparticularlylimited companies, especially joint-stock companiesand ultimatelyself-employed traders.We compared based and cancelled businesses, namely from 2000to2012. We will mention their annual comparison.

Limited companies

Since 2000the numberof newly establishedcompanies – limited companies – was increasing.The largest number ofnewly establishedcompanieswas recorded at the end 2011 namely with 2600 limited companies. Fromthis yearcurve had decreasing trend.The numberof cancelledcompaniesincreased every year. The increase wasslight, well in 2012 it achieved significant change in comparing with 2010. This is yet about approximately 5,000companies thatwere cancelled.

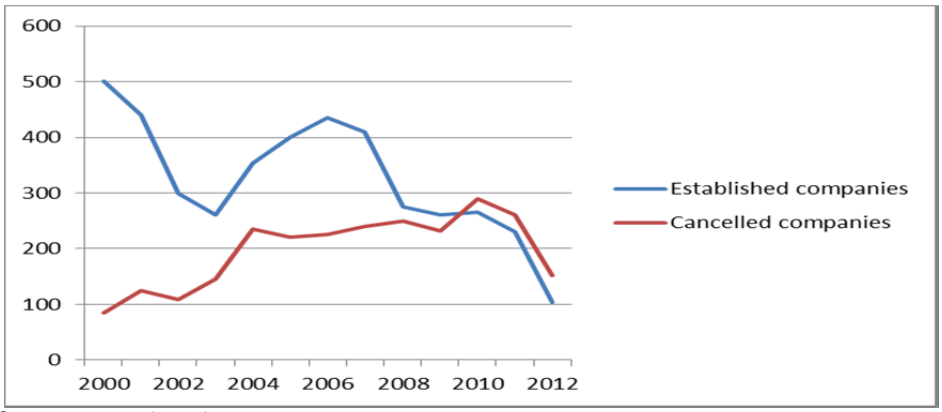


*Source:*www.edata.sk

Figure 3 – Development of new established and terminated limited companies in (2000 - 2012)

Joint Stock Companies

When comparing2010and 2012wenoted thatin 2012 there was basedmorethan50% companies.The numbers ofjoint stock companies has on the other hand increasing trend.In 2012, namely in March,anumber ofcancellations of joint stock companies significantly exceeded thenumber ofnewly established joint stock companies. It was highest over the last10 years.The number ofjoint stockcompanies had from2000 to2012 adecreasing trend.

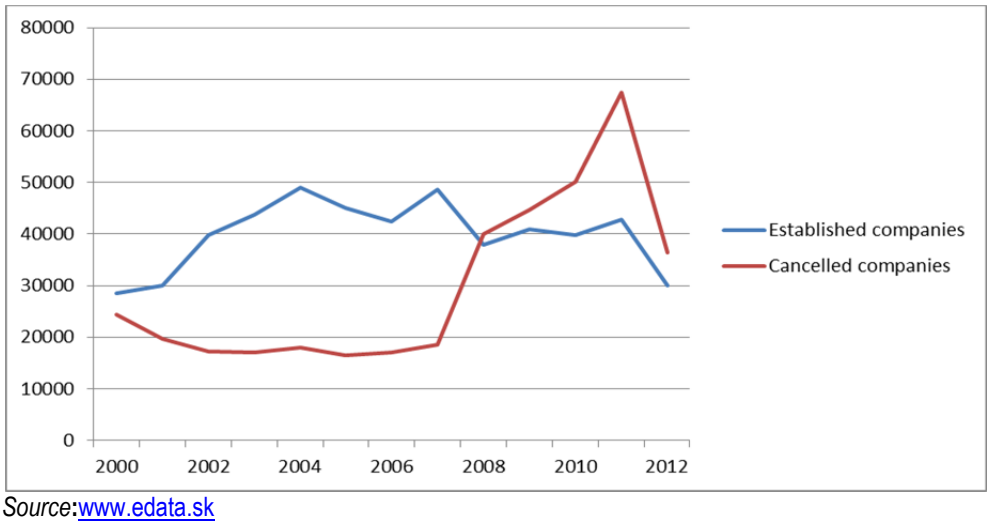


Source: www.edata.sk

Figure 4 – Development of number of established and cancelled joint stock companies in 2000-2012

Small traders

Within the small traderswe see thateach year there was repeating trend, namely highnumber of cancelledtrades, especially in December.Since 2007,we followa steadyincrease in the numberof cancelledtrades, thus curve marks increasing tendency.The growing character of number of new trades has been recorded since2000 till 2004.Later we see slight decline.



Source:www.edata.sk

Figure 5 – Development of established and cancelled traders in 2000-2012

7. Comparisonof established and cancelled companies with European Union countries

In 2005 there was made comparisonswith the countries ofthe EU, connecting factors that affect formationand cancellation of business entities. Legal standards, adapting Slovak business environment are affected by the EU process. Slovakia has committed to take principles of individual rights and legal standards of the EU. It has to apply them and use in domestic labor system. The way the process is carried out is not always appropriate. As an example of administrative complexity we indicate the number of steps necessary for business starting and the difference between Slovakia and the EU countries. Every entrepreneur who wanted to start a business in Slovakia had to complete at least 10 steps during establishment of company. Such amount is also the average in the countries of the region. The least number of procedures had to be done by entrepreneur in Hungary (5), the OECD average is 7 procedures (7 Netherlands, Germany 9, Austria 9, Czech Republic 10, Hungary 5). During evaluation of number of days required to set up a company in Slovakia, there was required 98 days compared to 48 day to start up a company within the average of the countries of Central and Eastern Europe and 30 day on average in OECD countries.

However, SMEshavelimited access tolong-term financing. AccordingNational Agency for development of SME65% of SMEs considerednecessary to improvethe availability of credit. Only15% of SMEs inthe EUconsideredaccess to financeasa major obstacle, whilein Slovakia till 65% companies believe that the availabilityof creditshould be improved.Total volume oftax burdenin Slovakia can beseenthrough thetwo mainsimple points of view: macroeconomic(in terms of taxes rate on gross domestic product), and micro(in terms of taxes rate onthe income of employees).Tax andmandatorysocial security contributions are collected by state approximately 30% ofthe totalgeneratedannual grossdomestic product.In terms of internationalcomparison Slovakia belongs among three EU Member Stateswith lowest overalltax burden, afterLatvia and Lithuania.On the other hand there isSweden(51%GDP) andDenmark(49%GDP).

Simplicity or difficulty of law enforcement is internationally measured by three indicators: a) the number of procedures counted from the moment of action in its own payment, b) the associated duration c) compliance costs expressed as % of debt. In Slovakia, the costs of law enforcement (contracts) make up 15% of the debt compared to 17.3% as a regional average and 10.8% of the OECD average. Thus, Slovakia is among the countries with the highest number of procedures related to law enforcement (27) and an unprecedented result in the number of days associated with law enforcement and (565 days). Cancellation of business is the latest index in series of indicators of the quality of business environment. This indicator presents time and costs associated with the solution of bankruptcy, mainly leaving of entrepreneur from the market. Costs for business cancellation include costs of juridical fees as well as fees paid to liquidator, lawyer, accountant, etc. The indicator measures the rate of compensation of efficiency and speed of bankruptcy and it is expressed by the ratio of cents to one dollar, which debt enforcer obtained from an insolvent firm. Compensation rate in Slovakia is 38.6 compared to the regional

average of 29.8. Compared internationally, Slovakia is the country with the longest duration time of business termination (4.8 years).

Conclusion

Development of the number of established and cancelled companies speaks about necessity to react timely to unfavorable situation. The analysis shows the forecast of increasing trend of companies in bankruptcy (bankruptcy restructuring). There were included to the analysis of development of companies' number legal subjects, as well as physical subjects – tradesmen, which assets were included to the bankruptcy, respectively they were allowed to make restructuring. Despite these developments, companies are likely to survive, as the global economy is gradually recovering, and economies of different countries showed some recovery as well. On the other hand, a heavy burden of public and private debt, causes using of a large part of revenues just to pay the debt. Paradoxically, mainly negative inflation supported by low demand causes the real debt increase. Growth is hindered also by geopolitical events that have still unclear results, since return of political risk to Europe itself affects the confidence of the individual entrepreneur in business opportunity.

In terms of the global economy, the presently used strategies of existing comparative competitive advantages of low cost are not further sustainable for Slovakia in the future. The growing competition of countries having cheap labor quickly devalues these temporary competitive advantages. Slovakian companies must focus on resource advantages, resp. intellectual capital, which are already represented in the knowledge base of the economy, i.e. growing innovation potential of enterprises, the quality of human resources, research and technology, which are considered as key factors of European competitiveness (Volna and Papula 2013). Stability seems to be the right path to building capacity for innovation. An excessive thoughtless action in costs reduction, although that may bring short-term economic effects, in the long term can seriously undermine the competitiveness of the company.

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Assessment of Balance of the Economic Development of BRICS

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Abstract:

During the study the factors that influence the balance of economic development of the country were identified through which it was the necessity of a comprehensive approach to assessing the balance of economic development from the perspective of two interconnected approaches: economic and social. In order to determine the overall quantitative assessment of the balance of economic development of countries it has been developed the indicator that integrates the categories such as investment climate, innovative activity, the resource-potential productive capacity, financial capacity, pertaining to the economic block of indicators and demographics and labor force, health and education that are related to the social block indicators. The main advantages are the possibility of the integral index of the complex (consolidated) assesses the balance of economic development within countries in the context of major socio-economic indicators, as well as in cross-country comparisons. In this study, the authors detail the algorithm of selection of indicators to assess the balance of economic development of countries and to track the dynamics of changes in the base factors, as well as the selection of homogeneous groups of countries with different levels of socio-economic development. Produced experimental calculation of integral index of balance of economic development on the example of the BRICS countries has given a fairly complete picture of the studied categories. Based on the calculated data main trends of integrated indicators of the balance of economic development of the BRICS were predicted and point forecasts for the development of two variants: pessimistic and optimistic are given.

Keywords:balance, economic development, investment attraction, social development, BRICS.

JEL Classification:F63, O11

1. Introduction

The BRICS, according to experts in the field of the world economy, was a response to the five largest countries on the imbalances of the global economy. Today BRICS alliance allows member countries more effectively implement the national interests and the interests of slightly represented in the international organizations, on the global and regional forums in developing countries and countries with emerging markets. With regard to the further development of the group, speaking at the third BRICS summit, which took place on April 14, 2011 in China (Sanya), Chinese President Hu Jintao highlighted four main objectives:

- The consolidation of peace and stability, respect for sovereignty, democracy in international relations;
- Economic development for all interest, based on a fair and equitable financial system and free trade;
- Development of cooperation in multilateral formats;
- Enhanced the cooperation among BRICS countries on the principles of solidarity, mutual trust, openness and transparency and the overall development (Glinkina 2014).

Of particular note is the declaration adopted at the third summit of the BRICS Leaders' Declaration. The Declaration considers the fundamental problems of the global financial and economic system, quite so topical political issues happening in the world today. In all of this, the BRICS adheres to the principles

of partnership, solidarity, mutual understanding and openness. The basis for the action is a global solution to the problems of economic development (Arkhipov 2013).

It is recognized that BRICS is primarily a political project as a major source of technology and investment, as well as the markets are Western countries, and the economic ties between BRICS countries (except China) are minimal (Lukow 2014). However, now a new multilateral institutions of BRICS are forming (Development Bank, created an insurance fund financial BRICS). This in turn entails the institutionalization of community, more active trade and economic ties between BRICS countries; the question of the possibility of developing common investment strategies associations in various regions of the world appears. BRICS countries today are oriented primarily to the innovative model of modernization - to ensure balanced development by the progress in high-tech industries. Countries consolidation gives the participants of the "five" the chance to build on complementarities of each other. At present, the BRICS intensively developed more than 20 formats of cooperation - promising areas of scientific and technical cooperation in the fields of aeronautics, biotechnology and nanotechnology. In order to modernize the global economic system, the center of which are the US and EU, the leaders of the BRICS member countries signed the documents establishing the Development Bank for the financing the major infrastructure projects.

BRICS countries have certain features, in particular, economic activity, differentiating them from other countries, and the accumulation of human potential. In addition, the BRICS countries have a high development potential, based primarily on the presence of the huge natural reserves of raw materials: Russia is the world's largest exporter of oil and gas, India - iron ore, diamonds, gold, and thorium. China has large reserves of coal, copper, aluminum, molybdenum, manganese; Brazil - iron and manganese ore, bauxite, nickel, uranium ore, tungsten, gold, zirconium, thorium; there is information that the country has proven oil reserves. Brazil and Russia also are the owners of the largest reserves of fresh water, which in the modern world is becoming an increasingly scarce resource.

In recent years, the search for new ways to enhance economic cooperation between the countries unites in various international organizations: EU, APEC, UN, the "Group of Eight", the "Group of Twenty" and others. One of the most important geopolitical events was the creation initiated by the Russian Federation in 2006, the Association of the Federal Republic of Brazil, the Russian Federation, the Republic of India, the People's Republic of China and South Africa (BRICS). The association was able in a short time become a significant factor in world politics.

Now in the context of globalization of the world economy an increasing the role in the development of the national economy plays a principle of balance development. Defined the criteria for a balance development of the national economies are not only economic growth but also social aspects. Over time, the development of the world community has shown that economic growth is not always accompanied by favorable social consequences that are manifested in the creation of conditions for improving the population's education, qualifications, availability of health care services and others. To the effectively Union it is needed an understanding of the degree of balance between economic development of the BRICS countries.

Balance economic development is provided primarily by the achievement of socio-economic equilibrium and the development of public relations, providing conditions for the material well-being and spiritual development and fulfillment of social rights. The main problem of the transition from the concept of unlimited growth to the balance development is the choice of target indicators. Currently, there is no consensus about what indicator or system of indicators allows evaluating more comprehensively the balance of the economic development. Currently used tools for constructing aggregate socio-economic indicators are based primarily on expert assessments, which often lead to subjective and controversial conclusions, in particular to the distortion of the real situation. In this connection, the problem is of particular importance of the research balance economic development of the state in accordance with modern trends.

2. Methodology

Balanced economic development is characterized by the following features: a continuous increase in efficiency of economic activity - reduction costs in undiminished volume of production; improving the competitiveness of the economy; the use of resource-saving technologies and products; stability of the economic system in crisis and recession; long-term trend in economic growth, and as a result, the welfare of the population (the level and quality of life).

The social component of the balanced economic development is related to the maintenance and strengthening of social justice and human development. Inthe base of the social aspect of balanced development is equitable distribution of resources, income and opportunities among the population of a country. The regulations of the most countries, declared the transition to a balanced development as the main development goals defined by the achievement of high standards of living and welfare of the population. The Program of Action adopted at the World Summit for Social Development (Copenhagen, 1995), reflects the main areas of the social dimension of balanced development (Martusevich 2014):

- the formation of a full-fledged civil society involved in the development and implementation of decisions, determining the functioning and well-being of the population;
- eradicating poverty, improving the quality of life for all;
- strengthening the institution of the family;
- fight against crime;
- equitable distribution of benefits among different social groups;
- increasing access to knowledge, technology, education, health care and information;
- strenthening solidarity, social partnership and cooperation at all levels;
- encourage and stimulation the employment growth;
- the full support of the development of the spiritual potential of the society, the growth of human capital.

It should be noted that the relationship between economic and social aspects defines the concept of sustainable development. So, the balance economic development is provided primarily by the achievement of socio-economic equilibrium and the development of public relations, providing conditions for the material well-being and spiritual development and human social self-realization.

Thus, under the balance of economic development will be understood the comprehensive development of the country's socio-economic system in which the balance between economic growth and rising the living standards of the population.

The challenge of balancing economic development of countries requires an investigation of factors influencing the balance of economic development. Based on the above mentioned, we distinguish economic and social factors of country balanced development.Equally important are economic factors that determine the industry specialization and have an impact on inter-country relationships, opportunities for innovation and investment, as well as affect the possibility of financial support of the development of enterprises, organizations, regions and the country as a whole. Economic factors should be considered in the economic, investment, innovation and budget policies.

During the transition to a new model of balanced economic development that meets the requirements of the global economy of the XXI century, a special role investment acquired. Without more investment it is impossible to provide a consistent economic growth. And even more so to implement fundamental structural changes and modernization to make the breakthrough that is needed in any economy. Therefore, a key challenge in the development of investment cooperation between the two countries is to provide a favorable investment climate.

The basis for the economic development of any country is its resource potential. This characteristic reflects the location ofthe natural resources, provision of certain sectors of the economy, their influence on the formation of economic specialization and spatial organization of the country. The value of the natural resource potential is the sum of the potential of certain types of resources. In general, speaking about the balance of economic development, the potential reserves, the diversity of natural resources and the nature of their location anywhere in the ability provide a broad development of all economic sectors without exception and integrated development of the economy.

Crucial to achieving sustainable economic growth is the productive capacity of the country. Production capacity depends on the resources of the country that with the full use of their permit a maximum gross of thenational product (GNP). This production potential is depend on the absolute production capacity of industries and the extent of their use. A high level of productive capacities has large countries with developed productive forces, greater national wealth.

In modern conditions the special importance has the issues of financial independence and security of the country, the solution of which depends largely on the structure of the economy and its level of development. Achieving sustainable growth of any economy and increasing the competitiveness is determined by the financial resources, the role of which is constantly increasing. In modern literature there

are different approaches to the formation and the use of financial capacity, which basically boil down to the fact that by taking into account the financial capacity of the state and all economic entities it is necessary to ensure improvement of its financial self-sufficiency, as well as the pre-emptive use of private investors.

Thus, to assess the economic component of the balanced development of the country we have identified the main groups of indicators: investment climate; innovative activity, the resource-potential, industrial and financial potential.

A key focus of the socio-economic development of any country is to improve the conditions and opportunities for livelihoods, improving human capital as the basis for economic growth in the long term. It should also be noted that the economic growth is not included among the priorities of the international community, because from the perspective of human potential economic growth does not appear as the ultimate goal of human development and as a factor in achieving the main objectives and it is the main condition. However, a decent standard of living in the country and the society is achieved through economic growth, and for each person - through a fair distribution of wealth and income. It should also be noted that the effectiveness of economic development is largely a derivative of the effectiveness of the social development of the individual and thus society as a whole, the effectiveness of the institutions of the state and the political system and civil society. Economic behavior is a form of social behavior and determined consciousness and objective reality, which affects the formation of values. Undoubtedly, the role of social factors cannot be understated. All these groups of factors influence the formation of social policy, which indicates the great role of human influence in the balanced development of the country.

Demographic characteristics and human resources accumulate in themselves the basic properties, which has a population: the ability of reproduction, change its size and maintain the balance of the biological functions of its generation, as well as characterize the individual growth of the person, determine the behavior of the population in the implementation of their social functions.

Health indicators describe the most important activities of the state sector, the aim of which is to organize and provide affordable health services to the population, the preservation and improvement of the level of health. Health care is part of the social sphere, the state and development of which depends on the health of the population and its performance, the solution of demographic and other social problems, the preservation and strengthening of the economic potential and the economic security of the country. We would like to note the important fact that the World Health Organization suggests that on the health care 5% of gross domestic product should be sent.

Along with the economic institutions the essential functioning have other, including - social and cultural institutions, such as institutes of education, science, health, etc. Indicators of literacy and education characterize coverage of the various forms of education and skill levels. The education system, along with the health care system is among the most important social institutions. From a functional point of view, the education system is included in the number of institutional structures to ensure the socialization of individuals. Socialization of the individual is the process by which individuals develop qualities that are essential for the effective functioning of the society in which they live. Socialization ensures the continuity of culture and its transmission from generation to generation.

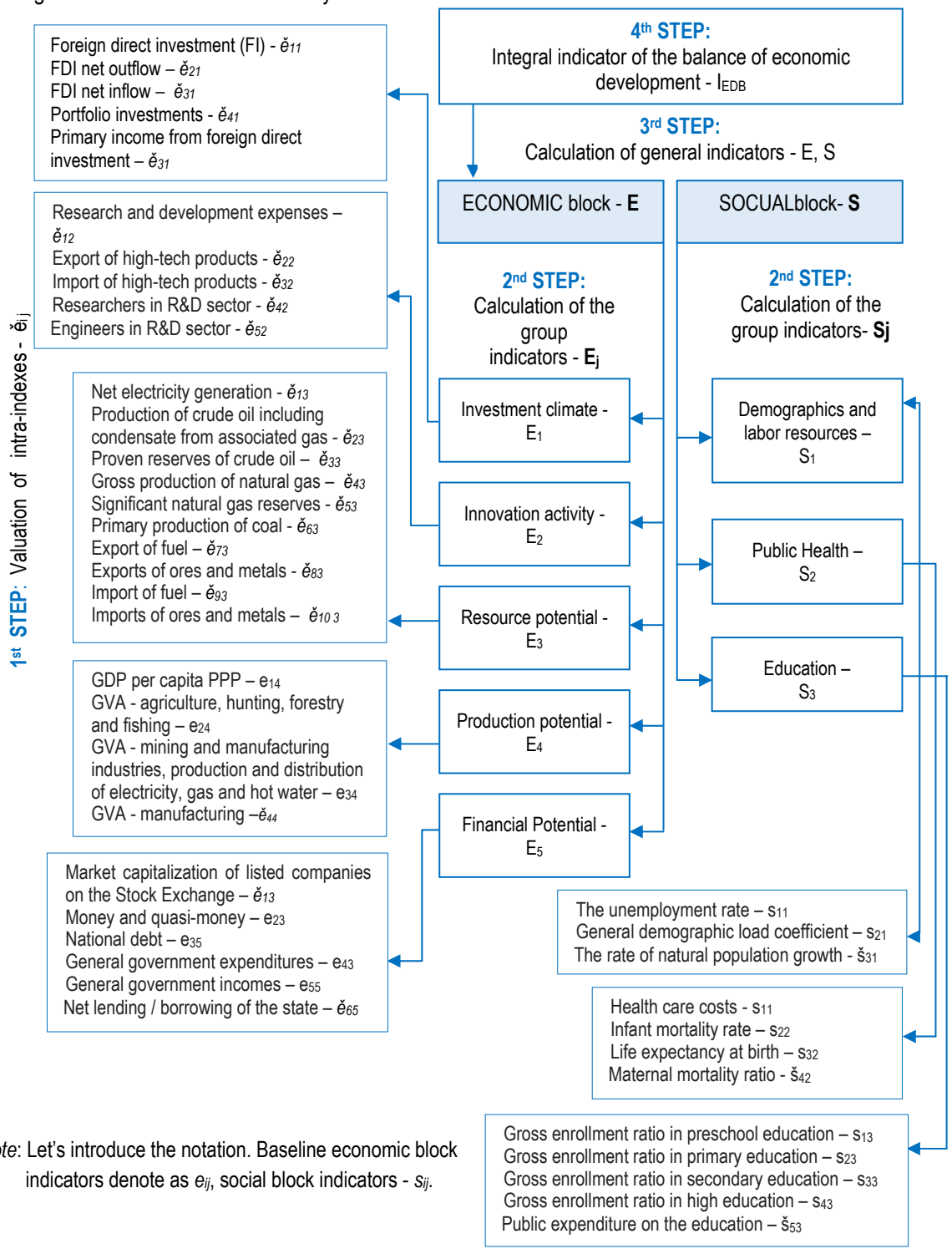
Therefore, to assess the social component of balanced development of the country we have identified the main groups of indicators: demography and labor, health and education.Of course, the use of a small set of key indicators facilitates evaluation of the balance of economic development, but more suitable option is to build an integral indicator. The presence of aggregated quantitative indicator is ideal for those who make management decisions. Due to methodological and statistical problems and difficulties of calculating the universally recognized indicator of the world, which characterizes the degree of balance between economic developments, there is still no.When forming an integral indicator of economic development it is necessary to use the following main stages.At the preliminary stage, a system of indicators is formed to assess the balance of the country, a general scheme is created.

In view of the above, for the construction of integral index of the balance economic development (Integral Indicator of Economic Development Balance - I_{EDB}) it is necessary to form a data base of statistics that meets the following requirements:

- systematic, according to which indicators are interrelated, they are subject to the general principle and are in order;
- sufficiency, according to which in this list all the main indicators of the category must be submitted;

- availability, in accordance with which attracted indicators should be available for their statistical registration;
- credibility, according to which the used statistics data should adequately reflect the state of the analyzed aspects (Arkhangelskaiya 2014, Barabash 2014, Belikova, 2012).

Practical application of the system of indicators will allow assessing and allocates homogeneous groups of countries according to the degree of the balance of economic development for the further study.Figure 1 shows the indicators that, according to the authors, represent the main characteristics of the degree of the balance in the country.



Note: Let's introduce the notation. Baseline economic block indicators denote as e_{ij}, social block indicators - s_{ij}.

Figure 1 - Hierarchical system of statistical indicators to assess the balance of the country economic development

In the first phase, in order to ensure comparability of basic statistical data, each of intragroup indexes (e_{ij}, s_{ij}) is reduced to a single scale of measurement, i.e., normalized (e_{ij} – $\check{e}_{ij}$; s_{ij} – $\check{s}_{ij}$), and the specific choice of a unified conversion depends on to a what type belongs the analyzed indicator:

- if the original intragroup indicator is associated with the tested integral feature (balanced economic development) monotonically increasing dependence, that is by the increasing the value of it integral indicator of balanced economic development I_{EDB} will also increase (1):

$$\widetilde{e}_{ij} = \frac{e_{ij} - e_{ij}^{min}}{e_{ij}^{max} - e_{ij}^{min}} \qquad \widetilde{s}_{ij} = \frac{s_{ij} - s_{ij}^{min}}{s_{ij}^{max} - s_{ij}^{min}} \qquad 1)$$

where e_{ij}^{min} and e_{ij}^{max} - are the smallest and largest value of the original i-th intragroup indicator for the j-th group E indicator of the economic block.

where s_{ij}^{min} and s_{ij}^{max} - are the smallest and largest value of the original i-th intragroup indicator for the j-th group E indicator of the economic block.

- if the original intragroup indictor is associated with the tested integral feature by monotone decreasing dependency, that is by increasing the value of its integral indicator of the balance of economic development IEDB will decrease (2):

$$\widetilde{e}_{ij} = \frac{e_{ij}^{max} - e_{ij}}{e_{ij}^{max} - e_{ij}^{min}} \qquad \widetilde{s}_{ij} = \frac{s_{ij}^{max} - s_{ij}}{s_{ij}^{max} - s_{ij}^{min}} \qquad 2)$$

In order to implement these reforms it is need to be defined for each intragroup index value of e_{ij}^{min}, e_{ij}^{max} and s_{ij}^{min}, s_{ij}^{max}. Since a single theoretical approach in determining the precise borders of reference points does not exist, the authors used for this purpose normative empirical approach, namely, chose the maximum and minimum values of the corresponding intragroup indicator for all countries of the world for the period under review.

Thus, the linear transformations allowed reducing the range of possible values of the intragroup indicators to the interval [0, 1], thus, a value of zero indicates the poor quality of this feature, and a single - the highest.

In the second phase the intragroup indicators E_j and $S_j$are calculated by the following formula (3):

$$E_j = \frac{\sum_{i=1}^{n} \widetilde{e}_{ij}}{n} \qquad S_j = \frac{\sum_{i=1}^{n} \widetilde{s}_{ij}}{n} \qquad (3)$$

where n - the number of intragroup indicators in the corresponding group E_j

where n - the number of intragroup indicators in the corresponding group S_j

In the third phase summary indicators (E, S), showing the extent of the balance of the country's aggregate economic and social indicators (4) are calculated:

$$E = \frac{\sum_{i=1}^{5} E_j}{5} \qquad S = \frac{\sum_{i=1}^{3} S_j}{3} \qquad (4)$$

The final fourth stage (5) integral indicator of the balance economic development of the country (I_{EDB}) is calculated:

$$I_{EDB} = w_1 E + w_2 S, \qquad (5)$$

wherew_1, w_2- weights coefficients of the general indicators of economic (E) and social (S) blocks, which represent the proportion of explained feature variance in the total trait variance.

The resulting integral indicator (I_{EDB}) ranges from 0 to 1. The closer an integral indicator to 1, the more balanced is economic development in the country.

For qualitative characteristics of the balanced economic development of the countries let's divide the variation values interval I_{EDB} into four equal parts. The total qualitative assessment of the balance of the economic development of the country is determined on the basis of the scheme presented in Table 1.

Table 1 -Qualitative characteristics of the balance degree of economic development of the country scale

Value I_{EDB}	Assessment
0,00-0,25	Low balanced development
0,25-0,50	Average balanced development
0,50-0,75	Balanced development
0,75-1,00	Absolutely Balanced development

Source: created by authors

Theoretical-regulatory approach in determining the optimum number of groups in most cases is very complicated, because the increase in the number of groups appears a problem of determination of similar in degree of balance countries in the different groups. The method of unification of the measuring scale is based on the use of quartile assessments of theoretical distribution function of the integral indicator of the balanced economic development.

3. Results

The combined GDP of the BRICS countries in purchasing power parity in 2013 was about 23.4% of the world, which exceeds the figure in the United States (17.9% of world GDP) and the EU (20.6% of world GDP). The largest share in the total GDP of the BRICS in the dynamics from 1990 to 2013 is attributable to China, which had the second place in the global rankings on the index value, behind the United States. It is worth noting that China's economy from 1995 to 2013 increased more than 11 times. On average its means an annual GDP growth of 10% and even higher.

Second place in the structure of the BRICS countries in terms of GDP takes India. It is more focused on the domestic market and not for export or foreign investment. Along with a high population, a large proportion of the adult population speak English in India there are various technology companies that expand its borders to the world market.

Brazil and Russia do not differ greatly in the structure of the combined GDP of the BRICS. Brazil's economy is characterized by a developed agricultural and industrial production, the modern mining industry and the services sector. Brazil has a monopoly on the production of niobium mining (92%) and the world leader in the production of iron ore (21.80%); it is on the second in the world in production of manganese (12.6%) and tantalum (15.7%) among the top five of bauxite, tin, lithium, magnesium, and is the sixth largest reserves of uranium. By up to 90% of the domestic demand for manufactured goods is provided by the expense of own production in the country. In the machinery and equipment demand is met by more than 85%. A number of competitive Brazilian goods (aircraft, buses, cars, trucks, tractors and road construction machinery, power equipment, electrical and electronic equipment, and others.) is supplied to the world market.

As for Russia, it is dependent on the country's internal resources (oil and gas). Undoubtedly, a huge database of fuel resources plays a significant role in the economy; however, experience has shown that when commodity prices fall, it is necessary to sell those resources at lower prices, the economy becomes particularly vulnerable. To realize the full potential of Russia as a member of the group BRICS it needs to go beyond the energy sector and create conditions for the development of companies in other industries. Now Russia has one of the best national technology policies in the world, and sufficient intellectual capacity to implement it. Traditionally strong preparation of the population to the exact sciences, in particular mathematics, allows the introduction of modern technology and come up with new, innovative ways to use them.

The lowest share in the total GDP in 1990-2013 years is accounted for South Africa. South Africa has a rich source of raw materials, a wide range of mined land, vast advanced technological base and the market of quite cheap skilled and unskilled labor.

Talking about the dynamics of economic development, today a leading position in the BRICS China plays and it is obvious that Russia will seek to improve its relations with Beijing. In recent years, relations between Russia and China actively strengthen and develop the cooperation in various spheres. In particular, in 2013, 21 countries signed a trade agreement, including a new deal of oil supply company

"Rosneft" with the Chinese Sinopec. In March 2013, the two governments signed an agreement on the joint construction of a refinery in Tianjin, east to Beijing. The project envisages the construction of large petrochemical plants, including plants of pyrolysis and the production of aromatic hydrocarbons. The plans provided by China are to increase investment in Russia in four times in 2020.

At the same time, despite the strong economic growth, compared to developing countries, the BRICS countries have a number of problems that do not allow yet to adequately fulfilling their economic potential. These problems may include reduction in investment activity of foreign investors, the weak development of the individual infrastructure components, the stagnation of foreign markets of these countries; slowdown in economic growth; the presence of inflation (though far from the critical level) and price volatility; reducing the proportion of the economically active population, etc.

Thus, a brief analysis reveals significant differences between the BRICS countries on macroeconomic development indicators and growth prospects. A number of indicators capture qualitative differences in levels of economic development. In fact, there is a little economic justification for the unification of the BRICS countries in a single, international structure, which does not exclude the possibility of expanding economic cooperation and finding ways to balance economic development between Brazil, India, China, Russia and South Africa in various sectors and industries cooperation.

According to the author methodology, let's calculate the integral indicator of the balance of economic development of the BRICS countries. The results are shown in Table. 2. Due to the fact that on many indicators, characterizing the degree of balanced economic development is not any information for 2013, was decided to consider the study period 2008-2012.

Table 2 - Dynamics of the integral index of balance economic development of the BRICS countries in 2008-2012

COUNTRIES	2008	2009	2010	2011	2012
China	0,554	0,560	0,561	0,567	0,572
Russian Federation	0,534	0,530	0,523	0,531	0,538
Brazil	0,498	0,492	0,508	0,510	0,505
India	0,462	0,463	0,456	0,455	0,454
South Africa	0,422	0,433	0,433	0,441	0,440

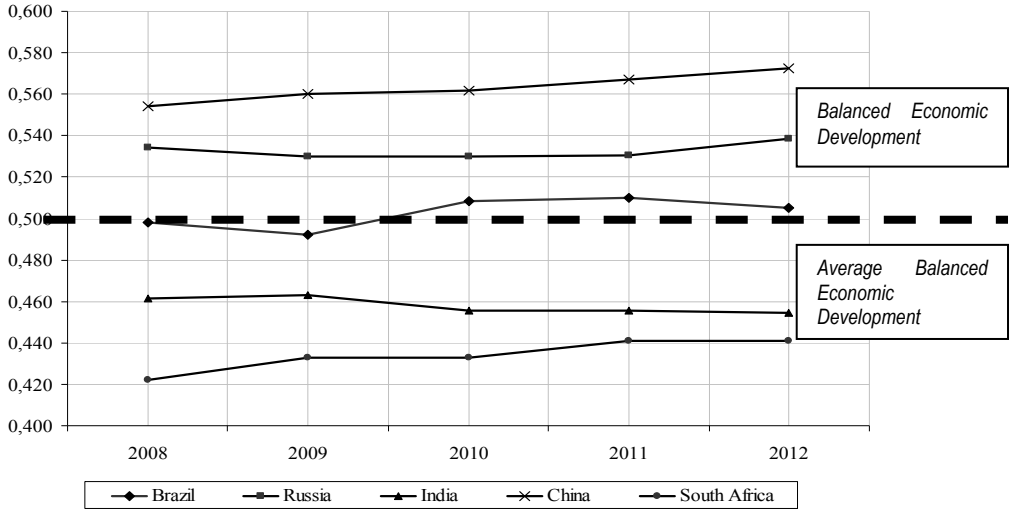
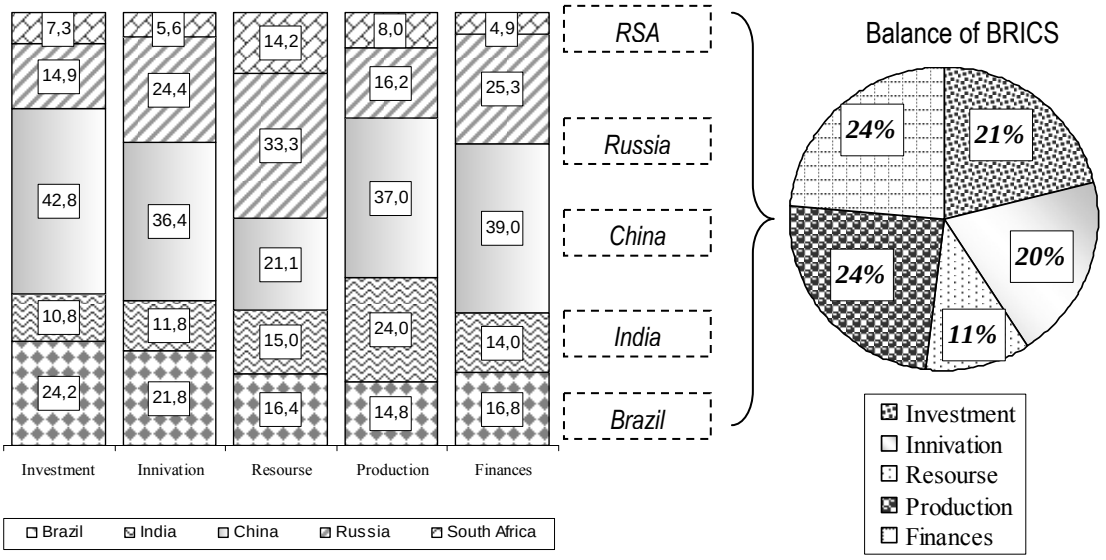


Figure 2 - The dynamics of the BRICS countries in the degree of balance of economic development for the period 2008-2012

In general, the results of 2012 are the following: in the ranking of the BRICS countries in the degree of balance between economic developments of the leading position occupied by the People's Republic of China and the Russian Federation. Third place goes to the Federal Republic of Brazil.

To visualize the data presented in Table 2 graphically the dynamics of the integral index of balanced economic development of the BRICS countries (Figure 2).As it can be seen from Figure 2, almost all of the BRICS countries, except India, show a positive trend in terms of the average balance of economic development. Despite the fact that in the ranking of the BRICS South Africa ranked last

throughout the study period, for five years, it shows a strong positive trend in the level of the balance economic development. Balance economic development index of Brazil decreased by 0.98% in 2012 compared to 2011. The negative tendency of the integral index of economic balance decrease was observed in India.To assess the balance of economic development of the BRICS economic bloc indicators: investment climate, innovative activity, the resource-potential productive capacity and financial capacity, we construct structural bar graph reflecting the contribution of each category to the total amount (Figure 3).



Note: Compiled from China Development; World Bank, the Reserve Bank of India, the Federal State Statistics Service of the Russian Federation, Central Bank of Brazil, the South African Reserve Bank)

Figure 3 - The structure of the BRICS group by the indicators of the economic bloc in 2012

In order to assess the balance of economic development of the BRICS countries, in particular according to the criteria of the economic block, let's have an integrated look at each characteristic separately.

Investment attractiveness of the BRICS countries is mainly determined by the market size, rapid economic growth, the availability of relatively inexpensive labor force. The most favorable investment climate by the end of 2012 was observed in China. China accounted for 42.8% the proportion of integral characteristics in the total amount of the BRICS countries, but compared to 2008 the share in the overall index decreased by 0.7% points. This reduction does not mean that the dynamics of all indicators included in the category of "investment climate" has tended to decrease, on the contrary, the volume of attracted foreign investments and the overall economic situation in China is today one of the most attractive among the BRICS countries. This structural shift was due to the increase in volume of foreign investments in Brazil, which is the second in structure. The share of Brazil in 2012 amounted to 24.2% (2008 - 20.6%). More or less stable situation in the overall structure of the criterion of "investment climate" was observed in Russia and South Africa. India in 2008 had a larger share of the BRICS group on this indicator (13.4% in the total), but in 2012 it lost her position and its share in the structure decreased by 2.6 percentage points. In order to improve the investment climate in the BRICS countries various investment projects are adopted and implemented. In Brazil, in order to "accelerate economic growth" the development plan for 2011-2014 provides for the implementation of infrastructure investment. China and India have adopted five-year plans of "aggressive infrastructure investment." In particular, China's five-year plan for economic and social development provides for the development of the energy, the development of high-speed railways, motorways and road networks, etc. India in the five-year plan (2012-2017 years), proclaimed the task of investing in infrastructure.

Another criterion of the economic block is the indicator of innovation activity. It should be noted that the foundations of innovation development in BRICS countries were laid before the crisis of 2008, which were aimed at improving education, enhancing scientific and technical capacities, the formation of national innovation systems, the growth of investment in high-tech industries. In the post-crisis period, the work in this area has increased, but in many respects BRICS countries innovation activity is still significantly lag

behind the developed countries of the West. With regard to the very structure of the BRICS countries in terms of innovation activity, by the end of 2012 the largest share was in China. The share of Russia and Brazil had an average of 22%, and in Russia there was a structural shift for the worse from 27.5% in 2008 to 24.4% in 2012. This shift was mainly due to the fact that India's growth rate for this indicator was much higher than that of Russia. The share of India in the overall structure of the BRICS countries in terms of "innovation activity" in 2012 was 11.9%, compared to 8.9% in 2008. Also, the favorable trend within the indicator of innovative activity shows South Africa, that share increased by 0.5% points and amounted to 5.6% in 2012. All countries member of the BRICS are guided by an innovative development model, which involves ensuring balanced development by the progress in high-tech industries.

With regard to the resource potential, in the framework of this indicator BRICS countries are more or less balanced. As it was noted earlier, the BRICS countries have rich resources and abundant natural resources. Countries from the group have for more than 30% of the world's arable land, particularly in Russia, Brazil and China accounted for almost 40% of forests. In modern conditions the ever increasing role of resources in the world the value of the BRICS that has large reserves of resources will undoubtedly increase. The largest share of the resource potential is in Russia, the weight of which in 2012 amounted to 33.3% in the total, followed by China - 21.1%, Brazil -16.4%, India - 15%, and South Africa - 14.2 %. Sharp structural changes compared with 2008 in the countries were not observed.

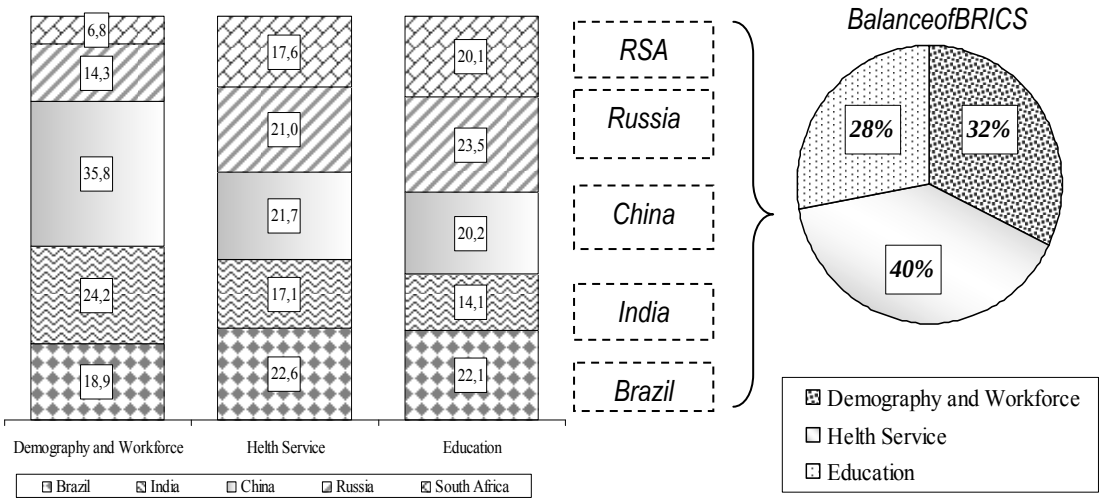
Speaking about the production potential of the BRICS countries, we should note China that accounts for 37% of the total balance sheet structure. Compared with 2008, there was a slight shift in the direction of increasing and amounted to 0.5 percentage points. The positive dynamics of growth in terms of production was observed in India and 24% in 2012 against 23.3% in 2008. A stable situation in the structure Brazil shows (14.8% in 2012 and 2008). Growth in Russia in indicatorscharacterizing the production potential considerably reduced and, consequently, the overall structure of Russia has lost the position from 16.9% in 2008 to 16.2% in 2012. A similar situation was observed in South Africa, the share of which amounted in 2012 to 8% in comparison with 2008 - 8.5%.

At present, there is the multilateral interest in BRICS in the development of certain areas of cooperation as industry, agriculture and banking. In the BRICS there have already been defined the terms of common interests, especially in the reform of the world monetary and financial system and impact of member countries in the system of global regulation of the world economy as a whole (Arkhipova, Fomicheva 2013).With the regard to the assessment of the balance of the BRICS countries in terms of characterizing the financial capacity, it should be noted the following: a greater share in the structure is attributable to China (39% in 2012), which is quite natural, since China ranks first in the world in terms of gold reserves. The growth rate of China’s key financial indicators is quite high, which gives the country a base to hold the leading position throughout the study period. Russia in 2012 yielded its position in the balance sheet structure to Brazil, which growth figures were higher. India in the balance sheet structure came in 2012 with a weight of 14%, adding to the rating 0.6% points. In South Africa, it was more or less stable in 2012 compared with 2008.

Thus, from the above analysis it follows that the Union BRICS is quite heterogeneous. As a part of the development balance of the BRICS by economic bloc indicators China has played a leading role in almost all positions.At the present stage of development of the BRICS is enough different, but the main task is the effective economic cooperation. BRICS countries actively discuss joint prospects for further development and the mechanisms of their implementation.

Obviously, a significant increase in the economic potential of the BRICS countries is not only significantly affect the macro-economic conditions for the development of the country (goods and cash flows, resource management, the purchasing power of the population), but also significantly affects the labor force and the basic demographic indicators, education and health . Thus, it is necessary to assess the degree of balance by the main social indicators.

Let’s consider the structure of the BRICS countries on integral criteria of social unit, previously described in detail (Figure 4).



Note: compiled from China Development; World Bank, the Reserve Bank of India, the Federal State Statistics Service of the Russian Federation, Central Bank of Brazil, the South African Reserve Bank)

Figure 4 - The structure of the BRICS in group of indicators of social bloc in 2012

During the study period the absolute leaders in terms of population are China and India. In the structure of the BRICS countries on this indicator China has first place with a weight of 35.8%. Second place goes to India (24.2%), but the working population is just over half the total population. Among the factors potential constraining economic growth in the BRICS countries in the long term is a significant slowdown in the population; increasing life expectancy and, as a consequence, the negative change in the balance for the economy between the number of persons of working and retirement age.

In terms of health care undisputed leader among the BRICS countries is Brazil mainly due to the high public expenditure on health per capita. The smallest weight on this indicator India shows (2012 - 17.1%).

In all BRICS countries public expenditure on education shows a positive trend. For example, in South Africa the proportion of education spending in GDP is almost twice higher than in France. The smallest proportion of the integrated category, characterized the education of the population in 2012 was observed in India. Here there are a number of problems: the bulk of the country is illiterate, the population has a very low access to modern technologies. At the end of 2012 more than 20% of children aged 6-14 years do not attend school at all. India's literacy rate is currently the lowest among all the countries of BRICS. Leading positions in the structure of the BRICS countries Russia has. It has one of the best national technology strategies in the world, and sufficient intellectual capacity to implement it. Traditionally strong preparation of the population to the exact sciences, in particular mathematics, allows the introduction of modern technology and come up with new, innovative ways to use them.

Thus, considering the above, we can conclude that the BRICS countries in all their diversity are quite different: one is the undisputed leader of the country on a number of economic indicators; others are more actively developing social vector. However, the main challenge faced by all participants of the BRICS is a profitable and effective economic cooperation. BRICS countries actively discuss joint prospects for socio-economic development and the mechanisms of their implementation.

The prospects of cooperation between the BRICS countries is convening of the Ministerial Conference on Education, which activities will be aimed at strengthening the interaction between science and research societies, to join efforts to improve the efficiency of the various spheres of national life. In this context, with some confidence we can talk about further cooperation of the BRICS countries, which have all the necessary prerequisites for the creation of a lasting and powerful economic center of the world economy development, and it is quite obvious fact of their growing influence on the development and increasing participation in the management of the global processes. Effective socio-economic, scientific, cultural interaction regions of these countries should be an important area of cooperation.

To determine the main trends of the integral indicator of balance economic development of the BRICS countries in the framework of the present study method of extrapolation was implemented. Based

on the dynamics of I_{EDB} for 12 years, since 2000, we construct the trend equation of the BRICS and determine the mostappropriate of them (Table. 3).

Table 3 - Trend models for the integral indicator of balance of economic development of the BRICS

GROUP	COUNTRIES	Type of trend line	Trend level	The value of reliability of approximation
Balanced development	CHINA	linear	$y = 0,549 + 0,0043\,t$	0,977
		exponential	$y = 0,55e^{0,0077t}$	0,976
		logarithmic	$y = 0,553 + 0,0105\ln t$	0,913
		Degree	$y = 0,553t^{0,0186}$	0,916
	RUSSIA	linear	$y = 0,533 + 0,001t$	0,929
		exponential	$y = 0,528e^{0,0028t}$	0,910
		logarithmic	$y = 0,529 + 0,0029\ln t$	0,911
		Degree	$y = 0,529t^{0,0055}$	0,902
	BRAZIL	linear	$y = 0,493 + 0,032t$	0,770
		exponential	$y = 0,493e^{0,0064t}$	0,769
		logarithmic	$y = 0,495 + 0,0079\ln t$	0,761
		Degree	$y = 0,495t^{0,016}$	0,759
Average balanced development	INDIA	linear	$y = 0,465 - 0,0022t$	0,775
		exponential	$y = 0,465e^{-0,0049t}$	0,774
		logarithmic	$y = 0,463 - 0,0054\ln t$	0,739
		Degree	$y = 0,461t^{-0,0118}$	0,736
	SOUTH AFRICA	linear	$y = 0,420 + 0,0046t$	0,867
		exponential	$y = 0,420e^{0,0106t}$	0,865
		logarithmic	$y = 0,423 + 0,0119\ln t$	0,933
		Degree	$y = 0,423t^{0,0275}$	0,932

To determine the main trends of the integral indicator of the balance economic development was chosen the best type of trend line that has the highest value of reliability of approximation.Further, based on the selected trend equation trend integral indicator of the balance economic development (I_{EDB}) for the BRICS countries (Table 4) was predicted.

Table4 - Forecast values of the integral indicator of balance economic development for the years 2015-2020

COUNTRIES	Years	Predicted Value I_{EDB}	Confidence intervals	
			Low	High
CHINA	2013 (assessment*)	0,576	0,571	0,580
	2014 (assessment*)	0,580	0,575	0,586
	2015	0,585	0,578	0,591
	2016	0,589	0,581	0,597
	2017	0,593	0,585	0,602
	2018	0,598	0,588	0,608
	2019	0,602	0,591	0,613
	2020	0,606	0,594	0,619
RUSSIA	2013 (assessment*)	0,539	0,537	0,540
	2014 (assessment*)	0,540	0,539	0,541
	2015	0,541	0,540	0,542
	2016	0,542	0,541	0,543
	2017	0,543	0,542	0,544
	2018	0,544	0,543	0,545
	2019	0,545	0,544	0,546
	2020	0,546	0,545	0,548
BRAZIL	2013 (assessment*)	0,512	0,492	0,533
	2014 (assessment*)	0,516	0,489	0,542

	2015	0,518	0,486	0,551
	2016	0,522	0,483	0,561
	2017	0,525	0,481	0,570
	2018	0,528	0,478	0,579
	2019	0,532	0,475	0,589
	2020	0,535	0,472	0,598
INDIA	2013 (assessment*)	0,451	0,444	0,459
	2014 (assessment*)	0,449	0,440	0,458
	2015	0,447	0,435	0,458
	2016	0,444	0,431	0,458
	2017	0,442	0,427	0,458
	2018	0,440	0,442	0,458
	2019	0,438	0,418	0,457
	2020	0,436	0,413	0,456
SOUTH AFRICA	2013 (assessment*)	0,448	0,437	0,459
	2014 (assessment*)	0,452	0,438	0,467
	2015	0,457	0,439	0,475
	2016	0,462	0,441	0,483
	2017	0,466	0,442	0,491
	2018	0,471	0,443	0,499
	2019	0,476	0,445	0,507
	2020	0,480	0,446	0,515

The assessment was made based on the statistical data (compiled from China Development; World Bank, the Reserve Bank of India, the Federal State Statistics Service of the Russian Federation, Central Bank of Brazil, the South African Reserve Bank)

4. Discussion

Creation of mechanisms that provide the development of commodity market infrastructure and formation of the required organizational and economic conditions for efficient competitiveness on the commodity market must be one of the priority areas of the state policy. The basic factors that restrain the formation and development of the commodity market infrastructure still include the lack of the state support for this area, imperfection of regulatory and legal framework, and non-availability of the unified state policy and approaches on the federal and regional levels.

Conclusion

BRICS countries which previously were attributed to the periphery of the World (Russia and South Africa were also on the list in the 1990s.) began to find not typical for them before the economic power and geopolitical importance.

As an independent entity, and the phenomenon of global economic the phenomenon of BRICS in many respects is unique. For the first time in the history there is the prospect of close cooperation and convergence in the framework of a coordinated political and economic project of very distant from each other, diverse economic, political weight and even civilizational and cultural memory countries. The few studies of the theory of a new model of global economic development provide scientific justification for the phenomenon of BRICS as a political and economic phenomenon and an integral methodology of the global forecasting and modeling is studying, comparative analysis and forecast of the two poles of modern geo-civilizational space - BRICS and G7 is performed. (Sadovnichiy *et al.* 2014, Yakovets 2014, Davydov 2014, Heifitz 2014)

Some authors consider the BRICS countries as important suppliers of raw materials and production and as a key market for many suppliers of goods. It is noted that the BRICS countries are the most important trading partners (Schrooten 2011).

Many scientists substantiate the influence of the BRICS on the transformation of the global economic system (Goldman 2012, Clifton and Díaz-Fuentes 2011, Kappel 2010.)Obviously, that any strong common BRICS institutions has not yet been developed, but these countries are important actors on the world political scene, and have a growing influence on the international relations (Kappel 2010).Serious institutional analysis of the development prospects of the BRICS countries is a major part of the research (Rothstein 2011.). The necessity of not only the hierarchical forms of decision-making institutions, but also large extent informal decision-making institutions is proved (Jann and Seyfried 2011).Attention is given to the measuring instruments, finding indicators (quantitative and qualitative) to measure the institutional mechanisms of the BRICS countries (Brusis and Jörg 2011).

The emergence of the BRICS has shown a new approach to the knowledge of the phenomenon of catching-up development, highlighting in it the scientific research group of leading countries as a specific object, which play a special role in shaping the face of the modern world economy. BRICS countries, as we think, are one of the most important examples of such leadership, and hence the subject of an in-depth study. Prospects for research in this field are manifold. However, the success of the economic union of BRICS depends on the assessment of the balance economic development of the countries, which will develop a rational mechanism of interaction of the economic system.

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Integration of Industrial and Educational Sphere in Modernization of Economic Relations

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Abstract:

The scientific article is devoted to the questions of developing the relevance of a human potential in modernization of an economic society system. The role of human fund in the system of new economic relations of an innovational industry is studied by the author. The influence of institutional changes to developing of economic relations is investigated in the article. The level of health, qualification, skills of using knowledge, competence nowadays is considered to be the main parts that make new economic relations of innovational industry. Based on the data of the concepts of long-term social-economic development of the Russian Federation from this time till 2020, may come to conclusion that Russia drops behind from other countries with the level of economic development though it has high educational potential. It can be explained with ineffective using of human fund and irrational investment into it. Having investigated, the authors classify into several groups: scientific center ↔ entity customer ↔ state. The main advantage of the innovational system is communicative skills and possibilities of organization. The practical importance consists in possibility of application of the theoretical provisions and practical recommendations stated in the research by bodies of legislative and executive power during the developing and implementation of federal and regional programs of support of the production and educational sphere by them in the conditions of modernization of system of the economic relations. The conclusions received in the course of research can form a methodological basis of creation of comprehensive programs of support of the production and educational sphere by means of efficiency of use of the available intellectual capital.

Keywords: human capital, innovative production, investments into education, economic growth, intellectual capital, innovative economy, social capital, innovative system.

JEL Classification: J24, O34.

1. Introduction

The main task of functioning of national economic system is maximization of satisfying society needs based on the effective using restricted resources. The reason of solving this problem is connected with the work of industry, providing extended reproduction. The effective work of an industry is conditioned by its stable development. During the developing of innovation economy it helps to solve problems connected with extended reproduction, the basis of which are the principles resource-saving, investments of human fund, social responsibility, working up new equipment and technology, scientific researches, that have practical parts (Romanov, Shubina 2012).

In the conditions of modernization of economic relation system, accumulated world experience of integration of industrial and educational sphere is important and must be improved. But, it is necessary for caring out the radical economic reforms in Russia with its different conditions to find untraditional methods to developing both industrial and educational sphere (Shvandar 2006). So, it leads to working up scientific systematic way to the beginning, regularities of functioning of these spheres in innovational economy (Yerokhina 2012).

2. Discussion and results

In modern society, one of the conditions for the development of the national economy is the production of innovations. The peculiarity of innovative production due to the conversion of scientific knowledge into new products, technologies and services through marketing research of markets and the competitive environment is defined by a radical transformation of the system of economic relations. The real sector of the economy calls for innovation, if necessary, not only to maintain the profitability of their business, but also to gain a competitive advantage in the marketplace (Coase 1988).

In this case, the innovation economy is understood as a new type of economic relations arising in the process of innovation production between its subjects. Accordingly, the formation and development of

innovative economy is possible only in terms of innovative production The members of the production process will succeed only if appropriately qualified personnel, and first of all top managers, able to orient the available human resources of the company in a more rapid adoption of innovative solutions and their implementation on the generation of ideas (Verian 1997). Business practice proves that not promising technology involves investments in the innovation process, and the management team is able to create innovative development of the enterprise (Nort 1997).

Thus, according to the World Bank, the combined potential of economic development for developed countries of 64% is formed by human capital companies and only 20% - by raw one, but for the Russian economy ratio quite different: 72% is defined by raw materials factor, and only 14% - the human potential (Gusev, Surkov 2006).

One of the elements that ensure the growth and reproduction of the accumulation of human capital in the innovation economy is education, which provides training for each of the spheres of social reproduction. The content and the state education system are determined by the socio- economic situation in the society (Fischer, Dornbush, Shmalenzi 1995). Social institution created by the education system, is designed for selection, preservation reproduction, distribution, extensive penetration into the mass consciousness of professional knowledge, scientific theories and cultural values. The education of a man is called perhaps the main form of accumulation of human capital and all investments in it boil down to the cost of education. The effect of investment in human capital is estimated solely through education. Since it is believed that only the growth of a person's education can lead to an increase in its productivity (Arend 2005)

Institute of Education serves at least two important functions: the development of the personality (the spiritual and moral development) and economic role (reproduction of skilled labor). The relationship of these functions in order and content of education and, consequently, the creation of appropriate conditions for the resource appear as a necessary prerequisite for social progress in all its manifestations. The basic principle for this investment in people, in human resources and the most effective should be the highest priority. Among the local representatives of the economic science in general and the economics of education in particular, Strumilin S.G., Jamin V.A., Kostanyan S.G., Jiltsov E.I., Daynovsky A.B., Chuprunov D.I. etc. have made a major contribution to the development of this area.

Educational services have specific characteristics that are reflected in the following. First, the effects of the consumption of educational services are a boon not only for the direct consumer, but for the economy and society as a whole. An economy in which workers have a high level of education according to the difference of technology has advantages for the economy, employing more backward technology and low-skilled labor (Blaug 1994).

At the same time by the beginning of the XXI century Russia has maintained its position in the group of the most educated countries. Although, the high educational level of the person is not yet a guarantee forthe constant innovation development. The development of innovative production occurs through the effective utilization of available human potential through prudent investing in his investment in the development of adequate knowledge of the system of industrial relations.

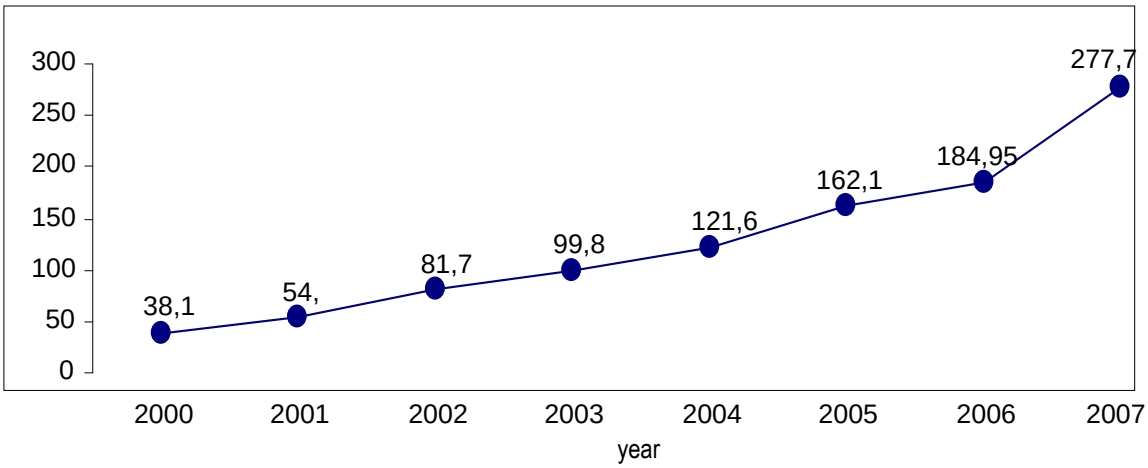
An example of this is the foreign companies: US corporations such as IBM, Digital Equipment Corp, which drain to the improvement of each of its specialist from 25 to 40 days a year. Japanese firms every 1.5-2 years produce rotation of personnel: in each employee's is "invested" money is trained by a new profession and professional growth is provided. Moreover, according to World Bank estimates for economic growth and social cohesion of the country overall level of investment in education should be 4 to 6% of gross domestic product (GDP). EU countries spend on average on education 5% of GDP, the United States - 6.6%, Japan - 3.5%, in Russia the figure in 2005 was 0.62% (Gusev 2006).

However, the situation has changed radically over the past three years. The overall level of investments in education in 2007 is 4.8% of gross domestic product (GDP). However, according to the Concept of long-term socio-economic development of the Russian Federation for the period up to 2020, this figure will continue to grow and by 2020 it will be 6.7% of GDP. It says according to the relative performance of current and future adequacy of funds for economic growth and social cohesion of the country. The main source to financing the education in Russia is still the state budget at all levels.

Table 1 -Expenditure on education in Russia for 2007-2020 years as a % of gross domestic product[2]

Index	2007	2008-2010	2011-2015	2016-2020
1	2	3	4	5
Education expenditures - total, %	4,8	5	5,9	6,7
Expenses of the budget system of education, %	4,1	4,3	5,0	5,3

The dynamic of the volume of investment in education for 2000-2007 is shown in the Figure 1.As we can see from Figure 1, the cost of education from year to year increases in absolute figures, but for the formation of new innovative relationship that is not enough. However, investment in education has provided schools with modern material and technical base: an increased access to information system "Internet" (to date, all of Russia's 52,000 schools are connected to network) to a qualitatively new level of teaching, the creation of a wide network of centers for retraining and professional development of the person.



Source: World Bank. Russian Economic Report 2008

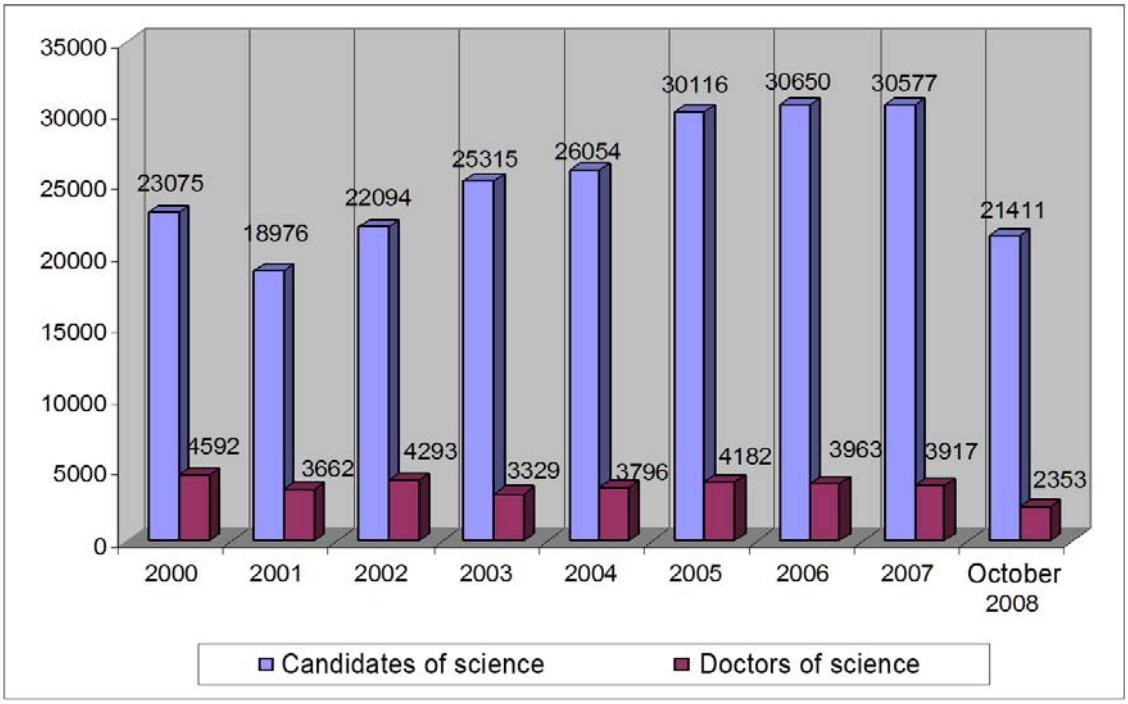
Figure1 - Dynamics of investments into the education system in Russia in 2000-2007, *bln. rubles*

Only with the development of these activities the intellectual capital will meet modern requirements. Since 2008, as declared by the Minister of Education and Science Andrei Fursenko, "is the integration of educational institutions, industry and business, i.e. there is an association of higher education institutions in the system" (Gusev, Surkov 2006)

To do this, at the present time it is necessary to attract the intellectual component of human capital - the researchers and scientists. Scientists and developers as the holders of knowledge are interested in the public funding of the research activities. But since the results of intellectual activity under the law belong to the state, the developer, at best, will get royalties. As a rule, the proposed developments are not brought to the presentation and need to be improved. Real opportunities for innovative products of scientists are absent.

In this case, the state and society, with such mental capabilities of scientists should not remain indifferent and in the future are required to use them to the full extent (see Figure 2).

[2]Law of the Russian Federation - The concept of long-term socio-economic development of the Russian Federation for the period up to 2020, collected legislation of the Russian Federation. 2008. #47, Article 5489.



Source: Yemelyanenkov, 2009

Figure 2 -Dynamics of persons approved the Higher Attestation Commission of the Russian Ministry of academic degrees in 2000 and 2008, a man

Each year, researchers who received a doctorate degree or PhD, are becoming more and more. However, if from 2001 to 2005, their number has steadily increased - from a half to four thousand a year, in 2005-2007 it has stabilized at around 34,000. And in 2008, for the first time in eight years, it was reduced by about five thousand.

Moreover, in the present conditions the intellectual capital of the country is not enough demanded. We agree with the opinion of Academician Dmitry Lvov, who believed that "society incompetently "wastes" available human capital. First of all, it is intellectual component - specialists with higher education. The main reason for this: a paltry wage. "Inadequate financial compensation for intellectual labor forces most qualified to seek employment abroad and in other sectors of the economy. In the United States more than 40% of doctors are working in the field of engineering and computer science, and 25% of university teachers are natives from abroad (Gusev and Surkov 2006), the lion's share of Russia. According to estimates of the Commission on Education of the Council of Europe, the losses of the Russian economy because of that reach 50-60 billion dollars annually.

There are systemic problems of development of innovative production that cannot be solved by piecemeal actions of the government, innovative organizations, and educational institutions. The way out of this situation is to: a) the development of a national strategy for human capital development through training and re-training people, and b) the dialogue between business and government on the occasion of a clear division of responsibilities for the implementation of the strategy, and c) identification with the state vocational qualifications by sector, corresponding to the modern needs of society (as vocational education, and especially "in higher schools often provide information that was relevant 10-20 years ago"). This suggests that many institutions produce annually 3 million graduates with low qualifications. This is a whole army of young educated unemployed.

The complexity of the effective use of human capital in today's environment is accelerating the process of obsolescence of knowledge. Exit - constant updating of knowledge (continuing education), in accordance with the accelerated modernization of fixed assets. When the worker is retraining, an accumulation of human capital takes place, professional characteristics are increased are not only of learners, but of teachers, that is, the educational component of human capital is increasing. This is particularly important when learning in the workplace (level direct use of human factors).

Date knowledge, methods of requirement are not always "slow down" self-development rights (a person who lacks motivation to replenish the knowledge, to change them according to the information

does not develop), new knowledge is based on the old one. The period of time during which half of knowledge becomes obsolete for the employee of a manufacturing plant is 3-5 years.

An important problem in addressing the issue to update the knowledge is gap of quality training programs on technical and technological renovation of enterprises. The tool for finding the balance between them, for example, can be cooperation with higher education institutions, based on mutual interest: the graduates - in getting a job, the company - in the acquisition of highly qualified personnel.

In the implementation ofthe economic andcontractualwork betweenenterpriseandthe departmentsof the university ispossible fundingof researchat the universityin the directionof the company.Academician of the Russian Academy of Education, G. Mukhametzyanova states that "in our time not just functionary are needed, but people who generate ideas that have mobility, adaptability enterprising. People, who are able to master new technologies quickly, will be competitive. Therefore, a new challenge now is in the sphere ofeducation. As close as possible to the real conditions of the practice to the conditions of production government, educational institutions and enterprises - the future employer must bring together their efforts". (Mukhametzyanova 2009)

However, investment in education is not enough that is the reason why they would give to the development of innovative production, if carried out only with a view to the creation of separate divisions of the innovation system. They are promising, if they aim to strengthen the national economy. This should be attempted to create an innovative system with the following departments: scientific center ↔ entity customer ↔ state (contribution to the socio-economic life of society).

All investments are justified and in demand, then when they are being used. Under present conditions they are effective to use, if they meet the needs of all stakeholders in the innovation market generating income on invested capital in knowledge. (Osadchy 2006)

In Russia this income on invested capital no one gets as the economic growth is due to cheap raw materials and low-paid labor. In developed countries, the human capital as a component integrated in the process of expanded reproduction, we have it as a foreign body. Thus, the human capital as a factor of production innovation in Russia under present conditions and with the current economic conditions, the market is not formed, because as such it is not claimed economy. Lack of attention to the intellectual component of human potential in the preparation and implementation of business decisions usually entail their low economic impact, contributing to a decrease in economic efficiency of the innovative production. Intellectual human capital is created and built up primarily through education and training.

The government, enterprises and their employees are investing funds in people, highlighting the time and money on education and vocational training necessary for the accumulation of knowledge, skills and abilities. The government spends public funds to education as they believe that a well- educated person will help accelerate the development of the country. Studies show that increasing the "education" of the society for one academic year, provides the economic growth of 5% in the short term and 2.5% in the long term.

Companies agree to pay for the training of their employees, as they expect that their costs will pay off, and they will get an additional profit due to higher worker productivity, while developing its innovative production. The very social and creative person is willing to spend not only time but also money to get education, because in most countries the better educated with better skills people are able to earn relatively more. In developed countries, every additional year of education leads to higher wages person by 10%, while in Russia the figure is only 4-5% (Bashirova 2005).The expenses for personnel training organizations on average are at the level of 0.5-0.7% wage bill, while they should be at least 1.5-2%. In the advanced economies, this item of expenditure of companies reaches 5-10% (Yerokhina 2012)

Education is indeed of great importance both for the person and for society as a whole. But consider education as the only component of human capital is not true. The priority of distribution of human efforts depends on what a person needs now and what goals he sets himself in the present and in the future. Constant changes in the structure and size of the human capital automatically create a need for various types of investments, such as for housing, and to improve working conditions in the workplace.

The data needs in any way cannot be satisfied, only by investing in education. Such an approach ignores many of the elements of human capital. These elements are interrelated, for example, an element of health and education. A healthy person is easier to study and work, carefully educated takes care about their health.

However, the deterioration of health is inevitable, but it can be slowed down by attracting investment in preventive action. The study proved that the "state of health by 15-20% for non-effect and by

50-55% depending on his lifestyle and work environment" (Erfurt 2006). Thus, the formation of healthy way of life supports its greater productivity, and subsequently the income received, both in duration and level.

An indicator of human health is the life expectancy of the population. Over the past ten years it has been steadily declining in Russia, from 69 years in 1990 to 66 in 2006 (Palkina 2006). Life expectancy in our country is for 12 years less than in the US for 8 years - than in Poland, and for 5 years - than in China (Olsevich, Mazarchuk 2005). The average male life expectancy is about 58 years, and for women is 72. (Shvandar 2006)

Thus, the Russian average men do not reach the age of retirement. According to the World Bank's Russia will lose 17.3 million (12% of the population) in 2025 (Elkov 2007). Health situation in Russia is characterized, above all, a high mortality rate in the working age (see Table 2). The general trend in Russia over the past fifteen years is a decrease in population. According to Table 2, it decreased from 148.2 million in 1990 to 141.3 million in 2008. The birth rate since 2004, gradually gaining momentum and increased by 0.2 annually for the forecast to 2008, but there is a negative trend: an increase in the annual mortality rate of about 0.1. Theresidentpopulationisannuallyreducedby 700 thousandpeople (We get more than we pay: Economic Development and Trade forecasts, Economy and life, 2006).

Table 2 - Demographic indicators of the Russian Federation in 1990-2008 at the beginning of the year

Demographic indicators	Year						
	1990	2000	2004	2005	2006	2007	2008
1	2	3	4	5	6	7	8
Population,million	148,2	146,3	144,2	143,5	141,3	141,9	141,3
The average annual change in population	1,2	-0,2	-0,5	-0,7	-1,0	-0,6	-0,6
The birth rate (per 1,000 people)	13,4	8,7	10,5	10,7	10,9	11,1	11,3
The mortality rate (per 1,000 population)	11,2	15,4	16,0	16,1	16,3	16,3	16,4

Source: (Sorokin 2006)

Thus, in the next twenty years in the Russian economy, the problem of the sharp decline in working-age population exists. The reduction began with increasing intensity since 2006. In the coming two decades working-age population will decrease by 50 million people. Youth generation, entering the working age in the years 2006-2025 declining workforce will reimburse only by half. However, this is not enough for a full recovery of the labor potential: in 2025 its population will be 20% less than today. The most dramatic would be the period of 2011-2015, which will account for 40% of all for twenty years (Fedorova 2005)

Without significant investment in the health care system, without the existence of perfect-diagnosis and preventive treatment of the problem of improving human health cannot be solved. It is necessary to increase social spending (see Table 3).

Table 3 -The level of public expenditure on health in the Russian Federation for the years 2006-2020 (% GDP (gross domestic product), annual average indicator)

2006-2007	2008-2010	2011-2015	2016-2020
3,5	4,5	5,5	6,0

Note: World Bank, Russian Economic Report (Report of the World Bank), Society and Economy, 2008

Every year the government increases spending on health care. The level of public expenditure on health was 3.5% of GDP for 2006-2007, compared to 2.9 and in 2003 and 2.8% in 2004. Meanwhile, the World Health Organization recommended minimum standard of government expenses on social costs - 5%. Russia will reach this standard according to the forecasted data by 2011-2015. For the smooth functioning of the Institute of Health, according to Glazyev (2006), requires a doubling of government spending, and to upgrade to a modern technological basis - they are tripling.

The main priorities of the reform of human health protection shall be:

- decrease in the number of occupational diseases;
- positive development for the health habits;

- improvement of working conditions in terms of health protection;
- allocation of funds now on preventive measures to reduce occupational diseases.

Without solutions of problems of formation of the human factor the national economy has large losses due to health and premature death. Loss of manpower in the coming years due to demographic crisis will exacerbate further the risks to the business and the country as a whole.In this case, to address existing issues requires an active and systematic population policy of the state. The aim of which should be that drastic measures to reduce the mortality rate of the population and to provide for the stabilization of fertility.

The main objectives of the government's population policy are:

- development for a long-term concrete measures to implement the population policy from the perspectives of socio-economic development of Russia;
- improving the quality of care, the development of prevention, diagnosis and treatment of socially significant diseases;
- development of measures to ensure the certification of workplaces in order to identify adverse factors affecting the health of workers;
- economic incentives for employers to improve the system of occupational safety and health;
- consideration of workers in need of better housing conditions, in determining the amount of state aid (eg, formation of a maternity capital).

It is important to note that in the present circumstances, the level of health, qualification, ability to use the knowledge, competence, are the basic elements that form the human factor. But one cannot ignore social responsibility for the decisions taken. The result of the neglect of managerial personnel demands of morality and social culture stands optionality on business partners, hired personnel, suppliers, and state. This implies the non-payment, breach of deliveries, late payment of wages, failure to comply with tax laws.

Thus, investment in intellectual capital provides economic and non-economic benefits a person, an organization, a society. The economic benefits are recognized as an increase in wages, productivity or economic growth, while the non-economic benefits - to increase social responsibility, improve the health and quality of life, improved the ecological situation in the region. In summary, we can say that Russia lags behind in terms of economic development of other countries, despite the fact that it has the highest educational potential. This can be attributed to inefficient use of available human capital and inefficient implementation of the investment in it.

Conclusion

However, the economic crisis in Russia will help to a certain extent, make the act more rationally, will promote the use of new technologies (energy saving), the innovation capacity production, address contemporary problems of development of human capital. In this case, it is an intelligent investment in human capital will contribute to the growth of its social capital, which is evident in the increasing confidence in the state as a legal institution, development and respect for moral and legal standards, as well as an understanding of the existing rules for each player present on the market field.

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The Importance of Facebook Ads in Terms of Online Promotion

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Abstract

The aim of the article is to describe specific aspects of the social network Facebook as a phenomenon of modern times. In assessing the direction of the issue the article summarizes the theoretical basis of advertising in the online environment, the issue of social media, and last but not least the narrower concept of social networking. The main attention of the article is focused on the social networking site Facebook as the most popular global social network and also vital marketing channel of communication from the perspective of existing social networks. Another aim of the article is to point out the current status of issues while pointing out their pitfalls.

Key words: Facebook Ads, social media, promoted post.

JEL Classification:M30, M31

1. Introduction

It is not necessary to remind that advertising has long been accessible only to organizations with million-worth budgets. With the coming of the Internet and social media, the circumstance has changed; Internet has brought to showcasing chance to connect with target groups in real time at relatively low cost (Scott 2014). This interactivity is a key to the success when creating the right mix of online communication on the Internet (Gavurová *et al.* 2014, Stec *et al.* 2014). Each organization must be aware of the fact that the customer controls the entire transaction by selecting and controlling the content, time and communication channel (Šoltés and Gavurová, 2013, 2015). It follows that only interactive strategy can produce the maximum benefit out of communication and marketing. Google AdWords changed the status of micro, small and medium enterprises in the market and allowed them to use targeted advertising with a wider range for the cost significantly lower than in mainstream media. The authors Turner and Shah (2014) argue that the advent of social networks, especially Facebook, has moved the location of people and organizations from the search engines towards this new medium because it allows two-way communication between the enterprise and their potential customers.

Facebook, as the most popular global social networking site, has become a universal communication application. Paradoxically because of its popularity, many traditional media use it to communicate with their audience. At the same time Facebook is now an essential platform for promotion and public communication. Companies, institutions, non-profit organizations – they all are on Facebook. To present oneself here is becoming more and more necessary. As reported by Dorčák *et al.* (2014), Facebook can change existing marketing efforts of companies by offering them a platform to grow the number of their audience and fans, allowing them to create deeper connections with customers and creates new possibilities for strengthening relationships with loyal customers. Facebook Ads, as a new advertising platform, was established as a logical outcome of the global popularity of social networks on the one hand and large amounts of data useful for advertising on the other (Marshall, Skranc and Meloche 2014). A number of authors concentrate on these issues, Such as Fisher (2015), Schleipfer (2014), and Cvijikj & Michahelles (2013)

Facebook Ads advertising platform is one of the most powerful marketing opportunities in history, as it allows companies to target their target audience very precisely (Carter 2013, Kirkpatrick 2011). Whenever you promote something through Facebook advertising, you take the opportunity to complete the

desired action directly in the ad (Crager *et al.* 2014). This means that your business website gets "likes" or an application without the customer having to leave Facebook. As the Crager *et al.* (2014) noted, another advantage is the relevance of the ads by the target audience and the opportunity to increase outreach through a relevant social proof in the form of "likes", sharing, and comments of other users. Moreover, the distributed message isthanks to precisetargeting more valuable(Beck2013).It should be emphasizedthatFacebookAdsisa powerful toolfor targetingyoungpopulationthatisonline (Vejačka 2012). PromotingthroughFacebookAds is suitable for smallandmedium-sized enterprisesbecause it hasthe highestClick-Through Rate,andthe lowestcost per click(Ray 2013).Click-Through Rate(CTR)representsa share of the number of ad clicksand the numberofdisplayedads(Goward 2013).On theother hand,cost per click(CPC-Cost PerClick)is the portion ofthe amount spenton advertising andthe number of clicksonthead(Kelly 2013).Based onTable 1 itcan be seen thatFacebookAdstargeting is significantly betterthanGoogleAdwords.

Table 1 – A comparison of Facebook Ads and Google AdWords

	Facebook Ads	Google Adwords
Targeting the precise interest	Yes	no
Intent (searched for)	No	yes
Location	Yes	yes
Age and sex	Yes	no
Marital status	Yes	no
Workplace	Yes	no
Education	Yes	no

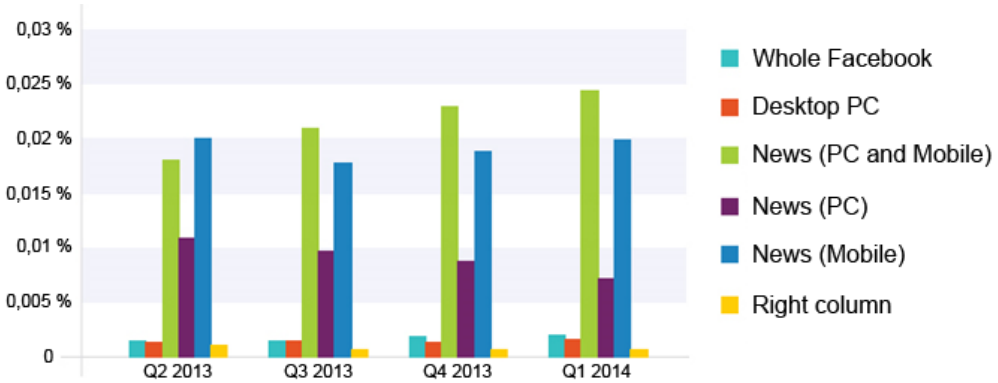
Source: own elaboration based on Carter, 2013

Maquire (2013) notes that when selecting a target group the enterprise must make sure that its report will be shown to the right audience. Otherwise the enterprise wastes the number of displays on target group that is unlikely to respond to the message. To increase the relevance of messages Facebook Ads offers 3 types of targeting. The first option is targeted to the people who gave "Like" to the page and their friends (Facebook 2014). According to Bodnar and Kohen (2012) the advantage of this type is the so-called social proof - people who are already fans of the page. On the other hand, this targeting is not ideal because it is very general (Maffin 2014). Another possibility is to target people who already like advertiser's site (Facebook 2014). The third option is targeting a select target group based on specific attributes. Advertising can be targeted at very specific groups (Newlands 2011). Carter and Levy (2012), emphasize that the targeting is useful in narrowing the potential audience for the selected ads. Advertising message can be selected based on demographic data (location, age, gender, and language), interests, and behavior and by connections (Weintraub 2011). According to Kirchoff and Regen (2014) it should be noted that it is necessary to test the targeting on the selected groups of customers. The last option is that the offers of Facebook Ads are targeting people who like the advertiser's site (Facebook 2014). We can find many authors dealing with these issues, such as Celebi (2015); Dehghani and Tumerb (2015); Pereira, Salgueiro and Mateus (2014); Barreto (2013), Yaakop (2013).

The authors Alba, Stay, and Melia (2013) divide the advertising offered by Facebook Ads depending on whether ads appear in the sidebar of news, outside the sidebar of news or in the news bar when using mobile devices. Today, however, almost all forms of advertising can be displayed at a place an enterprise desires. Socialbakers survey (2014) has shown that the highest Click- Through Rate is reached by an ad that is placed in the news. This ad is displayed in the news sidebar used in the mobile phone Facebook app or in the sidebar on the right in desktop devices (Crager *et al.* 2014). Carter (2013) in this regard states that promoting page's posts is suitable for increasing brand awareness and also for attracting the audience. An enterprise may advertise text, link, photo or video. An ad displays in the news and in the sidebar on the right side (Facebook 2014). In this context Taylor (2012) states that the promotion of page's 'likes' serves to increase the number of page's fans and that a page can be displayed in the news sidebar and also in the sidebar on the right side of the page (Booth & Koberg 2012).

The benchmark survey of Salesforce (2013), which focused its attention on the Facebook Ads, was carried out in the period from 1st January to 31st March 2013. The analysis included a total of 25 top countries where published advertisements together recorded 114 billion displays. Salesforce (2013) states

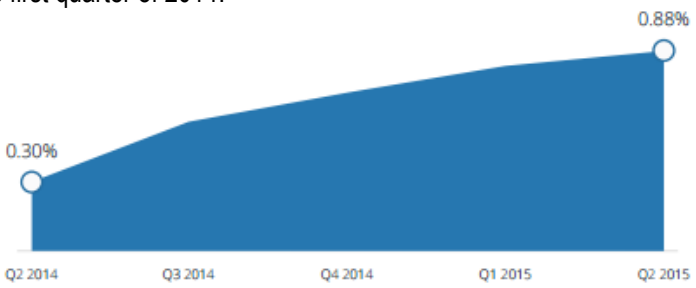
that the budget for Facebook Ads may reach $ 11 billion from the original $ 4.7 billion in 2012. The results of this survey further show that the best Click-Through Rate has a sponsored post marked with a location. The height of the Click-Through Rates stood at 3.20%. Based on our experiments we were interested in the Click-Through Rate divided by sector, specifically gastronomy and health and beauty industry. The average Click-Through Rate in the gastronomy was 0.217%, while the health and beauty sector stood at 0.433%



Source: own elaboration based on Socialbakers, 2014

Figure 1 - Comparison of the Click-Through advertising according to its location and device used

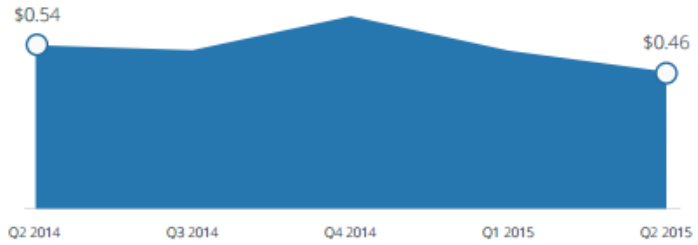
An interesting view on the issue provides another benchmark survey conducted by Socialbakers (2014) on a sample of 2,000 registered accounts in the period from April 2013 to March 2014. According to Socialbakers (2014) highlighted posts are a dominant form of advertising due to their placing in the Facebook news. Highlighted posts reached the highest Click-Through Rate in the first quarter of 2014, while their Click-Through Rate is approximately 0.008%. Individual click-through rates can be seen in Figure 1. In their research, Socialbakers (2014) investigated only restaurants. The Click-Through Rate for these ads is at around 0.40%. It should be emphasized that the volume of resources invested in promoting the contributions has increased from approx. 43% of the total expenditure ratio in the first quarter of 2013 to around 55% in the first quarter of 2014.



Source: Ninigans, 2015

Figure 2 - CTR (Click-through rate) Facebook ads Q2 2014 – Q2 2015

The research carried out by the marketing agency Nanigans (2015) presents the results of more than 300 billion ad displays in the second quarter of 2015. According to the survey the average Click-Through Rate (CTR) in Q2 2015 has recorded over the previous quarter only a small 8.00% increase to 0.88 %. As can be seen in Figure 2, the average CTR of Facebook ads during the period Q2 2014 - Q2 2015 has increased by 187%, which can be considered to be a significant event from the enterprises' point of view.



Source: Ninigans, 2015

Figure 3 - CPC (Cost per click) Facebook reklama Q2 2014 – Q2 2015

On the other hand, as shown in Figure 3, the average Cost per Click (CPC) in Q2 2015 (Nanigans 2015) decreased by 13% to $ 0.46 per click-through. For on-year comparison of Q2 2014 - Q2 2015 we can also see decreased price per click-through, namely a decrease of 16%, a difference of $ 0.08. From the perspective of the social network Facebook this state can be considered acceptable because the average CTR during the period grew faster than the decrease in CPC.

2. Methodology

The main objective of this article is, based on an experiment, to verify the existence of dependence between the Click-Through Rate of advertising and the budget invested in advertising in an environment of social network Facebook. We investigated the dependence using statistical data from our previous experiment. The secondary objective was to compare the measured Click-Through Rate with Socialbakers' (2014) statistics. In the experiment were conducted advertising campaigns through two registered accounts on the social network Facebook. The first reference account was the page EZO - your home spa. This Facebook page was established in March 2014 and, in general, is dedicated to aromatherapy and wellness. The second account was a Facebook page of French restaurant A la Maison Restaurant, active on Facebook as of April 2014. The experiment was conducted in the time period from 4th March, 2014 to 25th May, 2014.

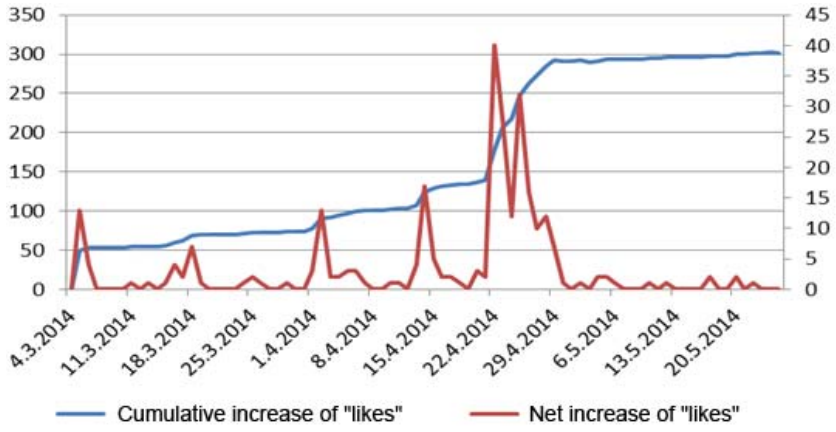
Source: Facebook.com, 2014

Picture 1 - Posts promoted through Facebook Ads

Based on Socialbakers' (2014) findings, for our experiment we selected promoted posts in order to maximize the Click-Through Rate. The experiment utilized 16 advertised posts. As a database intended to evaluate the experiment we used data from Facebook Page Insights and the Ad Manager on Facebook. The main attention was focused on the cumulative increase in the number of "likes" and net increase in the number of "likes". To test our statistical hypothesis we used Pearson correlation coefficient. Promoted posts content was varied, we promoted information and promotional content. The promotional content consisted of competitions that have been published in the form of shared photos with a description of the rules. Furthermore, we promoted various discounts on the occasion of events such as Ice Hockey World Championships. These were posted in a manner similar to the announced competitions - in the form of photos with a description of discounts. The informative content that has been promoted involved references to the company's website EZO.sk. These links represented specific contributions published on the blog as well as links to an e-book that visitors could download for free.

3. Results and discussion

During the experiment promoted posts recorded 35,200 views. From the data obtained during the experiment it was found that the average CTR of the promoted posts in desktop devices was 0.67%. As for the mobile devices, this rate reached 2.10%. By combining both, the Click-Through Rate of 1.40% was achieved, which a significant difference from the value is declared by the Socialbakers (2014). They state the rate of promoted posts to be at about 0.008%. The introduction of advertising had a positive impact on the growth of "likes" and also on a net increase (daily) of number of "likes" on the page EZO - your home spa. Figure 4 shows that at the time the advertising was introduced the number of "likes" increased when compared to other days. From the above Figure it is also possible to track the cumulative increase in the number of "likes". It is observed that at the time when advertising was introduced, the growth curve of the cumulative number of "likes" got a steeper character. Based on the findings it can be stated that during the period in which the advertising is active, the number of "likes" grow faster. These two metrics have not been studied in case of A la Maison Restaurant, as this account at the time of the evaluation had not been in operation long enough for us to be able to draw comprehensive conclusions on these two metrics. However, data on ad performance were used to test dependencies between the Click-Through ads and a budget invested in advertising.



Source: own elaboration

Figure 4 - The cumulative increase in the number of "likes" and a net increase in "likes" on the page EZO - your home spa. (Cumulative growth, the net increase)

Based on the theoretical knowledge we statistically tested the relationship between the Click-Through Rate (CTR) and the budget (EUR) intended for advertising within the Facebook Ads platform. The following hypothesis was tested:

H1: There exists interdependence between the Click-Through Rate and budget for an advertising campaign.

Table 2 - The correlation matrix

Variable	Average	Deviation	CTR	Budget consumed
(CTR)	1.651651	1.690561	1.000000	0.024364
Budget consumed (EUR)	1.118750	1.203500	0.024364	1.000000

N = 32; p < 0.5000
Source: own elaboration

When testing the dependence of the Click-Through Rate on the budget invested in advertising we got at the significance level of $\alpha = 0.05$ the value of 0.0243 of Pearson's correlation coefficient. Since the obtained p-value was higher than the significance level α, the hypothesis H0 could not be rejected. The dependence between the Click-Through Rate and the budget invested in advertising thus could not be demonstrated. It can be assumed that the reason for this result is the selected content type. Promotional content can probably reach the target audience to a greater extent which may be the reason that even

with a lower number of displays the target audience shows increased interest in the type of content, resulting in increased involvement and higher CTR. Therefore, the amount of the advertising budget seems irrelevant.

Conclusion

Also thanks to the social network Facebook the issue of social media and the social networks has in the last years caught massive worlwide attention of the academics and marketers. The constant development of technology and the Internet pushes the possibilities of applying this new medium in the field of marketing activities. This article describes the use of Facebook Ads tool in the online promotional campaigns. In the theoretical background we described the basic functioning of this form of promotion. Based on these assumptions, we conducted an experiment whose objective was to determine to what extent using Facebook Ads helps to increase audience engagement. A similar problem was also described by Salesforce surveys (2013), Socialbakers (2014) and Nanigans (2015). Our experiment has shown that the introduction of paid advertising on the social network Facebook through the platform Facebook Ads does not guarantee campaign's success. By testing the prepared hypotheses we did not find a relationship between the amount invested in promoted posts and CTR of individual ads. This result points out that in an environment of social network Facebook those with the biggest budget do not have to be the most successful. Comparing the results with the values recorded by Socialbakers (2014) it has been found that the values measured by us are several times higher than the values in the Socialbakers' report. Based on these results we concluded that many advertisers spend money on advertising that is not effective. This finding therefore proves that it is critically important to properly define your target audience and at the same time offer a content that the audience deems relevant. It can be assumed that with changing communication preferences of the target audience, in the near future online Internet environment, specifically the environment of social media, will be the necessary part of the marketing strategy.

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Does Government Expenditure Crowds Outthe Private Domestic Investment? Empirical Evidence of Indonesia

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Abstract:

The objective of this study is to examine the effect of government expenditure on private domestic investment in Indonesia. Based on the previous studies, there is no clear justification whether government expenditure is crowding in or crowding out the private investment. Using quarterly time series data during period 1985 to 2012, the empirical results show that government expenditure (total) is crowding out private domestic investment in both short term and long term. Specifically, government expenditure for public service is crowding out the private investment in both short term and long term. Unlike public services, the economic expenditure is crowding in the private investment in the long term. Moreover, health expenditure is crowding out the private investment in the short term while education expenditure is crowding out in the short term and crowding in in the long term.

Keywords: government expenditure, crowding out, private domestic investment, error correction model.

JEL Classification: E22

1. Introduction

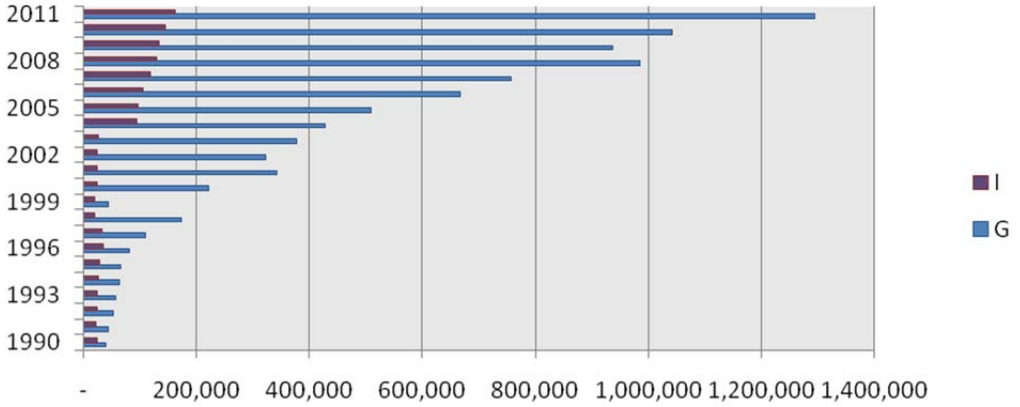
Investmentis one of themain important pillarsof the economic development. Through investment, the capital flows to the country can be usedforbusiness improvements, improve the employment opportunities, support the production process and technological transfer, as well as access tointernational marketsthrough the export products. In order to improve the investment level of the country, the fiscal expansion is necessarily needed by the government.

According to Keynesian economists, the fiscal expansion through an increase in government expenditure led to a better infrastructure, better health and education as a result of an increase in private investment. The reason is due to the fact that the government expenditure can reduce production costs and its consequences to the private investment. In other words, according to Keynesian, private investment becomes an important channel for the effectiveness of fiscal policy in promoting economic development (Ahmed and Miller 2000, Ahmad and Qayyum 2008, Hussain, *et al.* 2009). This argument is also in linewith Narayan(2004)showing that government spendingas a driving forceforprivate investmentwhich in turn drives the economic growth of the country. The positive role of government expenditure on private domestic investment is called the crowding-in effect.

However, in practice, an increase in government expenditure is not always followed by the more intensive private investment. According to classical economists, an increase in government expenditure led to increase the interest rates and then decrease the private investment. This phenomenon is called the crowdingout effect of government expenditure. In other words, the crowding out occurs when the expansionary fiscal policy caused rising in interest rates, thereby reducing private expenditure, especially investment (Dornbusch, Stainley and Startz 2008). This process happens especially where public sector activities are financed through several loans that lead to an increase in market interest rates and the increase in the cost of capital to the private sector. As a result, an increasing in government expenditure over the cost or expense of private sector will have a negative impact on private investment (Hussain, Muhammad Akram and Lal 2009). Some other empirical studies that support the crowding-out effect of

government expenditure on private investment including Pradhan, Ratha and Sarma (1990), Ganelli (2003), Voss (2002), Narayan (2004), Kustepeli (2005), Basar and Temurlenk (2007), and Ang (2009).

The objective of this study is to examine the impact of government expenditure on private investment in Indonesia during 1985 - 2012 periods. As presented in *Figure 1*, the relationship between the government expenditure and private investment in Indonesia is relatively ambiguous. Although there is a tendency of positive relationship of government expenditure on private investment in the recent year, an increase in government spending is not always followed by an increase in the private investment. The previous studies of Indonesia (*see for example* Kuncoro 2000, Hidayat 2005) showed that government expenditure has both crowding out effect on private investment and crowding in effect on private consumption, particularly in the short term.



Notes: (I) Private Investment and (G) Government Expenditure
Source: Central Statistics Board and Bank of Indonesia, 2012

Figure 1 - Private Investment and Government Expenditure in Indonesia,in billion Rupiahs (1990-2011)

This study extends the analysis by dividing the total government expenditure into four specific utilizationof expenditure including public service expenditure, economic expenditure, health expenditure and education expenditure. Beside total government expenditure, in this case, all of the specific expenditure will be estimated separately to see their effects on private investment. This classification is similar to what Wang (2005) and Laopodis (2001) did using Canadian data in the previous studies.

The outline of this paper is as follows. The second section discusses the research methodology used in this study. The third section discusses the empirical results. Finally, the fourth section concluded the findings.

2. Research methodology

The method used in this study is the Error Correction Model (ECM) developed by Domowitz and El Badawi (1987). One of the strength of ECM is the fact that ECM accommodates the possible existence of shock variable that can influence the expectation of economic agents or policy makers (Widarjono 2007). Before estimating the model, the unit root test of the Augmented Dickey Fuller and the cointegration test are conducted to see the stationary level of the data and to see possible long run relationship (long run stability) among the observed variables. In this case, it is expected that the observed data should be stationary in the same level, so the variance of the data is not too high and has a tendency near to the average value (Widarjono 2007).

Specifically, the ECM used in this study is as follow:

$$\Delta lnY_t = \beta_0 + \beta_1 \Delta lnX_{1t} + \beta_2 \Delta lnX_{2t} + \beta_3 \Delta X_{3t} + \beta_4 \Delta X_{4t} + \beta_5 \Delta lnX_{5t} + \beta_6 \Delta lnX_{6t} + \beta_7 \Delta lnX_{1t-1} + \beta_8 \Delta X_{2t-1} + \beta_9 \Delta lnX_{3t-1} + \beta_{10} \Delta X_{4t-1} + \beta_{11} \Delta lnX_{5t-1} + \beta_{12} \Delta lnX_{6t-1} + \beta_{13} EC_{t-1} + \varepsilon \quad (1)$$

where:Y_t: Private Domestic Investment; X_{1t}: Government Expenditure; X_{2t}: Gross Domestic Product; X_{3t}: Interest Rate; X_{4t}: Inflation Rate; X_{5t}: Minimum Wages; X_{6t}: Political Risk.

The dependent variable is the private domestic investment, while the main independent variable is the government expenditure. Following Wang (2005) and Laopodis (2001), besides estimating total government expenditure, this study also estimates using specific components of government expenditure separately including public service expenditure, economic expenditure, heath expenditure and education expenditure in separate equation. If the coefficient is negative and significant, we can say that government expenditure has a crowding out effect on private investment, while in contrast the crowding in exists when the government expenditure has a positive and significant effect on private investment.

In addition, Gross Domestic Product (GDP), Real Interest Rate, Inflation Rate, Minimum Wages and Political Risk variable are included as the control variables. Inflation rate is included to measure uncertainty and calculated based on the Consumer Price Index published by Central Board of Statistics, while average minimum wage measures the labour cost in the economy. In addition, political risk based on the International Country Risk Guide (ICRG) survey is included to see the political condition that might influence the investment level. Beside political risk that is colledted from ICRG, the other data are collected from Central Board of Statistics and Bank of Indonesia. The data is quarterly during the period of 1985 to 2012.

In order to see the validity of the ECM, Error Correction Term (ECT) is added as independent variable. As pointed out by Insukindro (1999), ECM models can be categorized as a valid estimate when the coefficients regression of error correction (ECT_{t-1}) is statistically significant.

3. Empirical results

As mentioned above, the unit root test and cointegration test are estimated before the ECM estimate. The unit root test results is presented in Table 1. Using Augmented Dickey Fuller (ADF) method, all variables are not stationer at level (zero degrees) as the result shows that the p value of the ADF statistic is more than 5% indicating insignificant results. Therefore it is necessary to do the unit root test by using first degrees (first differences). Using first difference, all of the data used in the ECM, including all components of government expenditure are stationer as the probability of ADF statistic is less than 5%. Therefore, we can conclude that all of the data used in this study are stationer in the same level at first difference. In other words, the data fulfil the stationary conditions and then can be continued to the co integration test.

Table 1-The Result of *Unit Root* Test

Variable	Level		1st difference	
	ADF-stat	Probability	ADF-stat	Probability
Investment	-1.961109	0.6154	-6.654612	0.0000
GDP	-1.782097	0.7069	-7.290688	0.0000
Government Expenditure (Total)	-2.693471	0.2415	-8.548827	0.0000
Real interest rate	-2.608589	0.2776	-6.987706	0.0000
Inflation	-2.283736	0.4386	-5.674454	0.0000
Minimum wage	-1,732327	0.7302	-7.327640	0.0000
Political Risk	-1.930691	0.6317	-6.001854	0.0000
Public Service Expenditure	-1.784391	0.7056	-6.594994	0.0000
Economic Expenditure	-2.530612	0.3131	-8.017029	0.0000
Health Expenditure	-1.113466	0.9214	-7.841597	0.0000
Education Expenditure	-2.034141	0.5758	-9.238313	0.0000

Source: Own Work

The cointegration test is conducted to determine the possible long term relationships among the observed variables. Johansen cointegration test is used using lag 1 until lag 4 for all specifications (including all component of government expenditure). The result of cointegration test is presented in Table 2. As presented, the probability is less than 5% indicating that all of the variables are cointegrated or all of the variables have stability in the long term.

Table 2 - The Result of Cointegration Test

Hypothesized No.of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	Prob.**	
None*	0.474184	170.6322	125.6154	0.0000	Government Expenditure (Total)
At Most 1*	0.312430	101.8523	95.75366	0.0178	
At Most 2	0.264683	88.29314	88.80380	0.0544	
None*	0.474184	170.6322	125.6154	0.0000	PublicService Expenditure
At Most 1*	0.312430	101.8523	95.75366	0.0178	
At Most 2	0.228208	61.77094	69.81889	0.1850	
None*	0.348556	129.9683	125.6154	0.0264	Economic Expenditure
At Most 1	0.245686	84.11197	95.75366	0.2408	
At Most 2	0.185429	53.94369	69.81889	0.4640	
None*	0.422565	138.9266	125.6154	0.0060	Health Expenditure
At Most 1	0.273527	80.16661	95.75366	0.3591	
At Most 2	0.169158	45.97435	69.81889	0.7983	
None*	0.513805	172.9822	125.6154	0.0000	Education Expenditure
At Most 1*	0.292253	95.81957	95.75366	0.0495	
At Most 2	0.239685	58.83301	69.81889	0.2730	

Note: Trace test indicates 2 cointegration equation(s) at 5% level; *) Denotes rejection of the hypothesis at the 5% level; **) MacKinnon-Haug-Michelis (1999) p-values.

The result of the ECM in the short term is presented in Table 3. As presented, the government expenditure (total) has a negative and significant to the private investment, suggesting a crowding out effect of government expenditure. Specifically, an increase in government expenditure by 1% decreases the private investment by 1.93% in the short term. The result issimilar to the findings made by Ganelli (2003), who found the crowding out effect between government expenditure and private investment in the short term.

Looking at the other variables, minimum wage and political risk have also a negative and significant effect on private investment, due to that the probability value of each variable is less than 5%. Looking at the coefficients, the minimum wage has the most dominant influence on private investment as the coefficient is largest among variables that affect private investment. In addition, GDP, real interest rate and inflation rate are not statistically significant influencing private investment in the short term.

Table 3-Estimation result of ECM in the short term

Variable	Coefficient	t-statistic	S.E.	Probability
C	-9.422084	-3.199807	2.944579	0.0019
D(ln Gov't Exp)	-1.934869	-4.989381	0.387797	0.0000
D(lnGDP)	1.209180	0.578187	2.091329	0.5645
D(Interest Rate)	-0.003578	-0.165153	0.021666	0.8692
D(Inflation)	0.018329	1.163880	0.015748	0.2473
D(ln Minimum Wage)	-2.066808	-2.646432	0.780979	0.0095
D(Political Risk)	0.214066	5.300126	0.040389	0.0000
ECT	0.061410	1.678231	0.036592	0.0965
R^2	0.534087			
F	8.553329			
DW	1.846559			

Source: Own Work

The ECM estimate shows that the model is valid, indicated by the ECT coefficient that is significant with the probability value of less than 10%, or in other words it is significant at 90% level. The ECT

coefficient in the model is 0.061, which means that the difference between the actual value of private investments and equilibrium value as much as 0.061 and it will be adjusted within less than one quarter.

Looking at the autocorrelation, the Breusch-Godfrey Serial Correlation LM test shows that there is no autocorrelation problem in this model. Furthermore heteroscedasticity test using white model show that chi-squares values is 0.3522 (35.22%) is greater than α = 5%, which means homoscedastic. In the other words, there is no heteroscedasticity problem in that model. *Furthermore*, multicollinearity test also showed that the models used in these equations do not experience serious multicollinearity problems.

Table 4- ECM estimation result in long term

Variable	Coefficient	t-statistic	Prob
D(ln Gov't Exp)	- 0.735884	-2.31302	0.0226
D(ln GDP)	16.962449	51.32005	0.0000
D(Interest Rate)	- 0.550203	-1.73439	0.0857
D(Inflation)	0.027813	0.087676	0.9303
D(ln Minimum Wage)	-3.096091	-10.0266	0.0000
D(Political Risk)	-0.791691	-2.49572	0.0141

Source: Own Work

The ECM result in the long term is presented in Table 4. Consistent with the short term result, the government expenditure (total) shows negative effect on the private investment. The coefficient of government expenditure (total) to is -0.736, meaning that if government expenditure increases by 1 percent will reduce private investment as much as 0.736%. Consistent with the short term, we can conclude that the effect of government expenditure in the long term shows that government expenditure is crowding out the private investment.

Similarly to the short term, minimum wage and political riskare also negatively related and significant to private investment. Unlike the effect in the short term, the real interest rate has a negative and significant effect on private investment in the long term, while GDP has a positive and significant effect on private investment in the long term. Inflation in this case is not significant.

In general, this results support classical hypothesis about crowding out effect of government expenditure. The empirical results also support the findings of a number of studies in various countries (Voss 2002, Narayan 2004, Hidayat 2005, Basar and Temurlenk 2007, Ang 2009, Furceri and Sousa 2011). As stated by Alani (2006), crowding out usually happens when government expenditures are financed mainly from loans (such as Indonesia), that will more likely to lead an increase in interest rates that decrease the willingness of private sector to investment. This is also supported by Bailey (2002) stating that when government intervention in the economyfinanced from deficit financing, it will more likely to lead a decline in private sector activity.

In the case of Indonesia, government expenditure normally has the purpose to improve people's welfare through the development and providing infrastructure and public facilities. The budget deficit policy is always conducted as an instrument taken by the government. Therefore, the government expenditure aimed to increase investment absorbing private saving, thereby the private investment assets is reduced. This indicates that there is a substitution effect between the private sector and the government sector. The budget deficit was initially encouraging private investment, but when government made investments by a loan, thus the budget deficit continues to rise.

The result has implications for the government budget inefficiency that relate to the inefficiency of government expenditure in the long term. Such conditions will lead a decline in private investment and will reduce economic growth and reduce employment opportunities as well. The effect of government expenditure on private investment is then estimated separately using four specific components of government expenditure, including public service expenditure, economic expenditure, health expenditure, and education expenditure. The summary of the results for each component in the short term and long term is presented in Table 5.

Table 5 -The summary of ECM estimation result of government expenditure in short term and long term

Variables	Short Term			Long Term		
	Coefficient	t-statistic	Prob	Coefficient	t-statistic	Prob
D(ln Public Service Exp.)	-1.633387	-4.983054	0.0000	-2.153400	-6.13559	0.0000
D(ln Economic Exp.)	-0.044416	-0.170281	0.8651	1.205962	2.44083	0.0163
D(ln Health Exp.)	-0.519450	-4.989381	0.0215	0.374935	1.064726	0.2894
D(ln Education Exp.)	-0.379336	-1.669204	0.0983	1.071248	2.68366	0.0084

Source: Own Work

Firstly, using the public service expenditure, the coefficient sign is the same with using total government expenditure which is negative and signficant with the coefficient of -1.63 in the short term and -2.15 in the long term. The results mean that if public service expenditure increases by 1%, it will lower the private investment as much as 1.63% in the short term and 2.15% in the long term. In other words, in both short term and long term, public service expenditure is crowding out the private investment, which is in line with Wang (2005) study in Canada.

In practice, public service expenditure is the largest share from the total expenditure of central government compared to the other government expenditure functions such as economic, health and educational expenditures. Public service function is managed by the state general treasurer primarily to finance the programs including debt interest payments program, subsidies and transfer payments programs, finance the executive and legislative, and also foreign affairs. The finance is generally derived from the loans made by the government through the sale of bonds and also from tax revenue. It has a positive impact on improving the quality and quantity of public services but with no direct impact on economic growth. Considering that allocation of expenditure is not largely address to the infrastructure development projects, therefore it will notprovide the multiplier effect on private investment and economic growth.

Secondly, using economic expenditure, the coefficient is not significant in the short term. In other words, we can say that the economic expenditure is not responded by the private investment in the short term. The possible reason is because of the time spent that might be too short.In the long term, the economic expenditure is positive and significant on the private investment.The coefficient of economic expenditure is 1.206 meaning that if the economic expenditure increases by 1% it will increase the private domestic investment by 1.206 in the long term. Therefore, unlike public service expenditure, the economic expenditure is crowding in to private investment for long term.

In practice, in Indonesia, the economic expenditureis the third largest expenditure after public service and education and is used for finance programs of transport infrastructure, agriculture, irrigation, and energy that is expected to support the efforts in order to accelerate the economic growth. This study supports Erden and Holcombe, (2005) and Afonso and Aubyn (2009) that suggest to support the infrastructure sector to increase the private investment. To support infrastructure for Indonesian case, the public-private partnership is needed to maintain the minimum service standards and to accelerate the infrastructure provision.The comprehensive infrastructure is also needed providing the management and operation program of sea transportation, land, air, and railroad system.

These resultsalso suggest that the economic expenditure will encourage the increase of the private investment particularly when it focuses on productive expenditure, such as infrastructure in transportation (Hasan, *et al.* 2011). The efficiency of the government budget therefore is necessarily needed, which is finally boost the economic growth and increase people's welfare. At last, it would lead the increasing of private domestic investment and accelerate the national development.

Thirdly, using health expenditure, the coefficient is negative and significant for short term. The coefficient is -0.519 meaning that if the health expenditure increases by 1%, it will decrease the private investment by 0.519%. In other words, in short term, health expenditure is crowding out the private domestic investment.

In the long term, health expenditure coefficient is not significant indicating that private investment does not respond well to the health expenditure. All of these results have also implications about the ineffectiveness of the health expenditure realization. Compared to the public service and education expenditures, the government budget for health service in Indonesia is relatively small and has not shown the expected results particularly in the long term

Finally, the education expenditure shows a significant negative effect on private investment in the short term. In practice, education expenditure is the second largest expenditure in Indonesia after the public service. The coeffiecient is -0.379 meaning that an increase in education expenditure by 1% will decrease the private investment by 0.379%. Therefore, the education expenditure is crowding out the private investment.

In contrast, in the long term, education expenditure shows a positive and significant effect on private investment. The coefficient is 1.071, meaning that an increase by 1% will increase private investment by 1.071%. Therefore, in the long term, the education expenditure is crowding in the private investment. This result is consistent with Keynesian hypothesis that government expenditure of education can stimulate the private investments and become an important channel for the effectiveness of fiscal policy in enhancing the economic development (Ahmed and Miller 2000, Ahmad and Qayyum 2008, Hasan, *et al.* 2011).

Education expenditure in practice is a reflection of the government efforts to provide community services and their responsibility in terms of education. By improving the quality of human resources, therefore the educated and skilled population or labour force will be good assets to have quality employment as one of the production factor. As a consequence, it will attract investors to invest in Indonesia particularly in the long term.

Conclusions

This study has examined the effect of government expenditure on private domestic investment in Indonesia, whether government expenditure is crowding in or crowding out the private investment. Using quarterly time series data during period 1985 to 2012, the empirical results show that government expenditure (total) is crowding out private domestic investment in both short term and long term indicating a potential inefficiency of government expenditure in both short term and long term. The results support classical hypothesis about crowding out effect. The crowding out usually happens when government expenditures are financed from loans that will more likely to lead an increase in interest rates that decrease the willingness of private sector to investment.

Looking at specific components of government expenditure, public service expenditure is crowding out private domestic investment in both short term and long term. As most of the expenditure is generally for non-productive programs, such as debt interest payments program, subsidies and transfer payments programs, finance the executive and legislative, and also foreign affairs, so the impact on private investment is negative.

Unlike public service, economic expenditure is crowding in the private domestic investment for long term. In practice economic expenditure includes productive expenditure such as infrastructures which encourage increased private domestic investment. This will also implied foreffectivebudget managementthat canprovidea multiplierеffecton economic growth.

Moreover, health expenditure is crowding out the private investment in the short term implying an inefficient allocation of government budget in terms of health. Meanwhile education is crowding out the private investment in short term and is crowding in for the long term. In the long term, it seems that education expenditure can stimulate a creation of qualified human resources that might attract more private investment.

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Study on Financing of Energy Service Companies by Creating Specialized Compensation Fund using Forms of Funding and the Provisions to Cover the Risks Involved

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Abstract:

The main proposals from energy service companies (ESCOs) in the market are to be declared as savings of energy and money through the development and introduction of highly efficient technologies and continuous services for operation and maintenance. However, in the world one of the important components of the success and growth of the ESCO industry is the ability to organize and recruit for their projects financing from the private sector at market rates. This is an important point, to which you should pay particular attention when deciding on participation in energy service project.The principal form of energy contracts used in the world practice, presented stages of energy service contracts, identified obstacles and risks at each stage of the implementation of an energy service contract and possible reserves to cover them. The possibility of attracting financial and government organizations using different forms of financing becames more obivouslly. The main differences between energy service contracts from other types of financing energy efficiency measures.

Keywords: energy service contracts, energy service companies, specialized Compensation Fund, forms of financing, the system realization of energy service contracts, risk groups.

JEL Classification: G3, D29.

1. Introduction

Over recent years, the debate on public-private partnership has been growing actively in the Russian society. This subject attracts increasing attention both the government authorities and the business community. Attention to this type of interaction between businesses and the state is due to the ability to solve effectively the social, economic and other issues by combining the resources of these sectors. The partnership contributes to the overall development and prosperity through the implementation of projects that can not be performed by government authorities or private companies separately.

The term *public-private partnership* (PPP) is a literal translation of the English one and has been used for a long time in foreign countries: France, UK, USA, Canada, Austria, Belgium, Denmark, Australia, Israel, Ireland, Finland, Spain, Portugal, Greece, South Korea, Singapore, the Czech Republic. Abroad the public-private partnership means the very wide range of business models and relationships. In the most general sense, the term is used for any use of private resources to meet social needs. Application areas for the public-private partnerships in foreign countries are very diverse. Cooperation between the partners takes place in the various legislative frameworks, with a diverse range of tasks and competence.

The state becomes an equal share business partner supplying infrastructure services and regulating the projects implementation. Such public-private partnership becomes an alternative to the privatization of infrastructure with specific economic and social consequences.

International practice of the partnerships shows that they can be formed in a variety of sectors:

- *Transport* - construction, operation, maintenance, implementation of motion control systems and many other projects in the various transport sectors, including urban transport.
- *Housing and utility services* - services for the population; operation of utilities (water supply system, sewerage); street cleaning, waste removal and recovery.
- *Ecology* - establishment, maintenance and development of urban and country parks with the right to exploit natural resources and receive ecotourism income.
- *Real estate* - construction and operation of public buildings and public housing in exchange for the building leasehold and participation in commercial projects.
- *Public peace and safety* - ensuring traffic order and peace in public places served by private companies; parking arranging and service.
- *Telecommunications* - foundation of telecommunications infrastructure and service delivery to consumers.

- *Financial sector* - attracting private insurance companies and asset management companies to operate with compulsory social insurance and public pension provision.
- *Education* - construction and equipping of schools and other institutions by private companies receiving building leasehold and the right to develop the surroundings.

Forms of the public-private partnership have different degrees of responsibility taken by the state or the private sector over for operation and maintenance, capital expenditures and the current financing, commercial risk; in addition they differ in assets owners and term of cooperation.

In the modern literature there are many definitions of public-private partnership. The most complete definition, in my opinion, is the following: a public-private partnership is institutional and organizational alliance between government and business to implement socially important projects and programs in a wide range of industries - from manufacturing industry and R&D to service sector. (Nechaev and Prokopieva 2014)

2. Methodology

The state is interested in increasing the scope and improving the quality of public services provided by the infrastructural and social industries. The private sector aims get stably and increase profits. Moreover, business owners having strategic minds manage their priorities not just in according to the size of the profits, but in the interest of stability of profits from the project simple mentation in the first place. Both sides are interested in the success of the project implementation in principle.

The partnership opens for the business additional opportunities in market expansion: it gains access to a number of very promising market areas that previously have been closed to it, or not attractive due to the high regulatory barriers. For business there is important a relative stability of markets for the partnership term, and this is significant factor of competitiveness in the very competitive and rapidly changing business environment. In addition, there are opportunities for private sector to increase the income through the adoption of technological innovations, effective organizational and administrative decisions, and other ways to save resources and improve the quality of service. Non-profit organizations' cooperation benefits are increasing the funding sources and other incomes for their mission realization - providing a variety of services demanded by society, provision of which in most cases is unprofitable for the private sector and is not funded by the state at all or in the proper scope. The state participation is motivated by the need to mitigate or eliminate the growing imbalance between the social demand for the services provided by the social and industrial infrastructure and the level of their development in the context of increasing financial constraints.

Among the basic principles of the public-private partnership are the following:

- The partnership parties are the state and private sector;
- Cooperation between the parties is specified with the formal, legal framework;
- Relatively long periods of validity: from 10-15 to 20 years or more;
- Interaction of the parties has equal nature and parties' responsibilities relative to each other and the law;
- Public-private partnership is clearly defined public and social orientation;
- In the process of projects implementation within the public-private partnerships the parties' resources are consolidated;
- Swap of the part of the state management authorities by some or other entities on the investment and other forms of private companies' assistance;
- Financial risks and costs, as well as the results achieved are divided by the parties in pre-agreed proportions.

One of the important features of partnerships is the partners' voluntary participation at joint projects and actions, ensuring that the interests of each party is respected, and the absence of any administrative, economic and other pressure or coercion of the party.One of the organization forms of the public-private partnership is an energy service company. The problem of depreciation of the infrastructure tangible assets is relevant at the moment. The rate on this indicator can be up to 60% showing that there are large leaks of heat, water, as well as significant losses in electric networks. The most appropriate action is modernization using an energy service contract. Federal Law *on energy saving and energy efficiency* dated 23.11.2009 No.261-FL (art.19) defines the energy service agreement (contract) as the contract where a subject is "execution by a Contractor of actions aimed at energy saving and energy efficiency when a Customer uses the energy resources". (Nechaev and Prokopieva 2013)

The main fundamental difference between the energy service contract and other types of financing is a company does not have to invest its own funds. The work to implement the infrastructure modernization projects

is carried out due to the investment resources provided or attracted by the energy service company (ESCO). Payment for work carried out by the ESCO is made by the consumer of energy resources at the expense of the funds received as a result of savings after a facility modernization.

The majority of energy service projects are financed by long-term loans. A way to lease equipment by the manufacturers is use widely too. In the initial period of the energy services development there was a typical situation that the energy service companies solved financing problems on their own. This took place because financial institutions did not understand the risks of energy service contracts and did not want to finance such projects. Some ESCOs acted as distributors of equipment used to improve energy efficiency. This allows them to use leasing. However, currently the ESCOs do not fund the energy service contracts on their own. This is possible because the tight competitive market of the financial institutions offers has developed in the sector (Nechaev and Antipin 2012). Almost all energy service contracts are financed by a third party - banks or other financial institutions.

Most energy services are ordered by public authorities. It is interesting that the on the West such energy service contracts are financed at the expense of the customer for the most part. Primarily this is due to the public authorities' borrowing in these countries are usually (at least until recently) cheaper than ESCO's borrowing (Sivaev, Gritsevich 2011). Thus, the public authorities as the customer borrow funds for the project, and the refund is guaranteed by the ESCO's obligations after achievement of the specified index of the energy efficiency. Capital market is quite competitive. In the US a typical project should have several funding proposals. And financial companies usually try to propose a flexible offer structuring a payment schedule in way of maximal synchronization with the project financial flows.

In the public sector there are quite spread tax-free lease agreements with transfer of ownership (Tulikov and Gritsevich 2011). In Occident this way enables to fund the ESCO projects from operating budgets. This financial model enables for the public sector to use the money saved in the future bills for utilities to purchase new energy-efficient equipment even today.

Quite often there are used targeted state or municipal bonded loans for funding of the energy service projects. In this case, a number of energy service projects are collected in one package funded with the target loan. This minimizes transaction costs and reduces the borrowing cost. (Managers Association 2007)

Also, possible financial instruments to attract investments in energy services include: overdraft, loan, leasing, factoring, forfeiting as well as various tax incentives in the form of investment tax credits.Comparative analysis of the considered financial instruments is shown in the Table 1.

Table 1 - Comparative analysis of financial instruments

INSTRUMENT	BARRIERS	PRO	CON
Overdraft	▪Upfront investment; ▪The difference in terms of saving and payments.	▪Minimal time expenditure; ▪Minimal documentation package; ▪No collateral.	▪Hard repayment schedule; ▪High interest rates; ▪The amount is determined on the basis of the current loan turnover.
Loan	▪Upfront investment ▪The difference in terms of saving and payments	▪Perfect and widely available financing vehicle. ▪It does not lead to loss of control over business.	▪Middle and high interest rates. ▪Perhaps vehicle is not flexible enough. ▪Often it does not cover the full amount of the investment. ▪Typically, the payback is associated with the borrower rather than with the project. ▪It is within the balance sheet items and can make debt problems.
Leasing Operational Capital	▪Upfront investment ▪The difference in terms of saving and payments.	▪The use of funding sources not included in the balance. ▪It coordinates the payback with the saving period. ▪Low rates thanks to exemption from income tax. ▪Availability of amortization payments.	▪There is no possibility to deduct the amortized cost. ▪It is within the balance sheet items and can make debt problems. ▪It covers only a fixed value of the assets.
Factoring	▪Upfront investment; ▪The difference in terms of saving and payments.	▪Turnover continuity; ▪Simplification of the work with accounts receivable; ▪Deferred payment.	▪The Russian rates are high and confusing; ▪Waiting for payment by the end user.

Forfeiting	▪Upfront investment; ▪The difference in terms of saving and payments	▪Minimal risk; ▪Minimal time expenditure; ▪Deferment payment; ▪Fixed interest rate; ▪Operating at the secondary securities market.	▪The bank can sell monetary obligations on the secondary market; ▪Disagreements in the selection of the credit document; ▪Good legislation aware by the borrower.
Investment tax credit	▪Credit risk; ▪Balance.	▪Easy to implement, the relative efficiency and flexibility. ▪The possibility to use real funds. ▪The target is to create a market demand.	▪It increases the burden on the government budgets. ▪It is difficult to prevent the illegal and unfair receipt of funds. ▪Not effective if end users do not pay taxes, lack of the visibility.

The paper proposes the establishment of the system to implement innovative energy service projects by creating specialized compensation fund and involving of the financial and government organizations using forms of funding and the forming reserves to cover the resulting risks. At present specialists of Sberbank form the general principles to finance the ESCOs. To secure the energy service contracts and the bank's confidence the borrowers will carry out their loan obligations, the Specialized Funds have to be established in energy service area. Approximate volume of the Fund should be 30% of the energy agreements values. The Fund's guarantees should provide at least 70% of the loans and investments volume. The Table 1 shows the operations of each stage of the energy service contract implementation. (Bashmakov 2009)

The main idea of the Specialized Fund formation is to provide the repayments to the commercial banks of the short-term loans for the energy service contracts implementation. It is essential that such a Fund should be created with the participation of regional authorities and/or local authorities. (Semenov, Kovalchuk, Sergeev2012)

3. Results

The budgetary funds investment in the Fund's authorized capital should serve as evidence the government and local authorities are ready to contribute the development of energy service business. The Fund can be established in the legal form of open joint-stock company. Its founders, along with government and municipal authorities, and the IFIs, can be the commercial banks and private companies (Vakulko, Zlobin, Romanov 2003).

Weighty argument for this form is that the private-public funds as a simple partnership have been operated already in Russia. For example, there is structured as a simple partnership a venture fund of the corporation "Aerospace Equipment Corporation" established with the participation of the Venture Innovation Fund. There are no barriers to structure in a similar way the funds to attract investment in the energy efficiency projects, and the proper state control for the funds' operation can be ensured through the participation of public investors in the fund's investment committee. Thus, registration of public-private funds in the form of the simple partnerships brings founding legal structure more in line with the world analogues that will be a strong incentive for experienced investors.

To assess the operation of the Specialized Compensation Fund, it can be compared to similar fund in Norway. In Norway, as in Russia, a significant part of GDP is get from the oil industry, so energy price change can greatly affect the state economy. The Norwegian fund allocates 60% of available funds in shares of foreign companies, 35% - in bonds, 5% - in real estate around the world, thus making a diversified portfolio that is effectively managed by qualified specialists. This is evidenced by the level of the Fund profitability - 9.6%. Additional feature of the Norwegian fund is percentage ratio of its money volume in relation to GDP - about 90%. The idea to invest the Fund's money in foreign assets is dictated by the assumption that if the funds are invested within the country, in the event of a crisis they will be lost due to the disruption; the second reason is a possible rise in inflation.

Investment attracting for the projects will be made through the energy service contracts. The use of this financial instrument will attract more investment in energy efficiency projects; in turn it will make possible the development of areas not attractive for investors previously.Under Russian law, the subject of the energy service agreement (contract) is execution by a Contractor of actions aimed at energy saving and energy efficiency when a Customer uses the energy resources. Energy service agreement (contract) shall contain:

- the provision on the value of energy savings which should be provided by the Contractor as a result of the energy service agreement (contract) implementation;

- the provision on the duration of the energy service agreement (contract) which shall not be less than the period necessary to achieve the value of energy savings specified by the energy service agreement (contract);
- the other mandatory terms of the energy service agreements (contracts) under the Russian Federation laws.

Main implementation stages:

- The ESCO concludes one or more similar energy service contracts to improve the energy efficiency of the public sector facilities;
- The ESCO takes out a short-term loan of a commercial bank to carry out energy-saving measures in the public sector facilities;
- The Fund's money is assigned for liability buyout the ESCO's revenues from savings achieved under the energy service contract;
- The amount paid by the Fund to the ESCO covers the costs (the bank debt) and allows the ESCO to get the needed revenue. This allows energy service companies to repay short-term loan of the commercial bank;
- The ESCO establishes reserves covering long-term risks under the energy service contract and becomes the legal owner of funds received from the savings achieved.

If potential savings formed by reducing resource consumption is lower than expected according to the energy service contract, the energy service company shall pay out for the Fund the missing savings at their own expense.The Fund may assign the annual revenue generated by the achieved savings to pay dividend for the founders or repay taken loans of MFIs, commercial banks or other financial institutions. (Tulikov 2011)

4. Discussion

Being undeniably profitable and efficient, the energy service contract still has certain risks. Possible risks have been studied in considerable part of the research conducted by the Managers Association over the leading Russian and foreign companies. (Review is available online at the RBK website, 2014). The private sector risk arisen for the PPP projects implementation can be divided into four main groups:

- The risks associated with the operation of public authorities;
- The risks associated with the participation of the state as a partner in PPP projects;
- The business risks of PPP projects;
- The risks associated with the protests of the population, public and international organizations.

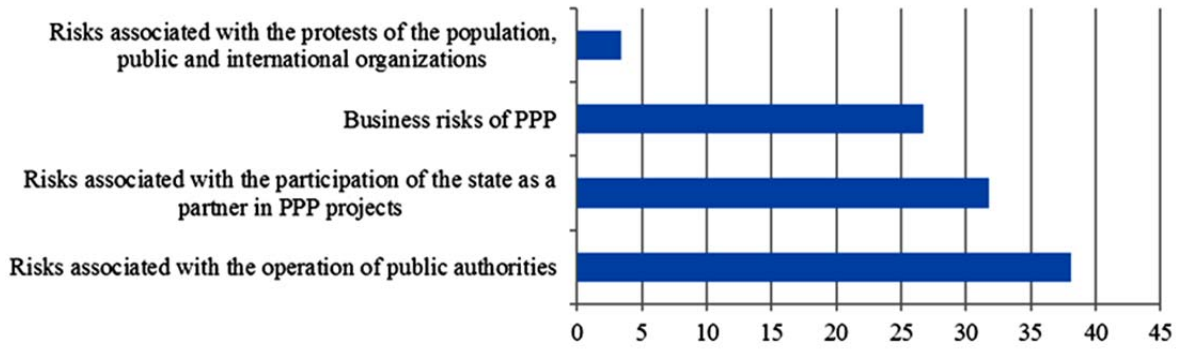
A study conducted by the Managers Association in 2006 has showed that the private sector has been worried mostly because of group of risks related to the public authorities operation - 38.1% of the vote. Slightly less the survey participants - 31.8% - do not trust the government as a partner in the public-private partnership projects. It should be noted that in the first case the state has been considered generally, as a regulator of economic activity, and in the second one - as the partner in the public-private partnership projects.

It is significant that the inefficiency of the state apparatus and the whole state system is the cause of more serious companies' concerns than the activity of the state as a partner. But the level of distrust to the state as a partner is also quite high.

Business risks of the public-private partnership project were noted by 26.7% of respondents. This shows that along with the high fear of the state activity, the private sector assesses the project proper risks as enough high.The lowest number of the respondents' votes has taken by the risks associated with the protests of the population, public and international organizations. These risks disturb merely 3.4% of the respondents.

Figure 1 shows the risks preventing mostly the development of the public-private partnership in Russia. (Danilova, Schelokova, 2006). The state guarantees to support energy service contracts, the willingness and ability to provide compensation for the risks involved are key issues for consumers.

The partnership and state guarantees open up not only new areas for business but also increase opportunities to take loans from Russian and foreign financial institutions. However, in Russia this opportunity realization is complicated enough. Facilities covered by the public-private partnership are owned by the state usually, it is typical for the concession agreements, and this makes impossible to use the mortgage finance instruments.



Source: Managers Association, 2006

Figure 1 – Risks preventing mostly the development of the PPP in Russia

Energy efficiency program includes funding of 10 trillion rubles till 2020, 90% of these funds are private. According to Sberbank, in energy-saving measures will be invested about 3.5 trillion rubles; among them the possible scope of the debt financing is not less than 2 trillion rubles. (Gulbrandsen, Padalko, Chervinskiy, 2010).Most of these measures can be implemented with the use of energy service contracts. Thus, the market potential is not less than 500 billion rubles per year. (Karpenko, Androsov, 2015).

However, there are several severe problems preventing the development of the energy service contracts market in Russia. Among them the main problem is the legislation gaps impeding to set out clear relationship and rights of the parties. (Bashmakov 2015)

The success of the public-private partnership is based primarily on a detailed regulatory framework for the various aspects of the partnership. Contradictions and conflicts, repeating systematically in the public-private partnership and reducing the efficiency of whole instrument, require continuous improvement of the "rules of the game". The rules specified, agreed and accepted by the parties are a powerful regulator in problem situations, significantly reducing the risks and increasing the efficiency of the entire system of public-private partnership.

Legislative control in the field of public-private partnership can be divided into general laws and specific laws. The special laws include the Budget Code, the RF Government Regulation #694 *Concerning the RF Investment Fund*, FL #115 *Concerning the Concession Agreements*, the FL #225 *Concerning Production Sharing Agreements*, the FL #116 *Concerning special economic zones in the Russian Federation* and several branch laws and regulations.These laws provide the overall framework for the development of the public-private partnerships. However, such specific for the public-private partnerships laws as the FL *Concerning the Concession Agreements*, *Concerning Production Sharing Agreements*, *Concerning special economic zones in the Russian Federation* are not perfect, and require significant amendments and adoption of the secondary legislation. It is also necessary to develop procedures for their implementation.

In order to encourage the development of regional and private energy service companies there has been proposed at the federal level to establish a so-called Super ESCO - a specialized organization with state participation, the main aim of which is to provide funding for projects on energy saving and energy efficiency of regional and private energy service companies, as well as the implementation of pilot energy service projects in the public sector and, as a general rule, the defense industry. The Super ESCO has been established in India, the Philippines and some other countries and has shown high efficiency.

In Russia as the Super ESCO should be the Federal Energy Service Company (FESCO) being established currently at the RF Ministry of Energy under the organizational and methodological support of the FGBI "REA" of the RF Ministry of Energy. It is assumed that FESCO will provide funding for the energy conservation and energy efficiency projects implemented at the regional and municipal level. As possible co-financing model there is not only participating in the authorized capital of regional and private energy companies, but also rent, leasing, supply by installment, securing performance of obligations and other models under the civil legislation. (Kashin 2013)

The very first steps towards the creation of a sustainable market are presented as the lack of necessary methodical support including practice proven standard energy service agreements (contracts), standard tender documentation, methods to determine the energy savings and others. The availability of appropriate guidance materials and public access to them will create additional conditions and incentives as for customers, as for contractors to provide the energy services. In part the development of such guidance materials is provided by the FGBI "REA" of the RF Ministry of Energy, including within cooperation with the Efficiency Valuation Organization

(EVO) to prepare the official Russian translation of the international monitoring and verifying protocol for energy savings of the IPMVP. Drafts of the standard energy service agreements (contracts) have been developed within separate working groups of the MEDT of Russia, Ministry of Regional Development of Russia, RF Ministry of Energy, including the working group on the establishment of the Federal Energy Service Company (Veryovkin 2015). However, the majority of prepared solutions have the nature of theoretical developments exclusively.

Conclusion

As it has been shown in foreign countries which have adopted the new generation laws on energy saving and energy efficiency, such as India, to form a full-fledged and sustainable energy services market it is needed at least 3-5 years. For this time there is occurred an identification and removal of gaps and contradictions in the legislation, preparation and implementation of pilot projects, development of methodological basis, the consolidation of the professional community, that is accompanied by pushing out the weak and unskilled players. The main role in this process is played not only by the government agencies as the FGBI "REA" of the RF Ministry of Energy, but also by the associations of energy services market participants able to represent centrally the attitude of the professional community. Relevant associations and partnerships have been established in Russia already, and they have taken the responsibility for control of these services quality, development of guidelines and standard solutions. Their activation shows that the domestic market development goes under scenario met the international practice. (Gabov 2003)

However, such development is significantly hampered by the gaps and contradictions in the new laws on energy saving and energy efficiency, which in some cases block their implementation or the implementation results do not respond to the public policy goals. The main directions to improve the laws should be:

- development of additional models of the energy services contracts for state and municipal needs, including contracts combining deliveries by installments and fees on the achieved energy savings, as well as providing for the savings measurement and verification by the way of calculation methods and a limited number of times;
- detailing of various types (models) of energy service agreements (contracts) concluded in the private and public (municipal) sectors, depending on the distribution of financial risks arising for the customer and contractor providing the energy services;
- detailing of the energy agreement (contract) terms associated with the transfer of the items of property from the contractor to the customer, as well as other provisions for which legislation detailing is required;
- incentives for establishing and development of the regional and municipal energy service companies, as well as organizations with state and municipal participation (energy efficiency centers) providing methodological and information support for energy saving and energy efficiency at the regional and municipal levels;
- introduction of the "white certificates" system as a measure of government control, and stimulating the energy services market development;
- creation of instruments to encourage the development of programs on energy saving and energy efficiency and provision of energy services under the results of the energy inspections;
- establishment of withdrawals under which meeting by the main budgetary funds managers requirements to reduce budgetary allocations by the state (municipal) institutions for the purchase of energy resources does not prevent them to conclude and execute the energy service agreements (contracts);
- Indicating of cases to provide the investment tax credits and tax incentives for energy service companies. (Trubaev,Shirrime 2015)

Thus, the use of energy service contracts has good prospects in Russia. It seems particularly important to use them in the public and municipal sector; that will enable during their implementation to solve the problem to manager professionally with public buildings. Overall management contracts in housing sector also have good perspectives. Even today, a number of companies managing apartment buildings seek for implementation of such contracts, and consider the contracts implementation as their competitive advantage. (Kursova, Sevriugina, 2013)

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On a Preference Analysis in a Group Decision Making

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Abstract:

The aim of the paper is to provide several quantitative measures concerning preference structure in a group decision making setting. These measures enable to assess group and individual discord, core preferences and outliers, or to find a consensus, where a consensus is defined as a preference with a minimum sum of distances to other preferences. Also, it is shown that a distance of a consensus to a median preference is upper bounded, which might reduce a search for a consensus significantly.

Keywords: consensus, decision making, distance, discord, geometric median, group decision making, group discord, preference, preference structure.

JEL classification: D71

1. Introduction

The aim of collective decision making is to undertake the best (optimal) solution to a given problem by a group of experts in a given field. Group decision making is present everywhere where a committee, a board, a council, etc., has to carry out a decision. It occurs in many areas of human action such as economics, politics, environmental protection, education, civil engineering, medicine, military, etc., but it is also present in everyday family lives. For a brief review of past, present and future of group decision making see e.g. Kameda *et al.* (2002).

Decision makers can express their preferences in many different ways. Given a set of feasible options (objects, alternatives, candidates, etc.), the most common preference formats include rankings of all compared options from the best to the worst, a selection of the best option only, or assigning each option its 'value' (expressed in points or marks, language variables such as 'very good', etc.).

Ranking of options or selection of the best option (without ranking the rest) is a well-known setting from the social choice theory, where individual decision makers (DMs) are called *voters*, they choose among a finite set of *candidates*, and their preferences (rankings of candidates, usually without ties) are called *votes*, *individual preference list* or *ballots*. For an introduction to the social choice theory, see e.g. (Sen 1970, Fishburn 1973, Feldman and Serrano 2006, Wulf 2006, Taylor and Pacelli 2009, Myerson 2013). A winner of an election is found with the use of many different social choice functions or procedures such as plurality voting, Condorcet's majority rule, Borda's method of marks, Copeland method, Hare system, see e.g. Taylor and Pacelli (2009). All these methods satisfy some 'reasonable' properties, such as unrestricted domain, monotonicity, independence of irrelevant alternatives, Pareto efficiency, non-dictatorship, etc., see e.g. (Arrow 1951, Fishburn 1973, Wulf 2006, Taylor and Pacelli 2009). But, as shown by Arrow (1951), none method satisfies all of them if there at least two decision makers and at least three alternatives (see also Gibbard–Satterthwaite theorem). Also, some social choice procedures are susceptible to voting paradoxes, such as Condorcet's paradox; see e.g. (Saari 2000, Felsenthal 2010).

While the literature on social choice theory focuses mainly on examination and comparison of social choice functions (procedures) under different conditions, the orientation of this paper is slightly different. It focuses on an evaluation of a structure of decision makers' preferences, and a relationship between this structure and a group consensus, because it is the structure of preferences that determines whether achieving a group consensus is possible (and whether this consensus is unique).

In this paper a consensus is defined as a preference which minimizes the sum of distances to all preferences provided by DMs. In this sense a consensus is an analogue to the *geometric median*, which is defined as a point in an n dimensional *Euclidean space* E^n, minimizing a sum of distances to a given (finite) set of points from E^n. However, in this study this concept is extended to all spaces endowed with a metric function, called *decision spaces*, such as a space of all permutations S_n of the order n, a space of pairwise comparison matrices, etc.

As mentioned before, DMs' preferences determine the result – the consensus. The aim of this paper is to provide several new measures and concepts enabling to evaluate a structure of decision makers' preferences, and to show how to use it in finding a consensus especially if the decision space is discrete (for example S_n).

The paper is organized as follows. In section 2 basic concepts and notation is introduced. In section 3 some theoretical properties are examined and section 4 provides numerical examples. Section 5 provides a brief discussion of well-defined and ill-defined problems and in section 6 some possible extensions to the proposed approach are discussed. Conclusions close the article.

2. Concepts and notation

In this paper it is assumed that a finite set of decision makers evaluate a finite set of alternatives and provide their (crisp and complete) preferences in such a form that these preferences can be considered elements of some metric (decision) space.

The format of preferences includes:

- rankings of *n* alternatives, so they can be regarded elements from a space S_n of all permutations of the order *n*,
- pairwise comparison matrices as proposed in the analytic hierarchy/network process, see Saaty (2001), which are elements from a space of square matrices of the order *n*,
- real (integer) number values assigned to each alternative, etc.

Assumption that a decision space is endowed with a suitable metric function is important, because it allows measuring distances among preferences.

DEFINITION 1: *Let* μ *be a function on a set X so that* $\mu : X \times X \rightarrow R$*.Function* μ *is called a metric, if it satisfies the following axioms (1) to (4):*

1. $\mu(x,y) \geq 0$, *(non-negativity),*
2. $\mu(x,y)=0$ *if and only if* $x = y$, (*identity*),
3. $\mu(x,y) = \mu(y,x)$, (*symmetry*),
4. $\mu(x,z) \leq \mu(x,y) + \mu(y,z)$, (*triangular inequality*), *for all x, z, y* $\in$ *X.*

Some well-known examples of metric function include:

i) The distance between two real numbers *x* and *y* on a real axis: $\mu(x,y) = |x-y|$.

ii) Euclidean metric, $x = (x_1,...,x^n), y = (y_1,...,y_n) \in R^n$: $\mu(x,y) = \sqrt{(x_1-y_1)^2 + ... + (x_n-y_n)^2}$

iii) Manhattan metric, $x = (x_1,...,x^n), y = (y_1,...,y_n) \in R^n$: $\mu(x,y) = |x_1-y_1| + ... + |x_n-y_n|$

iv) Kendall's tau metric defined as a number of transpositions of adjacent pairs of digits necessary to turn one permutation into other (also known as the *bubble-sort distance*).

v) The distance between matrices *A*(a_{ij}) and *B*(b_{ij}): $\mu(A,B) = \left(\sum_{i,j} |a_{ij} - b_{ij}|^p \right)^{1/p}$, etc.

In this study all metric functions are equivalent, in numerical section 4 metrics i) and iv) are applied.

Merriam-Webster's dictionary defines a 'consensus' as a general agreement, a unanimity of opinions, but in this paper a consensus is defined as a preference closest to a set of given preferences, see Definition 2 below. Hence, it is a preference that best describes an opinion of a group (also, it can be regarded a compromise).

DEFINITION 2: Let *DS* be a decision space, that is a space of all feasible decisions *D*. Let μ be a metric function on *DS*. Suppose a set of *n* decision makers (DMs) provide *n* (not necessarily distinct) decisions $D_i \in DS$, $i \in \{1,2,...,n\}$, which form a subspace of *DS* denoted as *DNS*. Then:

i) A decision $D_j \in DS$ for which $\sum_{i=1}^{n} \mu(D_j, D_i)$ is minimal is called a *consensus* and is denoted as D_C thereinafter.

ii)A decision $D_j \in DNS$ for which $\sum_{i=1}^{n} \mu(D_j, D_i)$ is minimal is called a *pivot* and is denoted as D_P thereinafter.

iii) An *average distance* of all $D_i \in DNS$ to a consensus (a pivot) is denoted as *AVCD (AVPD)*:

$$AVCD = \frac{\sum_{i=1}^{n} \mu(D_C, D_i)}{n} \; (AVPD = \frac{\sum_{i=1}^{n} \mu(D_P, D_i)}{n}).$$

iv) A *maximal distance* between two $D_i \in DS$ is denoted as *MAXD*.

v) A *group discordGDIS* among $D_i \in DNS$ is given as: $GDIS = \frac{AVCD}{MAXD}$.

vi) An *individual (relative) discordIDIS* (*RIDIS*) of an element $D_i \in DNS$ is given as:

$$IDIS_i = \sum_{j=1}^{n} \mu(D_i, D_j) \; (RIDIS_i = \sum_{j=1}^{n} \mu(D_i, D_j) / \sum_{i=1}^{n}\sum_{j=1}^{n} \mu(D_i, D_j)).$$

vii) A $D_j \in DNS$ is called a *DNSoutlier*iff $\mu(D_i, D_C) > (1+\varepsilon) AVD$, $\varepsilon \geq 0$.

viii)A $D_j \in DNS$ belongs into a *DNS core*iff $\mu(D_i, D_C) \leq AVD$.

ix) A problem is called *well-defined* iff there is a unique consensus. Otherwise it is called an *ill-defined* problem.

x)A *cumulative distance function CDF* (for well-defined problems) is given as:

$$CDF(x) = \left| D_i \in A; \mu(D_i, D_C) \leq x, 0 \leq x \leq MAXD \right|$$

Remark 1. In Definition 2i) a consensus might not be unique, in Definition 2ii) a pivot might not be unique. An individual discord *IDIS* from Definition 2vi) expresses the total distance of a given preference to all other preferences (RIDIS expresses a ratio of a discord of each individual to a group discord, respectively), thus each decision maker is assigned a degree of his/her disagreement within a group. By Definition 2vii) decision makers-outliers can be identified, and the parameter ε controls the outlier threshold distance. Outlier DMs might be excluded from a decision making process. In Definition 2ix) well-defined and ill-defined problems are introduced, as usually only one consensus is required. In Definition 2x) the (piece-wise constant) cumulative distance function enables to recognize a structure of decision makers.

3. Some relationships regarding a consensus

Intuitively, a consensus should lie somewhere 'in the middle' of decision makers' preferences, and it should be not too distant from a pivot preference, which is a 'midpoint' of all provided preferences. In this section some propositions regarding a consensus are provided.

The following proposition postulates a maximal distance between a consensus and a pivot.

Proposition 1. Let $DNS \subseteq DS$ be a space of *n* decisions D_i. Let $D_P \in DNS$ be a pivot and let $D_C \in DS$ be a consensus. Then: $\mu(D_C, D_P) \leq 2AVPD$.

Proof: From triangular inequality we have $\mu(D_C, D_P) \leq \mu(D_C, D_i) + \mu(D_i, D_P)$ for all *i*, hence summing by all *i* we obtain: $n \cdot \mu(D_C, D_P) \leq \sum_{i=1}^{n} \mu(D_C, D_i) + \sum_{i=1}^{n} \mu(D_i, D_P)$. Dividing by *n* we get

$$\mu(D_C, D_P) \leq \frac{\sum_{i=1}^{n} \mu(D_C, D_i)}{n} + \frac{\sum_{i=1}^{n} \mu(D_i, D_P)}{n} = AVCD + AVPD \leq 2AVPD.$$

The following proposition restricts a maximum value of *AVCD*, when a decision space is a one dimensional (real) space.

Proposition 2. Let $DNS = [a, b] \subset R$ be the decision space of *n* decisions D_i. Then: $AVCD \leq \frac{MAXD}{2}$.

Proof:

Let's consider case of n = 2 and let D_1 = a, D_2 = b. The distance of these two decisions is maximal possible and clearly $AVCD = \frac{MAXD}{2}$ for every consensus (each number from*DNS* = [a, b] is a consensus). By adding another preference D_3 (and then D_4, D_5, ...)*AVCD* always decreases, so $AVCD < \frac{MAXD}{2}$ holds.

Next proposition concerns a uniqueness of a consensus in the case when a decision space is a one dimensional (real) space.

PROPOSITION 3. Let $DNS = [a,b] \subset R$ be the decision space of n decisions D_i. Let $a \le D_1 < D_2 < ... < D_n \le b$ (all decisions are distinct), and let $\mu(D_i, D_j) = |D_i - D_j|$. Then:

a) For n odd there is a unique consensus $D_C = D_{\frac{n+1}{2}}$.

b) For n even a consensus is not unique and lies in an interval: $D_C \in \left[D_{\frac{n}{2}}, D_{\frac{n}{2}+1} \right]$.

Proof (by a contradiction):

a) Let's assume that $D' = D_c + \varepsilon = D_{\frac{n+1}{2}}$ is a consensus instead of D_c, where ε is a small ($\varepsilon < \left| D_{\frac{n+1}{2}} - D_{\frac{n+3}{2}} \right|$) positive number which expresses a shift from D_c. Let $R = \sum_{i=1}^{n} \mu(D_C, D_i)$ and let $S = \sum_{i=1}^{n} \mu(D', D_i)$. By substituting $D' = D_c + \varepsilon = D_{\frac{n+1}{2}}$ into S we obtain: $S = \sum_{i=1}^{n} \mu(D', D_i) = R + \frac{n+1}{2}\varepsilon - \frac{n-1}{2}\varepsilon = R + \varepsilon > R$, so D' cannot be a consensus.

Geometrically explained, when we shift a consensus from D_c to D' (to the right), the distances to all D_i on the left side from D' grow by ε, while distances to all D_i on the right side from D' decrease by ε. But after the shift there is always at least one more D_i on the left, so the overall distance (to all D_i) always grows. The proof for larger (or negative) ε is analogical.

b) The proof is analogical to a). If the decision space is one dimensional, the geometric median is equal to the median, the result shown already in Haldane (1948), though the median is not defined unequivocally for even number of points. However, from Proposition 3 it follows that for n even every point (not only the median) between two 'middle' given points is a consensus.

The importance of Proposition 1 can be seen when considering decisions in the form of rankings of k objects (objects ordered from the 1st to the kth place). In such a framework rankings are usually treated as permutations from a space S_k of all permutation of order k, and consensus is a permutation minimizing the sum of distances to other (given) permutations. For a solution (finding a consensus) several permutation methods were proposed, such as CRM or DCM, see e.g. (Cook and Kress 1985; Cook 2006; Tavana *et al.* 2007, Mazurek 2011).

Main disadvantage of these methods is that they search through the whole space of S_k, but the number of permutations grows as $k!$ and the maximum distance as $\binom{k}{2}$, so for larger k (approx. k> 10) these methods are inapplicable. However, from Proposition 1 it is clear that a consensus cannot be too distant from a pivot, hence the searching (discrete) space can be reduced significantly (by several orders of magnitude).

4. Numerical examples

In this section several numerical examples are provided to illustrate concepts and measures introduced in section 2.

Example 1. A 'classic' example from the social choice theory: three candidates (*a*, *b*, and *c*) are ranked by three voters in the following way. Find a consensus (a winner):

place	voter 1	voter 2	voter 3
1.	a	b	c
2.	b	c	a
3.	c	a	b

Solution:

All candidates are ranked equally; there is no consensus; and no winner as well. We can evaluate (Kendall's tau) distances between all preferences (columns C1 to C3): $\mu(C1,C2)=\mu(C1,C3)=\mu(C2,C3)=2$. All preferences have the total distance to others equal to 4. Each preference is a pivot and also a consensus. Apparently, the problem is ill-defined.

Example 2. Six decision makers (DM_1 to DM_6) rank 7 candidates (from A to G) for a given managerial position. All rankings are provided in Table 1. Find:

a) a pivot,
b) a consensus,
c) a group discord *GDIS*, *AVCD* and *AVPD*,
d) an individual discord of all DMs,
e) outliers,
f) a cumulative distance function.

Solution:

At the beginning we have to decide what metric is going to be used, as different metrics might lead to (slightly) different results. In this example Kendall's tau distance is applied as a natural metric when dealing with rankings (permutations). Also, we set $n = 6$ and $k = 7$.

Table 1– Rankings of all alternatives by all decision makers

Position	DM1	DM2	DM3	DM4	DM5	DM6
1	A	C	C	D	A	C
2	C	A	D	A	C	D
3	D	F	A	C	F	A
4	F	D	F	B	B	F
5	B	B	B	G	D	G
6	G	E	G	F	E	E
7	E	G	E	E	G	B

a) Pivots are DM_1 and DM_3 with the sum of distances from the other D_i equal to 16.

b) The unique consensus D_C = (C,A,D,F,B,G,E). Its sum of distances to other D_i is 15, which is a minimum.

c) $AVCD=\frac{5}{2}$, $AVPD=\frac{8}{3}$, $MAXD=\frac{k(k-1)}{2}=21$, $GDIS=\frac{AVCD}{MAXD}=\frac{5}{42}$.

d) $IDIS_1=16$, $IDIS_2=20$, $IDIS_3=16$, $IDIS_4=26$, $IDIS_5=24$, $IDIS_6=22$,

$RIDIS_1=\frac{16}{124}=0.129$, $RIDIS_2=0.161$, $RIDIS_3=0.129$, $RIDIS_4=0.210$, $RIDIS_5=0.194$,

$RIDIS_6=0.177$. ($RIDIS_4=0.210$, for example, means that DM_4 is responsible for 21% of the disagreement of the group)

e) For $\varepsilon=0$ DM_4 and DM_5 are outliers. These two DMs could be asked to revise their preferences or they could be excluded form a decision making process. The rest of DMs belongs to the core.

f) Some values of *CDF*: *CDF*(0) = 0, *CDF*(1) = 2, *CDF*(2) = 4, *CDF*(3) = 4, *CDF*(4) = 5, *CDF*(5) = 6.

From Proposition 1 we know that $\mu(D_C, D_P) \leq 2AVPD$, and indeed, in this case we obtain: $\mu(D_C, D_P) = 1 \leq 2AVPD = \frac{16}{3}$.

Therefore, the search for the consensus can start with each of two pivots. Then all permutations with the distance from the pivot equal to 1, 2, 3, 4 and 5 (integers smaller than 16/3) are examined, and the consensus is found. It is not necessary to examine all possible permutations from S_7 space (5040 permutations), as it suffices to scrutinize only 343 permutations for each pivot. (The distribution of permutation distances can be found e. g. in Margolius (2001))

Table 2 – Distances among all alternatives from Example 2.

	DM1	DM2	DM3	DM4	DM5	DM6
DM1	0	3	2	4	3	4
DM2	3	0	3	7	2	5
DM3	2	3	0	4	5	2
DM4	4	7	4	0	7	4
DM5	3	2	5	7	0	7
DM6	4	5	2	4	7	0

Example 3. Six decision makers (DM_1 to DM_6) rank 7 candidates (from A to G) according to their leadership skills. All rankings are provided in Table 3. Find:

a) a pivot,
b) a consensus,
c) a group discord *GDIS*, *AVCD* and *AVPD*,
d) an individual discord of all DMs,
e) outliers,
f) a cumulative distance function.

Solution:

The problem is apparently ill-structured, as there are two groups of DMs with identical rankings, which are in an 'opposition'. One cannot expect to get a reasonable result – a consensus – under such circumstances. Nevertheless, we set $n = 6$ and $k = 7$ and proceed. The problem emerges immediately:

- All DM_i are pivots.
- A consensus is not unique. Actually, each permutation 'between' (A,B,C,D,E,F,G) and (D,A,C,B,G,F,E), for example (D,A,B,C,E,F,G), including the both aforementioned permutations, is a consensus with a total distance of 21 to all other permutations.
- $AVCD = \frac{7}{2}$, $AVPD = \frac{7}{2}$, $MAXD = \frac{k(k-1)}{2} = 21$, $GDIS = \frac{AVCD}{MAXD} = \frac{1}{6}$.
- $IDIS_i = 21$, $RIDIS_i = \frac{21}{126} = 0.167$ for all *i*.
- Outliers or a core cannot be identified (there is no unique consensus).
- The cumulative distance function requires a unique consensus. Setting (for example) D_C = DM_1 we obtain: $CDF([0,7)) = 3$, $CDF(7) = 6$. A sudden 'jump' in *CDF* values indicates a problem in DMs' preference structure.

But if one decision maker, for example DM_1, changes his preferences, then a (unique) consensus would be possible, and it will be equal to DM_1. Applying the procedure for ill-defined problems introduced in the next section would result in a removal of all DMs in one step, with no consensus (solution) found.

Table 3 – Rankings of all alternatives by all decision makers

Position	DM1	DM2	DM3	DM4	DM5	DM6
1	A	A	A	D	D	D
2	B	B	B	A	A	A
3	C	C	C	C	C	C
4	D	D	D	B	B	B
5	E	E	E	G	G	G
6	F	F	F	F	F	F
7	G	G	G	E	E	E

Example 4. Five members of a director board discuss the optimal amount of an investment. Their proposals (preferences) are as follows (in thousands of dollars): DM_1 = 200, DM_2 = 250, DM_3 = 230, DM_4 = 310 and DM_5 = 190. Find a consensus.

Solution:

By application of Proposition 3 we immediately get D_C = DM_3 = 230. The overall distance of D_C to all $DM_i$is 170. By a change, for example, to D' = 240 ($\varepsilon = 10$), we obtain overall distance to all D_i= 180, which is more (by $\varepsilon = 10$) than in the case of D_C= 230. The arithmetic mean of all preference numbers is 236, but it is not the closest value to all preferences, while the median 230 is the correct result.

5. Well-defined and ill-defined problems

Problems of achieving a consensus in a group decision making may be classified as *well-defined* (with one unique consensus) or *ill-defined* (problems leading to no consensus or more than one consensus).

Analysis of preferences is able to indicate the ill-defined problems, as shown in numerical examples of the previous section. However, there is not known general method for discriminating both cases based only on an analysis of preferences, though it is known that if preferences are points in Euclidean space and no three points lie on the same line (there is no collinearity), then the consensus is unique, see Vardi and Zhang (2000).

Question arises how to handle ill-defined problems. In real-world situations, decision makers may discuss (negotiate) the problem and change their preferences in a way that enables achieving a consensus (see for example *Delphi method*). This might be case of various boards or councils, but it is not possible for example in elections, where once polling is over, nothing can be changed. In the social choice theory ill-defined problems are considered paradoxes; Example 1 in section 5 for example illustrates the so called *circular ambiguity*, which stems from intransitivity of preferences. During time various sophisticated methods were developed to avoid the problem, see e.g. Nurmi (1999).

In the context of this study a simple way to obtain a well-defined problem from an ill-defined one lies in the identification of preferences (aka decision makers) with the highest discord (outliers). Such preferences might be a subject of revision or can be excluded from a decision making process. Then, a new analysis could be performed and a unique consensus might be found. If not, a preference with the second highest discord can be changed (excluded), and the whole process is repeated until a unique consensus is found or there is no preference left (and no solution as well).

This procedure might succeed in some cases, though unsolvable (ill-defined) instances such as from Example 3 (two equally strong opposing groups) will persist (the proposed procedure excludes all preferences at the beginning as all preferences have the same discord, leaving the set of preferences empty).

6. Some possible extensions of the proposed approach

In previous sections preferences provided by decision makers were supposed to be precise and complete. But sometimes decision makers are not able to express their preferences in that manner due to lack of time, insufficient or incomplete information, limited knowledge, lack of appropriate education, prejudice, etc. In such a case, decision makers can provide uncertain preferences in many forms ranging from applications of fuzzy sets, computing with words, use of intervals, to belief and possibility theory.

The proposed analysis of preferences can be extended to comprise some forms of uncertainty:

- *Fuzzy pairwise comparisons*: One common way of expressing preferences are pairwise comparisons of objects. When uncertainty is involved in pairwise comparisons, an additive fuzzy preference relation is

defined as a binary relation on a universal set X assigning each pair (x,y), $x, y \in X$, a value ρ from the interval [0,1] so that $\rho(x,y) = 1 - \rho(y,x)$ (additive reciprocity). The value $\rho(x,y) = 0.5$ denotes indifference between objects, while the value 1 means that a given object is absolutely preferred over some other object, see (Orlovsky 1978, Perny and Roubens 1998, Herrera *et al.* 2001). Then, all pairwise comparisons can be written in a fuzzy pairwise comparison matrix, and their distance can be evaluated with the use of an appropriate matrix norm.

- DMs can express his/her uncertain preferences with the use of triangular or trapezoidal *fuzzy numbers* with a suitable metric, see e.g. Voxman (1998). Moreover, fuzzy preferences can be incomplete too, see Herrera-Viedma *et al.* (2007).
- Individual preferences can be expressed also in a form of words (the so called *linguistic variables*), see e. g. (Zadeh 1975, Xu 2013), where terms such as 'good' 'very good', etc., are represented by fuzzy numbers.
- DM can express his/her opinion in a crisp, but *incomplete* form. For example when ranking ten objects a DM can be able to rank only top three, leaving the rest of the list empty. Though there are methods for the evaluation of incomplete pairwise comparisons or incomplete rankings described in literature, the approach proposed in this paper relies on a precise measurement of a distance by a suitable metric function, which cannot be achieved for incomplete preferences in general.
- The proposed approach can be extended to *multiple criteria* framework as well, with the evaluation of a distance among preferences taking place before an aggregation phase (for each criterion separately), or after the aggregation (for all criteria).

Conclusions

The aim of this paper was to introduce several measures for an analysis of decision makers' preferences in a group decision making environment, which is a rather neglected issue in the literature. By the proposed measures a disagreement of each preference (each decision maker) can be assessed, so decision makers with the highest disagreement within a group can be identified, and asked to revise their opinion. Also, analysis of preferences can reveal ill-defined problems before a (futile) search for a consensus begins. Furthermore, the distance theorem (Proposition 1) bounding the maximum distance between a pivot and a consensus was introduced. The theorem facilitates search for a consensus especially for discrete spaces (for example for permutation spaces), as it reduces the searching space significantly. A simple procedure for dealing with ill-defined problems was proposed as well, though, of course, some unsolvable cases will persist.

The proposed approach can be easily extended to cases with preferences not only in the form of ordinal rankings or real numbers, but also to cases with fuzzy preferences, fuzzy numbers or linguistic variables. Also, it can be extended to a multiple criteria environment. In such a case preferences can be analyzed for each criterion separately, or for all criteria at once after an aggregation step takes place.

The future research might focus on the problem of the existence of a unique consensus. Vardi and Zhang (2000) showed that a unique consensus (unique geometric median) is achievable if all data points (in E^n) are not collinear (no three points lie on the same line), but no general result is known at present. Furthermore, as shown in Fiedor and Mazurek (2011), with growing differences among preferences (with growing entropy) a unique consensus is less likely to be achieved. The ultimate goal towards this direction might be to find general conditions (concerning a structure of preferences) under which a unique consensus exists or cannot be achieved, respectively.

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The Relationship between Industry Structure and International Competitiveness: Evidence from a Small Open Economy

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Abstract:
The existing empirical literature is ambiguous in findings on how the level of industrial concentration is related to the international competitiveness of the industry. This relation can have a different nature and can be explained differently depending on size and degree of openness of particular economy. In this article we examine the relationship between industry structure and international competitiveness for a panel of 10 key industrial sectors over the period from 1999 to 2014 in the Slovak Republic that is considered to be small, open and export-oriented. The results indicate that international competitiveness improves with a change towards a more concentrated industry structure.

Keywords: industry structure, Herfindahl–Hirschman Index, international competitiveness, revealed comparative advantage.

JEL Classification: F10, L11, L13

1. Introduction

Studies of the industry structure – performance relationship are numerous, beginning with the pioneering work of Bain (1951) who tested the major hypothesis that the profit rates of firms in industries of high seller concentration should, on average, be larger than those of firms in industries of lower concentration, and definitely not ending with the work of Martin (2012) who examined mainstream industrial economics view in light of recent studies of the market structure and market performance relationship in specific industries. Many of the recent studies, however, recorded departure from industry and spotlight on banking sector such as Park (2012), Behname (2012), Zhang, Jiang, Qu and Wang (2013), Ferreira (2014), among others.

Whereas, in the centre of our attention is assessment of international competitiveness and its influencing factors, we were seeking for studies focusing on this issue. Already Pickering and Sheldon (1984) pointed out that more attention needs to be paid to the international trade flows as important measures of industrial performance. However, the scope of works focusing on a relationship between industry structure and international competitiveness as a measure of performance is substantially narrower, with rather contradictory findings.

Hence, the different views on the relationship between domestic industry structure and international competitiveness, as well as the lack of related empirical findings in the context of small economies, led us to analyse the general trend of industry structure evolution and its relationship to international competitiveness in conditions of major industrial sectors in the Slovak Republic at a high level of aggregation. The share of exports of goods and services from the Slovak Republic reached 92% of GDP in 2014. Thus, the Slovak economy is generally considered to be small, open and export-oriented.

2. Literature review

The existing empirical literature is ambiguous in findings on how the level of industrial concentration is related to the international competitiveness of the industry. Empirical studies related to the topic outlined often rely upon the theoretical framework developed by White (1974), who tried to demonstrate that there are theoretical reasons to expect a relationship that runs from the domestic market structure to foreign trade flows. Various arguments support either a positive or a negative relationship on the basis of the industrial organization theory.

On the one hand, Glejser, Jacquemin, and Petit (1980) found (on a sample of Belgian firms) that domestic concentration puts rather a brake on export rates. Similarly, Pickering and Sheldon (1984) concluded that higher or increasing levels of concentration are associated with weaker international trade performance of British industries. The results achieved by Donghwan and Bruce (1997) showed that domestic seller concentration of US food manufacturing industries has a negative influence on global market performance in the case of

homogeneous goods, but has negligible effects in the case of differentiated goods. The evidence found in the study of Zhao and Zou (2002) performed in conditions of Chinese manufacturing firms suggests that industry concentration exerts a negative influence on both export propensity and export intensity. These findings are in principle in accordance with theoretical postulates of Porter (1990) who concluded that the presence of strong local rivals is a powerful stimulus to the creation and persistence of competitive advantage. According to him domestic rivalry creates pressure on companies to innovate and improve. Thus, fragmented industry structures connected with competitive pressures seems to be better drivers of international competitiveness.

On the other hand, the efficiency hypothesis (Demsetz, 1973) argues that concentrated industries are results of more efficient firms´ growing at the expenses of less efficient ones. Thus firms in highly concentrated industries shall be more likely to export than those in fragmented industries. Utton and Morgan (1983) found an association between high concentration and high exports; however, they also found a link between high concentration and slow growth in exports, especially where the influence of multinational companies was limited. Hamilton (1997) supported the view that dominance in the domestic market of New Zealand manufacturing industries is associated with superior trade performance in terms both of higher export growth and lower rates of import growth. Several similar results were detected in regard with the size of the company as one of additional structural variable characterizing industry structure besides concentration itself. Findings of a research project conducted on 7000 German manufacturing companies showed that the probability that a company will export increases with the size of the company (Wagner, 1995). Equally Šuštar (2004) in conditions of Slovenian companies found that a statistically significant dependency between the size of a company and the share of exports in the total sales of company did exist. However, he also pointed out that there are also other factors in addition to company size that influence the export intensity of companies. Interesting cross-industry study was performed by Lin and Huang (2014) who assessed the impacts of banking market structure on industrial exports and found that a more stable and concentrated banking system is important to the exports of those industries that rely more on external finance.

Since the theoretical answer to the relationship between industry structure and international competitiveness is less than clear, the answer has to come case by case. It is reasonable to assume that the relationship can have a different nature and can be explained differently depending on size and degree of openness of particular economy. As explained by Gal (2001) unique economic characteristics of small economies create a basic conflict between productive efficiency and competitive conditions. Small size sharpens the dilemma between whether an economy would be better off with higher concentration to permit more efficient scales of activity or with lower concentration for better allocated efficiency through competition.

In the absence of conclusive findings in this area of research, we examine the unique environment of small and open Slovak economy to determine which arguments are more likely to be valid in the Slovak context.

3. Data and methodology

Our analysis of relationship between industry structure and international competitiveness was performed in conditions of Slovak economy over the period from 1999 to 2014. We used annual panel data for 10 key industrial sectors in the Slovak Republic. According to the two-digit industry level International Standard Industrial Classification of all economic activities (ISIC, Rev. 3), the industries are: the manufacture of food products and beverages (15); the manufacture of coke, refined petroleum products and nuclear fuel (23); the manufacture of chemicals and chemical products (24); the manufacture of rubber and plastics products (25); the manufacture of basic metals (27); the manufacture of machinery and equipment (29); the manufacture of electrical machinery and apparatus (31); the manufacture of radio, television and communication equipment and apparatus (32); the manufacture of motor vehicles, trailers and semi-trailers (34); electricity, gas, steam and hot water supply (40). The sectors included in the research form more than 80% of the sales of the Slovak industry as a whole. Analyses were performed at such a high level of aggregation due to the public availability of input data only at this level and to meet the aim of measuring the role played by large firms within particular industry sectors as a whole.

In order to construct indicators of industry structure, input data on sales and other control variables for the industry sectors investigated were taken from Industry Yearbooks published by the Statistical Office of the Slovak Republic. Given that the yearbooks contain the results of the processing of corporate annual reports submitted by firms with 20 or more employees as well as firms with up to 19 employees, but reached yearly turnover of more than 5 million Euros, only those organizations were included in the research. To complete it should be acknowledged that we only worked with firms incorporated in Slovak Republic, i.e. with domestic producers.Data on the sales of the largest firms in the relevant industry sector were obtained from firm annual reports published on the firm website or filed with the collection of deeds in the relevant commercial register.

As a primary indicator of industry structure, the Herfindahl–Hirschman Index (*HHI*) was chosen due to the fact that from 1982 it is used by the US Department of Justice as a formal numerical guideline for horizontal mergers assessment. Its application can also be found in numerous empirical works (see e.g. Sepúlveda, 2012; Nawrocki, Carter, 2010). It is calculated as the sum of the squares of the market shares (s_i) of all firms in the industry and varies between 0 and 10 000.

$$HHI = \sum_{i=1}^{n} s_i^2 \tag{1}$$

Crucial to the construction of HHI and similar indexes is accurate measurement of the largest firms' shares, as these have the greatest impact on resulting value. We applied a hypothetical assumption that the market shares of "other" firms are the same and we divided the remaining market share equally among other firms operating in the industry, so as to avoid potential distortion of the value of the index.

As additional indicators of industry structure, the average size of firm measured by the average number of employees (*E*) and number of firms (*F*) in the industry sector were used.

As a proxy for international competitiveness, trade performance is generally employed by considering a combination of export and import flows (e.g. Hamilton, 1997; Pickering & Sheldon, 1984). However, another common approach is to analyse trade performance on the basis of revealed comparative advantage (*RCA*) (Fertö, Hubbard, 2003). Although there are many revisions and modifications of Balassa's (1965) RCA index, the original RCA index is still the measure most widely used by applied economists (Cai, Leung, 2008). For the purpose of assessing the international competitiveness of industries, we used Balassa's RCA index as published by the OECD and transformed to the symmetric form (revealed symmetric comparative advantage – *RSCA*), as recommended by Laursen (1998). Balassa´s RCA index can be defined as:

$$RCA_{ij} = \frac{\frac{X_{ij}}{\sum_i X_{ij}}}{\frac{\sum_j X_{ij}}{\sum_i \sum_j X_{ij}}} \tag{2}$$

where nominatorrepresents share of export (X) of the industry i on the total exports from the country *j* and denominator represents share of export of the industry i on the total exports of OECD.

The*RSCA*index can be defined as:

$$RSCA = \frac{RCA - 1}{RCA + 1} \tag{3}$$

The*RSCA*index varies between -1 to 1, while negative values indicate uncompetitiveness positive values competitiveness. When*RSCA*equals zero, for a given sector in a given country, the percentage share of that sector is identical with the OECD average.

The relationship between industry structure using*HHI* and international competitiveness using*RSCA* index was performed on the level of all 10 analysed industries and additionally separately for fragmented (5 industries) and concentrated (5 industries). The categorization of industries was performed according to the achieved value of*HHI* as defined by Department of Justice´s *Horizontal Merger Guidelines* (2010, section 5.3).

4. Results and discussion

Table 1 provides the average values of the studied variables for the total sample of all 10 analysed industries (*T*) and separately for the groups of concentrated (*C*) and fragmented (*Fr*) industries. Due to the consecutive combination of linear and quadratic variables, the table also contains *lnHHI* used in the following analyses. This indicates that concentrated industries achieve positive international competitiveness on average, whereas fragmented industries are in contrast uncompetitive (negative average value of the *RSCA* index).

Table1 -Average values (means) of studied variables

Variable	*T*	*C*	*Fr*
RSCA	0.061	0.145	-0.021
HHI	2498.096	4622.730	372.823
lnHHI	6.994	8.246	5.742
E	343.323	479.153	204.473
F	108.070	49.504	166.636

Source: own processing

The categorization to fragmented and concentrated industries according to the achieved value of*HHI* was verified by testing the equality of means. There was confirmed the existence of statistically significant difference in international competitiveness trade performance (*RSCA*, t-test 3.08), firm size (E , t-test 8.24) and number of firms (F , t-test 10.7) between fragmented and concentrated industry sectors.

Relationship between industry structure and international competitiveness was at first studied through correlation analysis. Table 2 shows the corresponding correlations using Pearson and Spearman correlation coefficients. Statistical significance of results was achieved mainly at analyzing the total sample of all industries. Slightly higher Spearman correlations may indicate existence of non-linear relationship between the studied variables.

Table 2 -Correlation coefficients

	Pearson Correlation coefficient				Spearman Correlation coefficient			
$RSCA_T$	HHI_T	$lnHHI_T$	E_T	F_T	HHI_T	$lnHHI_T$	E_T	F_T
	0.3125 ***	0.3355 ***	0.3499 ***	-0.2540 ***	0.4011 ***	0.3712 ***	0.4951 ***	-0.2043 **
$RSCA_C$	HHI_C	$lnHHI_C$	E_C	F_C	HHI_C	$lnHHI_C$	E_C	F_C
	0.2088 *	0.3044 **	0.2990 **	0.1190	0.0244	0.0411	0.3369 ***	0.3085 **
$RSCA_{Fr}$	HHI_{Fr}	$lnHHI_{Fr}$	E_{Fr}	F_{Fr}	HHI_{Fr}	$lnHHI_{Fr}$	E_{Fr}	F_{Fr}
	-0.1875	0.0632	0.2720 **	-0.2951 **	0.0877	0.0798	0.2299 *	-0.1731 **

Source: own processing

The relationship between industry structure and international competitiveness was then studied within a panel regression framework. Concentration, measured via *lnHHI*, remained in focus, while the dependent variable remained the *RSCA* index and other market structure indicators were gradually added. We considered three types of model: RE – random effect, LSDV – least squares dummy variable, within-between RE – Mudlak´s within-between RE model with the following specification (model III with all variables):

$$RSCA_{it} = \beta_0 + \beta_1\left(\ln HHI_{it} - \overline{\ln HHI_i}\right) + \beta_2\left(E_{it} - \overline{E_i}\right) + \beta_3\left(F_{it} - \overline{F_i}\right) + \beta_4 \overline{\ln HHI_i} + \\ + \beta_5 \overline{E_i} + \beta_6 \overline{F_i} + \left(u_t - e_{it}\right) \quad (4)$$

The results in Table 3 indicate that international competitiveness improves with a change towards a more concentrated industry structure.

Table 3 - Panel regression

	I			II			III		
	RE	LSDV	within-between RE	RE	LSDV	within-between RE	RE	LSDV	within-between RE
const.	0.0721**	-0.2989***	-0.4245	0.0721	-0.2989***	-0.3803	0.0721	-0.2889***	-0.2630
	(0.0256)	(0.0205)	(0.3156)	(0.0820)	(0.0256)	(0.1327)	(0.0705)	(0.0336)	(0.8673)
$lnHHI_{it}$	0.0912*	0.0912*	0.0912	0.1012**	0.1012**	0.1012	0.1340**	0.1340***	0.1340
	(0.0499)	(0.0566)	(0.0703)	(0.0490)	(0.0500)	(0.0998)	(0.0535)	(0.0380)	(0.1120)
E_{it}				0.0011***	0.0011***	0.0011***	0.0019***	0.0019***	0.0019***
				(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0003)	(0.0002)
F_{it}							0.0031*	0.0031**	0.0031
							(0.0009)	(0.0009)	(0.0016)

$\overline{\ln HHI_i}$			0.0766			0.0503			0.0435
			(0.0390)			(0.1003)			(0.1420)
$\overline{E_i}$						0.0013			0.0015
						(0.0049)			(0.0011)
$\overline{F_i}$									-0.0005
									(0.0008)
R^2 adj.		**50.62 %**		**55.87 %**				**58.12 %**	

Source: own processing
Notes: Robust standard errors in parentheses. ***, **, * denote significance at the 1%, 5% and 10% levels, respectively. $\overline{\ln HHI_i}$ ($\overline{E_i}$, $\overline{F_i}$) denote average *lnHHI* (*E*, *F*) over time *t* for given industry *i*.

Most of the panel data models suggest the existence of a positive relationship between industry concentration and the international competitiveness of major industrial sectors in the Slovak Republic at the aggregated level of analyses. These results support Hamilton's (1997) finding that dominance in the domestic market is associated with superior trade performance. A possible explanation for our finding is that large firms in concentrated domestic markets within small open economies can in general cope better with the risk associated with export activities, have better research potential for innovations and possess more non-price competitive assets. Thus, we can agree with Das (1982, p. 691) that "a country will export the product of its relatively more concentrated sector". This is partially supported also by findings of Lopez, Lopez, Lirón-España (2014) results of which indicate that greater concentration is likely to enhance aggregate welfare in industries with low or moderate initial concentration that exhibit economies of scale and have greater exposure to international trade. Higher industry concentrations are associated with existence of smaller number of larger firms. As indicated by Šuštar (2004) larger companies possess to a greater extent internal resources which they can more easily combine with the opportunities that appear in foreign markets. Large firm or plant size may be according to Gal (2001) required in order to achieve efficient scales of production in small economies. Key implication of this fact is that high levels of industry concentration in small open economy may be necessary in order to achieve positive competitiveness on international markets.

Conclusion

The paper introduced conflicting views on the relationship between domestic industry structure and international competitiveness of key industry sectors within small open economy. The results show that increasing industry concentration has positive effect on international competitiveness of industries. This seems to be valid for economies with relatively small internal market with the resulting need to enable firms to grow to relatively large size in order to realize necessary efficiency and bear the risks on international markets.

However, our findings have limitations with regard to the identification of small or statistically non-significant relationships by analysing concentrated and fragmented industries separately. We assume that the analysis of the relationship between industry structure and international competitiveness at lower levels of aggregation may bring moderately different results depending on the nature of the particular industry.

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The Impact of Board Structure on New Initial Public Offering Companies' Survival

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Abstract:

Corporate governance beliefs generally employ the recreation of an essential role to determine business bankruptcy. Our research objective is to examine the relation between corporate governance related to the board structure and the bankruptcy of Thai IPO (Initial Public Offering) companies based on agencytheory. In this paper, we evaluate 272 companies consisting of 250 survivors and 22 non-survivors. We use the survival analysis by Cox and the proportional hazards technique to find a predictable bankruptcy pattern using our hypotheses. Our results indicate that the board size, the proportion of independent board members, the proportion of board committees, the leadership structure, the ownership concentration and the company age are statistically significant factors in decreasing the hazard of IPO bankruptcy. Otherwise, ownership concentration alone has an increasing risk effect on IPOs bankruptcy.

Keywords: corporate governance, survival analysis, board structure, agency theory

JEL Classification: G34

1. Introduction

Most capitalist business operations today have the main goal of earning maximum profit (Smith 1776). Therefore, amidst higher competition, the companies have been pressured by various factors; these are driving forces causing them to use any possible means to achieve their intended goals. For example, intent to change accounting numbers exists, using the flexibility of generally accepted accounting principles, customized to senior executives' desires. This is shown by AIG, which manipulated its company's financials to show earnings of more than 1.7 billion USD over its actual number by creating a plan to establish insurance companies in other countries]to which to transfer company losses (SEC News Digest, 2006). In another case in 2002, WorldCom manipulated 3.85 billion US dollars in financial data. Consequently, the company achieved 1.38 billion US dollars in net revenues in 2001 instead of suffering losses. These corporate behaviors have caused a lack of confidence in the stock market and management systems, causing a capital outflow from the USand impacting the country's overall economy. This behavior also called the lack of transparency in financial statements of other companies into question (Leahy 2009). This may not reflect the actual economic events including corporate governance violations.

Thailand had improved and transformed its systematic business operation structure into the Western model to be more appropriate, (Keong 2002, Khan 2004) after experiencing a major crisis in 1997. This crisis caused bankruptcies for nearly 50 of the listed companies on the stock exchange market because of weak business operations that had no corporate governance (Dhnadirek and Tang 2003, Limpaphayom and Connelly 2004). The concept of "corporate governance is the relationship between various parties used to make decisions in the operation and direction of the company".

Corporate governance focuses on structures for operating the business and managing the firm; this involves the relationships between a company's controlling systems and the roles of the board of directors, shareholders and stakeholders (Hong Vo and Minh Nguyen 2014). The corporate governance structure consists of three primary groups of people: shareholders, board of directors and the executive. Their roles involve groups of secondary people, including stakeholders, the audit committee and the independent committee (Monks and Minow 2008). The Stock Exchange Market of Thailand has introduced 15 principles of corporate governance to listed companies in 2006. These are comparable to the corporate governance of The Organization for Economic Co-operation and Development: OECD (The Organization for Economic Co-operation and Development, 2004), which is a model of law and practice for the governance of government and the Stock Exchange. Many researchers have noted the mixed format for proper corporate governance for developing countries. In addition to compelling high quality in the capital markets, strong corporate governance also reassures investors to believe that a company will effectively exist (Roberto *et al.* 2008).

This study focuses on investigating the relation between the board structure of IPOs, called 'Initial Public Offerings', and the likelihood of company bankruptcy. IPOs are referred to as the initial public share offering of a

company. The company may require expansion funds for its budget or may want to distribute its shares to the general public. The data on the structure of the Board of IPOs are clearer and more specific than those of companies previously in the stock market. Survival analysis methods are used to analyze the impact of the board structure because of the belief that every company would want to operate in the long-term. In addition, this method is effective for the analysis and is not vague (Chancharat *et al.* 2012).

Our results indicate that the board size, the proportion of independent board members, the proportion of board committees, the leadership structure and the company age are statistically significant to decreasing the risks to an IPO's bankruptcy. Otherwise, the ownership concentration solely has an increasing risk effect of IPOs bankruptcy.This paper is structured as follows. First, we review previous studies regarding board structure and corporate governance to develop our hypotheses. Second, we present our data and methodology. Third, we present our empirical results and interpretations. Finally, we offer our discussion and conclusion for development of future research.

2. Literature review and theoretical development

This study considers the impact of the five major committees' structure, according to the principles of good corporate governance of listed companies on the Stock Exchange of Thailand (SET), which is the same as the following stock markets: NYSE and NASDAQ inUSA and ASX in Australia (Chancharat *et al.* 2012). According to the literature, this study includes the variables that may relate to the likelihood of an IPO's bankruptcy. These variables include board size, independent board, audit committee, leadership structure, and ownership concentration, number of meetings, auditor's reputation, trading signs, company age.

Board Size: The board is vital to the company and has a role in determining a company's operational policies, rules and regulations. The board's role includes focusing on compliance according to corporate governance principles (Bupakarakul 2009). Based on the factor regarding the board's size, although there is no clear definition of the appropriate number of board members, the large size of the board committee may lead to effective operation (Goktan and *et al.* 2006). This is because the board will adequately consult before deciding any aspects of company business. The study by Haniffa and Hudaib (2006) found a correlation between the board size and the company's operating results. The study shows that a company with a large board will perform better because of a wide range of experiences and opinions causing the companies to select the best choice. We find studies regarding small boards relevant to corporate governance. This includes studies by Fich and Stezak (2008), who found that a small committee will be able to avoid company failure better than a company with a larger board (Susan et al. 2002, Xie *et al*, 2003, Chiang and Chia 2005, Coleman 2007, Roberto *et al*, 2008, Mohamed *et al.* 2009 and Eyenubo 2013). However, a study by Bupakarakul (2009) found that the size of the company board negatively relates to the company's operating results; these results are the same as those of the study by Hermalin and Weisbach (2000). However, the study by Tachapichaya (2007) found that board size does not affect the company's operation. The proxy of board size was used in the study to validate our results. The research hypothesis is established as follows:

Hypothesis 1: The Board size of IPOs affects the bankruptcy of the listed companies on the Stock Exchange.

Board Independence: One important mechanism of board structure is the composition of the board (George and Karibo, 2014). The composition examines decisions, balances the company administration, controls decisions and eliminates conflicts of interest between the shareholders and the management team, which, according to the agency theory of administrators, performs these duties more efficiently than dependent boards. The theory states that people are motivated to advance personal interests (Letza *et al.*, 2008). A board composed of external parties will act to protect the interests of all shareholders in all groups who are unlikely to confront the executive director and to efficiently examine the administrative department's operation (Helen *et al.*, 2010) because they must to retain their reputations. This causes the independent board to become essential variables of corporate governance, which will be able to reduce problems arising from the representatives. The study by Jiamsakul (2007) found that a higher proportion of independent board members can reduce the agent problem and improve operations (Ho and Wong 2001, Tachapichaya2007; Roberto *et al.*, 2008, Pupanit 2010; Apadore and Zainol2014). The research hypothesis is as follows:

Hypothesis 2: The proportion of board independence of IPOs affects the bankruptcy of a company listed on the Stock Exchange.

Audit Committee: This is tasked with monitoring business governance to ensure such businesses have strong internal controls and is tasked with creating increased quality auditing (Al-Ajmi 2009), including the need to abide by the requirements of the Stock Exchange of Thailand. The audit committee is an independent organization that provides support and action on behalf of the Board of the company to verify the financial information presented to the shareholders and other stakeholders. The committee also monitors the risk management system, the internal control system and the internal audit system, including communications with the company's auditors to efficiently comply with the principles of good management. The organizations with an appointed audit committee will prepare more reliable financial statements (Beasley and Salterio 2001,Vafeas 2005). The audit committee is directly responsible for appointing, determining remuneration and supervising the work of the external auditors. In Thailand, the audit committee should have at least three of five members who are independent from the administration department (The Stock Exchange of Thailand, 1999). This regulation will reduce the chance that the audit committee will be interfered with by major shareholder groups. The research hypothesis of the audit committee is established as follows:

Hypothesis 3: The composition of the audit committee of IPOs affects the bankruptcy of companies listed on the stock exchange.

Leadership Structure: The chairman of the board should be chosen from an independent committee and should not be the same person as the managing director (CEO) in order to divide their responsibilities on policy determination and regular administration (The Stock Exchange of Thailand, 1999) and to provide a management system with balanced power (Pannarong2010). Therefore, the company is able to determine the appropriate structure of the company. An effective principle is that the chairman should not have his/her position combined with that of the CEO (chief executive officer). Furthermore, the chairman should be an independent and should not be the representative of major shareholders or stakeholders. This may affect the company's operations. If the president and the chairman are the same person, this will cause the administrator to work without consideration for the best interests of the shareholders or stakeholders. This focus damages the company and its operations (Bupakarakul2009). A study by Coleman (2007) found that the combined position of the chairman and CEO has a negative relationship to the shareholder value of the listed companies in the stock markets of South Africa, Kenya, Ghana and Nigeria. According to the study by Haniffa and Hudaib (2006), such a relationship has negative results for operations (Tachapichaya 2007, Jiamsakul 2007, Bupakarakul 2009); this is consistent with the study by Zhenglin and Bernstein (2004), which found that companies that separate the chairman and CEO roles had better performance than those with a combined position. Management of the committee by someone who is not in the chairman position negatively relates to financial problems (Susan *et al.* 2002; Abdullah 2006). The dummy variable takes a value of 1 if the chairperson and the CEO is the same person; otherwise, it takes the value 0. Accordingly, Hypothesis 4 could be determined as:

Hypothesis 4: The combined position of chairman and CEO of IPOs affects bankruptcies of companies listed on the stock exchange.

Ownership Concentration: According to agency theory, which plays a role in optimizing regulators and company management (Arthur *et al.* 1993), concentrated ownership may cause representatives who are major shareholders to have the right to sufficient votes to control the company (controlling shareholder). For example, a family business with a high share concentration has a conflict of interest between major shareholders with sufficient voting rights to control the company and minority shareholders, instead of between the board and the shareholders. This causes the board to consider the interests of the major shareholders as important. Shareholder concentration potentially negatively affects the company (Helen *et al.* 2010) and increases the risk of company bankruptcy in Thailand before an actual bankruptcy (Chitnomrath *et al.* 2011). The shareholding structure in concentrated form is often dominated by large shareholders who have sufficient voting rights to control the company (Hutchinson and Gul 2004). The hypothesis of ownership concentration used in the study is formulated as follows:

Hypothesis 5: The structure of ownership concentration affects the bankruptcy of a company listed on the stock exchange.

Number of Meetings: The audit committee is the major mechanism that shall be established to provide good corporate governance. The qualification of the audit committee, general meetings, duties and responsibilities must ensure that the financial report is released appropriately and correctly (Kanyakiti2010). The number of annual meetings depends on the size of the company and the assigned responsibilities, with an

average of four times a year. There may be a special meeting of the audit committee if requested by the audit committee, the auditors and the internal auditors or the chairman of the company to discuss critical issues (The Stock Exchange of Thailand, 1999). Although there are no specific rules for determining the number of meetings each year, the company must disclose the meeting attendance for each member of the committee (Corporate Governance, 2005). The meeting is particularly important for committee data exchange and interaction; this increases the quality and quantity of information, which is helpful in effectively managing the company. Additionally, this reduces reliance on external information and increases the independence of the committee (Martin, 2005). A study by Xie *et al.* (2003) found that the number of audit committee meetings is associated with earnings management in the negative direction, if there are a large number of meetings (Abnormal Board Activity) or special company meetings. This may demonstrate problems and may inevitably reflect the bankruptcy of the company (Vafeas, 1999; Helen *et al.*, 2010). The hypothesis is established as follows:

Hypothesis 6: The number of meetings affects the bankruptcy of a company listed on the stock exchange.

Auditor Reputation: The comments of auditors can provide assurance on the financial statements to information users. According to theory, the auditor will mainly work for the benefits of the shareholders and to alleviate the agency problem between the agents and the representative. Therefore, it is possible that the board will employ auditors with a high standard of quality service. The use of a large firm's audit service will result in the relationship causing higher auditing quality than that of a small firm (Al - Ajmi 2009), which can attract investment. When a large auditing firm has provided the auditor with high quality, this is deemed as the method for preventing earnings management. The dummy variable takes a value of 1 if the accounting company is one of four large accounting companies, including Ernst and Young, KPMG, PWC and Deloitte Touche Tohmatsu; otherwise, it takes a value of 0. Consequently, Hypothesis 7 could be defined as follows:

Hypothesis 7: The size of the audit firm affects the bankruptcy of the listed company on the stock exchange.

*Trading Signs:*The display of signs, NP, NR, H and SP, indicates a temporary ban on trading securities. This normally happens in cases such as awaiting information from the company, having news and information that affects the rights and interests of the shareholders, waiting for fact approval that the company must clarify for the stock exchange, violating or failure to comply with the laws, failure to submit financial statements to the stock exchange in time, delivering a financial report late three times, being in consecutive revocation and being in the status improvement period (The Stock Exchange of Thailand, 1999). These cases show a lack of discipline in corporate governance, possibly affecting bankruptcy of the company. The dummy variable takes a value of 1 if the trading sign is one of these four signs, including NP, NR, H and SP; otherwise, it takes a value of 0. The hypothesis is set as follows:

Hypothesis 8: Showing signs of trading ban affects the bankruptcy of a company listed on the stock exchange.

Company Ages: Older companies will have more experience in the learning model developed, which allows the companies to survive better than the younger companies, which have a high risk of failure due to lack of experience in the operation. The age of the company can indicate a financial failure (Rommer, 2005; Hensher *et al.*, 2007). The research hypothesis of company ages can be defined as follows:

Hypothesis 9: The ages of the company affect the bankruptcy of the listed company on the stock exchange.

3. Data and methodology

3.1 Data and Sample

This study used data for the listed IPOs during 1992-2007 and followed their performance until the year 2012 in the SET. This study excluded companies listed on the MAI and the financial institutions because their financial statements differ from the other groups and the companies that do not have inadequate information. Consequently, there were 272 sample companies (250 companies are survivors, and 22 companies are non-survivors). The sample used is shown in Table 1. The collected data are the secondary data of the fiscal year and the annual statement (Form 56-1). For non-survival companies, the data listed are revoked from 1992 to 2012 (The Stock Exchange of Thailand, 2012).

Table 1 - Composition of sample

Stratified by GICS industry sector		
GICS industry sector	**Number**	**Percent (%)**
Service	51	18.75
Property & Construction	73	26.84
Agro & Food Industry	25	9.19
Consumer Products	13	4.78
Technology	37	13.60
Resources	25	9.19
Industrials	48	17.65
TOTAL	**272**	**100.00**

*Note:*N is the number of companies. Percent is the proportion of the company group relative to the total number.

Stratified by Status		
Status	**Number**	**Percent (%)**
Survival	250	91.91
Non-Survival	22	8.09
TOTAL	**272**	**100.00**

*Note:*N is the number of companies. Percent is the proportion of the particular status group relative to the total number of companies.

3.2. Analytical approach

A technique called Cox Proportional Hazard (CPH) or Cox Regression is one of the techniques of survival analysis that is a class of statistical methods for studying the incidence and timing of events (Allison 2010). In a study of the relation between the dependent variable and independent variables, some of the available data and the time involved are incomplete or are obtained from the censored data developed by Cox (Cox 1972) using analysis, such as the analysis of multiple regressions in the Cox Proportional Hazard model. The variables used and the definition are shown in Table 2.

Table 2 - The variables used in the study

VARIABLE CODE	VARIABLE NAME	DEFINITION OF VARIABLE
STATUS	Dependent variable: Survival or Non-survival	State of IPOs listed from 1992 to 2007 their performance followed until the year 2012: a company that remains on the market = Survival (recorded as a value of 0) and a company that is out of the market or being revoked = Non-survival (recorded as a value of 1).
BD_SIZE	Board size	The total number of board members.
BD_INDP	Proportion of independent directors	Proportion of independent directors per the total number of members of the board committee.
BD_AUDIT	Proportion of audit committee	Proportion of audit committee per the total number of committee members.
DUAL_LS	Dual leadership structure	If the chairperson and the CEO is the same person, a value of 1 is recorded; the value is 0 otherwise.
TOP5	Top 5 shareholders	Proportion of shareholders by Top 5 shareholders
MEETING	Meeting of audit committee	The number of annual meetings of the audit committee.
BIG_FOUR	Auditor reputation	The accounting company that IPOs rely on for examination of their financial information. It is one of four major companies in Thailand. The Big 4 accounting companies include Ernst and Young, KPMG, PWC and Deloitte Touche Tohmatsu.
SIGN_LATE	Trading signs	To sign up the temporary trading ban of listed securities. Each time requires duration of not more than one round of trading according to the SET. Trading signs include NP, NR, H and SP, which result in a value of 1; the value is 0 otherwise.
TIME	Company age	The number of years that IPOs have been in the Stock Exchange listed during the years 1992-2007, with their operation followed until the year 2012.

Source: Literature review

The parameters as a function of the risk of the event of interest at time (t) and independent variables can be either quantitative variables or variables that do not depend on time and do not have a normal distribution. The characteristic of the variable of the corporate governance is an abnormal distribution (Susan *et al.* 2002). Additionally, this technique avoids population groups that have a bias (Shumway 2001). The previous studies used the Cox proportional hazards model in the survival analysis, including those of Turetsky and McEwen (2001), Lamberto and Rath (2008) and Chancharat *et al.* (2012). Survival analysis is composed of two functions: the survivor function and the hazard function. The survivor function, *S(t)*, gives the probability that the time until the firm experiences the event, *T*, is greater than a given time *t*. Given that *T* is a random variable that defines the event time for any particular observation, the survival function is then defined as:

$$S(t) = \Pr\ (T > t) \tag{1}$$

The hazard function, *h (t)*, istheevent occurrence ratioattime t,with anon-event untilthat time. The hazard rateis0 toα. The hazard function is defined as:

$$h(t) = \lim_{\Delta t \to 0} \frac{\Pr\ (t \leq T < t + \Delta t \mid X, T \geq t)}{\Delta t} \tag{2}$$

This study employedaCox proportional hazard (PH) model in a semi-parametric model forsurvival analysis. The semi-parametric model requires no assumptions of a distribution model of the hazard function. The estimation of a parameter rate of Cox uses partial likelihood, which eliminates the need to estimate the baseline hazard. This method has a basic agreement because the influence of each independent variable in the equation is the same throughout the study period. That is, the proportion of the influence of the independent variables between the groups or the entire study units is constant. Additionally, each independent variable is time-independent. The model can be written as follows:

$$h(t) = h_0(t) \times \exp(\beta_1 X_1 + \cdots + \beta_k X_k) \qquad i = 1, 2, \ldots, k \tag{3}$$

- *h(t)* - ratio of interesting event occurrence at time *t.*
- $h_0(t)$ - the baseline hazard, representing the risk of individual companies when the variable is equal to 0.
- β_i- the regression coefficients of the independent variables.
- X_i- the independent variable.

For Survival function can be written as the model as follows:

$$S(t) = S_0(t) \times exp^{(\beta_l x_l + \cdots + \beta_k x_k)} \qquad ; i = 1, 2, \ldots, k \tag{4}$$

- *S(t)* - the probability of survivalduration.
- $S_0(t)$- the baseline survival function, referring to the survival of the individual companies when the independent variable is equal to 0.
- β_i - the regression coefficients of the independent variables.
- X_i- the independent variable.

4. Empirical results

This paper focuses on studying the effect of interesting factors, including board size, the proportion of independent board members, the composition of the audit committee, dual leadership structure, the ownership concentration, the number of audit committee meetings, audit reputation, trading sign and company age, to determine thesurvival likelihood of new economy initial public offering companies (IPOs). Basically, certain factors often affect the IPO's survival based on the asset survival theory, such as board structure; therefore, we seek strong evidence to support the theory via empirical study. Therefore, empirical measurement is very useful for the IPOs survival data with sufficient sample companies; we used Pearson correlation coefficients and Cox proportional hazard model computations to explain the empirical measurements.The Pearson correlation coefficients computation is the relation measurement across the variables. The results of the Pearson correlation coefficients are shown in Table 3 to represent a weak relation between the variables with the multicollinearity problem.

Table 3 - Pearson correlation coefficients

Variable	STATUS	BD_SIZE	BD_INDP	BD_AUDIT	DUAL_LS	MEETING	TOP5	BIG_FOUR	SING_LATE	TIME	PAR	CUR	TAT	ROA	DET	ASSET
STATUS	1	-0.022	0.03	.218**	0.082	0.081	-.333**	-.163**	-.303**	.221**	0.011	0.025	0.059	-0.007	-0.005	-0.021
BD_SIZE		1	.296**	-.659**	-0.035	.177**	0.06	.185**	0.006	0.074	0.084	0.025	.215**	.273**	-0.031	.246**
BD_INDP			1	-.390**	-0.053	.191**	0.004	0.006	-0.009	-0.032	0.049	0.075	-0.03	0.034	-0.043	.310**
BD_AUDIT				1	-0.02	-0.065	-0.082	-.141*	-0.106	-0.012	-0.071	-0.028	0.015	-.172**	-0.054	-.188**
DUAL_LS					1	0.009	-0.068	-0.037	-0.009	-0.054	-0.065	-0.056	-0.101	-0.024	0.086	-0.083
MEETING						1	0.071	0.106	0	0.021	0.097	-0.047	0.049	-0.054	-0.04	.234**
TOP5							1	.270**	0.07	-0.106	0.046	0.045	.198**	0.11	-.136*	0.084
BIG_FOUR								1	-0.035	-0.033	-0.063	-0.077	.155*	0.086	-0.05	0.012
SING_LATE									1	.417**	0.09	0.06	-0.043	-0.041	0.095	0.043
TIME										1	.129*	0.087	0.09	0.059	0	-0.019

*Note:**. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.10 level (2-tailed).

STATUS = status of IPOs (survival or non-survival), BD_SIZE = board size, BD_INDP = proportion of independent directors, BD_AUDIT = proportion of audit committee, DUAL_LS = dual leadership structure, MEETING = meeting of audit committee, TOP5 = top 5 shareholders, BIG_FOUR = auditor reputation, SING_LATE = trading signs and TIME = company age.

Cox Proportional Hazards Model Computation

This paper employs the Cox proportional hazards model to estimate the risk coefficients for an IPO's survival likelihood based on each corporate governance variable. We then used the hazard ratio value or regression coefficient for each variable to explain the effect of IPO survival. The estimation results are shown in Table 4.

Table 4 -Estimation results of multivariate cox proportional hazards model of the entire sample

Covariate	Coefficient	Standard error	Wald	p-value	Hazard ratio
BD_SIZE	-.315**	.141	5.004	.025	.730
P_BD_INDP	-9.175**	3.558	6.648	.010	.000
P_BD_AUDIT	-21.258*	6.007	12.522	.000	.000
DUAL_LS	-1.700**	.741	5.256	.022	.183
TOP5	.062*	.020	10.017	.002	1.064
BIG_FOUR	.947	.906	1.092	.296	2.578
MEETING	.042	.088	.232	.630	1.043
AGE	-.275*	.066	17.440	.000	.759
SIGN_LATE	14.164	113.100	.016	.900	1416909.217

Note: *. Correlation is significant at the 0.01 level.
**. Correlation is significant at the 0.05 level.
STATUS = status of IPOs (survival or non-survival), BD_SIZE = board size, BD_INDP = proportion of independent directors, BD_AUDIT = proportion of audit committee, DUAL_LS = dual leadership structure, MEETING = meeting of audit committee, TOP5 = top 5 shareholders, BIG_FOUR = auditor reputation, SING_LATE = trading sign

The Cox proportional hazards model result presents the regression coefficient (β), the standard error, Wald chi-square for testing the relation between time and all of the covariates in the model, p-value tests with the null hypothesis in which the regression coefficient is equal to zero, and the hazard ratio. We compute the hazard ratio to estimate the risk of IPO bankruptcy by the exponential value of the regression coefficient, that is, e^{β} or Exp (β), where β is a regression coefficient of Cox proportional hazard model. There are three levels of interpretations of the hazard ratio results. In the first level, the hazard ratio is equal to 1, such that the variable covariate has no risk effect on IPO survival based on the variable. In the second level, the hazard ratio is more than 1, such that the variable covariate has a more rapid hazard timing of IPO bankruptcy. In the last level, the hazard ratio is less than 1, such that the variable covariate has a low risk timing of IPO bankruptcy.

Our results show the negative coefficient of board size (β= -.315, $p < .05$), indicating that a large board size has a decreased risk of IPO bankruptcy. Our results are similar to those of Haniffa and Hudaib (2006) but different from those of Fich ans Stezak (2008). This study indicates that the board size covariate is significantly related to the operation of the company in IPO survival. The hazard ratio of board size (BD_SIZE) is 0.73 and significant, which indicates that the probability of failing decreases by 27%. Therefore, we find strong evidence for Hypothesis 1.

The degree of board independence (P_BD_INPD) is a negative estimated coefficient (β= -9.175, $p < .05$), and the hazard ratio is zero. The degree of board independence has a decreased risk of IPO bankruptcy while increasing board independence; therefore, we accept Hypothesis 2. Our result of variables is similar to that of Ho and Wong (2001) and Tachapichaya (2007). The hazard ratio of the composition of the board committee (P_BD_AUDIT) is zero, with a negative estimated coefficient (β= -21.258, $p < .01$).

The composition of the board committee (P_BD_AUDIT) has a decreased risk of IPO bankruptcy while increasing the board committee. Our result is similar to that ofVafe as (2005); we thus find support for Hypothesis 3.Our results indicate the negative coefficient of dual leadership structure (DUAL_LS), indicating that the chairperson and the CEO is the same person in the structure has a decreased risk of IPO bankruptcy. The probability of risk is 81.7%, with a hazard ratio of 0.183, so we accept Hypothesis 4. Our result is inconsistencies to those of previous studies, such as those of Susan *et al.* (2002)and Abdullah (2006); that separate the chairman and CEO roles had better performance than combined position.

The ownership concentration (TOP5) has a positive coefficient (β= .062, $p < .01$), has a negativepotential effect on the company (Helen *et al.*, 2010) and increases therisk of bankruptcy of the companyin Thailandbefore

bankruptcy (Chitnomrath *et al.*, 2011). We find support for Hypothesis 5. The hazard ratio is 1.064, indicating that opportunities are increasing the risk of IPO bankruptcy by approximately 6.4 percent.

Finally, company age (AGE) indicates a negative coefficient (β= -.275, $p < .01$), and a low company age has a higher risk for failure than a high company age. In reality, a company with a high age has more experience in IPOs than a company with a low age, with a decreasing risk of bankruptcy (Rommer, 2005; Hensher *et al.*, 2007). The hazard ratio is 0.759, indicating that high IPO age has a decreased risk of IPO bankruptcy at approximately 25 percent.

The auditor reputation, the number of board committee meetings and the trading sign variable do not significantly affect the IPO's chance of survival. Our results do not support Hypotheses 6, 7 and 8. However, all of the variables are signs of situations regarding problems with IPOs, which is important for survival, although the variables do not affect the IPO's likelihood of survival.

5. Discussion and conclusion

Our study examines the relevance between corporate governance and the board structure and the survival of IPOs using variables based on agency theory. We employ the survival analysis model by using the Cox proportional hazard technique to estimate 272 IPOs that exclude financial group. There are 250 surviving companies and 22 non-surviving companies. Our results, which indicate that board size, the degree of board independence, the composition of the board committees, the leadership structure, ownership shareholder and company age, are statistically significant with a decreasing hazard of IPO bankruptcy. Otherwise, ownership shareholder alone has an increasing risk effect on IPO bankruptcy.

The board size finding is consistent with the work ofHaniffa and Hudaib (2006) regarding the relation between board size and the performance of Malaysian listed companies. Because the company's performance can refer to survival situations, which companies with large board will high performance and more expert director. The study is inconsistent with a study by Fich and Stezak (2008) we showed that a small board size has lower bankruptcy risk than a company with a large board. However, a paper by Tachapichaya (2007) found that the relationship of board size and performance for an industrial group company is not affected because these companies have different characteristics. The proportion of independent board members is consistent with the work of Jiamsakul (2007) and reduces the agency problem. This is consistent with agency theory and causes a performance increase. Agency theory indicates the relation between the principal and agent such that the agent (executives) takes over duties of the principal (shareholder) as long as the agent oversees the administration consistent with achieving the highest benefits for the principals. The relationship between these two parties will be fine. However, if the objectives and benefits of the principal and agent are not consistent, a problem will occur for the agent. Having independent committeesin the administrationtobalance the powerand examine administrationoperations to achieve business goals will reduce the agent problems as observed for independent variables: the composition of the board committees, the leadership structure, ownership and shareholderare associatedwithsurvivalwith statisticalsignificance.

Inthe future, wewill study the relevance of the proportionofindependent board members and survival of the company by comparing the old rules under the Securities and Exchange Commission (SEC), which is a board with not lessthanthreepeople and new rulestoincreasetheproportion tooneinthreeonthe board. The SEC rules specify that the composition of the board committee is not less than three persons and that not less one person is a financial specialist. Our finding regarding the composition of the audit committee is consistent with the work of Beasley and Salterio (2001)which showed that an organization with an audit committee will create a reliable annual report. The result of the dual leadership structure is consistent with the work of Palmon and Wald (2002), who finds that he same position between chairperson and CEO are increases Tobin's Q for complex firms and make high cost when firms that practice separate position will a more difficult time to recruitment new CEOs (Larcker and Tayan, 2011). But the study is inconsistent with the work of Coleman (2007), who described the agent problem when the chairperson and the CEO is the same person in companies in South Africa, Ghana,Kenya and Nigeria.Our finding of ownership concentration is consistent with the work of Chitnomrath *et al.* (2011), who presented that the concentration ofshareholdersincreased the company's risk ofbankruptcyin Thailandbefore abankruptcy occurred during a financial crisis. Finally, the finding of company age is consistent with the work ofHensher *et al.* (2007) in terms of the relationship between age and financial failure; age refers to the company's experience. This occurs because a high company age means there is stronger experience than in a company with a low age.

For future research, we will separate the board size data into small, medium and large boards to examine the relevance of IPO survival (Chancharat *et al.*, 2012). The proportion of women on boards is an interesting variable that may have an effect on IPO survival; therefore, we will also use this variable for empirical results.

The limitations of this study were the use of the IPO sample referencing new companies listed on the stock exchange. The operating results may be unstable. However, this study focused on the committee structure to obtain a count of the board members; this has not changed from the companies that entered the stock exchange earlier. This led to a determination of the time at which the companies were listed.

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Innovations in the Company – Ensuring the Quality of Economic Growth

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Abstract:

The aim of the present article is to reveal the peculiarities of assessing the impact of innovations on the cost of the company capital. According to scientific and methodological approaches presented in this article, the innovation process is represented by the complex events that can be decomposed into factors as a result of the analysis of the principal characteristics and forms of innovation. This approach allows using the available statistical tools to identify the most important factors affecting the growth of the company value. The company valuation is carried out on the basis of assessment of the impact of factors on the innovation process as a result of which the company value may increase. On one hand, this allows to provide a set of key financial indicators characterizing the results of the innovation process and, on the other hand, correctly assess the future economic benefits of the company as a result of innovations.

Keywords:innovations, innovation cost factors, economic growth, peculiarities of the innovation assessment, terminal value, and innovation value.

JEL Classification:Q55, O32, F43.

1. Introduction

The identifying feature of the innovation economy is the presence of a significant number of companies, the market value of which is several times higher than the book value of the assets in some cases. This is due to the intellectual capital of the company, the ability to use the surrounding events in own interests, to effectively combine the available resources. Thus the initiation of the innovation process in the company is carried out in order to ensure the quality of economic growth in the future, which cannot be achieved at the expense of minor improvements, copying and pseudo-innovation. Innovation cannot be copied, which involves the creation of a unique structure of the business operation and, from an economic point of view, the formation of modified forms of financial relations in the process of implementing innovations due to the influence of a new set of factors which are manifested in practice both in the explicit and latent forms. The financial mechanism is intended to assess the prospects for the initiation of the innovation process and provide economic assessment of the methods used to ensure the effectiveness of the implementation of innovations.

Within the framework of the International Valuation Standards (IVS 2013) there are three approaches (income, comparative, cost approaches) and their use is regulated by the following three conditions: the presence of reliable information about future income and expenses of the assessment object, reliable information on prices and characteristics of the similar objects, the possibility of replacing by the exact copy based on the beneficial properties of the object taking into account the capital depreciation. In view of the logical contradiction between possessing unique properties and lack of information on innovations, within the scientific approaches we offer methods for assessing the object that involves making reasonable forecast of key financial indicators of business operation. In addition to the forecast, there is a problem of standardization of a set of financial indicators of the business activity for assessing the results of the innovation process. Ensuring long-term trends of increasing the economic growth for a long period of the company activities seems difficult to achieve for its owners, shareholders and management team. In conditions when the company aims to achieve sustainable and irreducible growth rate, by means of monotone business improvement (strengthening the role of scientific and technical progress, reorganization, introduction of a new improved system of management processes, the use of a new type of raw materials, the use of "non-standard" marketing strategy, etc.), it becomes impossible to correctly assess the innovation in the legitimate field and from the scientific perspective to identify the key indicators of the company operation, which act as a confirmation of the validity of decisions in order to maximize the value and use the financial resources for initiating and further development of the innovation process in the discussion between the owners and the executive body of the legal entity (management and leadership) of the company.

1.1. The level of the topic scientific development

It should be summarized that there is an information field relative to existing approaches to estimating the cost of capital on the basis of key performance indicators and with the subsequent decomposition of these

indicators to the elements in order to determine the factors affecting the performance of the company. In this regard, we relied on the works of the following authors: Rutgayzer (2008), Pratt (2000), Griffit (2000), Gregori (2003), Sharp (2001), Damodaran (2008), Kooler (2005, 2010), Kouplend (2005), Gordon (1959), Shumpeter (2008), Drucker (1985, 2007), Taker (2006), Howkins (2007), Hargadon (2007), Mensh (1975), Twiss (1989), Bass (1969), Valdaytsev (2013). In this case, the selected factors are not united under a single logical framework (innovation), the selection of factors depends on the used assessment model (Kouplend, *et al.*, 2005; Koller, *et al.*, 2005), Volkov (2008)) and thus the set of factors affecting the value of the company as a result of innovation is insufficient. Definition of innovation factors and the development of the adapted model for the selection of key factors influencing the financial results after the initiation of the innovation process are of immediate interest.

The works of Damodaran (2008) provide and describe a number of approaches to the company valuation, but the works which provide approaches to the assessment of startup companies in lack of information content with respect to the estimated object are considered especially interesting from the point of view of the innovation. In these works it was also suggested to divide periods of active and stable economic growth. We also looked through an interesting dissertation research – the work of Dubrovin V.V. "Valuation of high-tech companies at various stages of development" (2009), in which the author offered the model of valuation of high-tech companies unified for all stages of the life cycle on the basis of the modified approach to evaluating options. Although this methodological approach is problematic regarding the selection of the factors influencing the innovation process in the organization.

In matters of the selection and assessment of factors we should note the research of Rappaport (1998), who described the seven drivers of the company value. The scientific views on the features of the selection of the main factors affecting the company value were provided in the works of Sheremet (2006), Valdaytsev (2013 *et al.*), Volkov (2008), Kouplend (2005 *et al.*).

2. Methodology

2.1 The problem of defining innovation in the financial context of the relationships.

Conventionally, all approaches to the definition of the phenomenon of the innovation can be divided into three groups. According to the approaches of Shumpeter (2008) and Drucker (1998, 2007) an innovation is a form of the process ("creative destruction"), characterized by originality and uniqueness, the authors talk about innovation as an already existing structure in a theoretical context of social and economic relations.

The second group of researchers (Nixon 1990, Santo 1990) talk about the need of "... a set of activities, not only as a set of technical, industrial and commercial activities ..." which are the basis for the innovation emergence. Santo focuses on the possibility of making "additional profits". The third group of researchers (Zavlina, Kazantseva, & Mindeli, 1997) focuses on two key aspects of an innovation, the first aspect considers the innovation as a process that includes the impact of the time factor, and the second aspect is the need for ideas and inventions, in other words, novelties and/or new developments.

In the scientific literature the term "innovation" includes a number of features, not connected to each other at first view. "Innovation" can be a result, a process, a system, a new development, a set of activities.

In order to obtain the desired result, different forms of manifestation should be combined under the same logical basis, it means that a generalization of the test material allows determining the optimal combination of features of the studied phenomena for future practical use in the process of solving the tasks in research. But we must remember that for each case of the innovation manifestation the indicators characterizing the degree of its manifestation, can be eliminated or, conversely, express themselves in a more explicit form. If we stick to a summary of the above material, it becomes clear that innovation is characterized by the presence of a new development (idea), the ability of the organizational structure for its creation and implementation, features of public needs and, eventually, innovation can manifest in the form of creating an additional economic value. The emergence of a new development is only a part of innovation; its implementation and further use depend on the prevailing social needs. For this reason, a new development (innovation) should be considered as a result of fundamental, applied research, development or experimental works in any field of activity in order to increase its efficiency, in the following forms: discoveries, inventions, patents, trademarks, technical innovations, technology, management or production processes, know-how, scientific approaches or principles, documents (standards, recommendations, methods, instructions, etc.), results of marketing studies, etc.

From the point of view of the consumer, innovation is a unique product that brings some benefits through the implementation of certain requirements. Bringing an additional value through the implementation of needs so far unimplemented, innovation may have an additional value due to its unique properties. Innovation

in today's market begins with creativity, novelty, new developments, and ideas and should lead to a positive result as to meet the needs of the consumer and economic benefits for the innovation supplier. Otherwise, the process becomes meaningless.

2.2 Manifestation of innovation in the financial aspect of the relationships

According to the studied material the author's definition of the term "innovation" is as follows: an innovation is a socio-economic process that leads to a positive result, which manifests itself as the creation of economic value added after the introduction and/or use of new developments. Commercialization of innovations is their cost-effective application in practice, introduction of a new development is a practical embodiment of innovations, at the same time the occurrence of foreign trade benefits, information, social, environmental, technological and other benefits are allowed.

2.3 Classification of innovations

Thus, the important stages of the analysis of innovations are their classification on a number of basic features. In this regard, we have been systematized the classification of sources of innovation, on the basis of which the key element is a novelty and/or a new development (Table 1.)

Table 1 - Classification of innovations according to the interpretation of Shumpeter I

Types of innovations	Types of a novelty and/or a new development	Stage of the innovation cycle	According to Schumpeter
Resource types	Raw materials	Research (R&D)	Receipt of a new source of raw materials
Organizational types	Production methods, material and technical support	Production	introduction of an unknown production method
Process-management types	Organization's management system, the process of distributing products	Research (R&D), production, consumption	Conduct of the relevant reorganization, development of new markets
Commercial types	A brand new product	consumption	Creation, giving new properties to the product

Source: compiled by the author.
Note. Resource types of innovations are considered as a new kind of materials possessing new properties, such as the production of ultra-strength polymer, ultra-light steel, etc. As a result, this material may allow achieving a number of required improvements for the subsequent implementation of innovations.

The organization of production is an important element of the innovation process. Innovations related directly to the production process, including technological equipment and specialized information may allow to achieve the necessary quality improvements, such as reducing production costs, increasing productivity, saving labor costs, electricity, etc.The company's management system is the most complex and comprehensive element of the innovation process, one of the clearest examples of such innovations are services provided by IT companies to automate business processes, settlement and cash services, finance and accounts department. A brand new process of products distribution, as well as the dissemination of information in a new format of claims may be an innovation in the management of the organization.

Commercial innovations should be considered as a fact of occurrence of a new good or a new way to meet the needs of the consumer, such as a new form of entertainment or a new type of clothing with novel properties.As far as the features of assessment of innovations are concerned, this classification provides a way to organize innovations according to the source of the main element of the innovation process that allows the management team to pay attention to the structural elements of the organizational structure, financing and the correct management of which improve the efficiency of the company that develops and implements innovations.

2.4 The main elements of the innovation process

According to the provided classification of innovation sources (see Table 1) the first element of the system of the innovation process is an innovation (idea, scientific and technical knowledge). Then the second element of

the innovation process is the management staff of the organization. Management of the organization is engaged in providing the organization with everything necessary for the development and application of innovation; it can be a search for support staff or a search and provision of additional financial resources. Motivation of the management staff can be measured by the indicator of selling general and administrative expense (SG&A).

Certainly, an innovation does not have any economic value. The third element includes the tasks to develop and implement innovations. Mentioned tasks should be redistributed to additional departments of the organization. The department responsible for research and development (R&D) usually acts as such connecting link. At the same time the costs directed by the management on R&D, are a specific group of general expenses of the company that performs two main functions: the first, more simple function is to study new products, the second, more complex function is responsible for identifying new horizons of scientific knowledge for creation of new types of goods and services. The costs for this activity allow the company to increase the level of competitiveness of products on the market. The indicator of R&D costs can be used as an indicator reflecting the performance of the creative research link in the innovation process.

The company is not able to overcome all the barriers to enter the market with a new form of a product or a service, as well as unforeseen technological barriers may adversely affect the product or service not yet established on the market, and it can take several years to develop and study a new product or a service. However, an opportunity to buy the product development of a competitor or any other company can significantly reduce the time necessary to overcome market barriers. Investments for the purchase of patents and ideas are a certain price to pay for the opportunity to overcome these barriers under more favorable conditions. Especially at the initial stages of the innovation process management has to attract investment, it allows to share the risks, but at the same time it increases the debt burden on the company capital, therefore, the rate of required costs should exceed the weighted average capital cost (WACC). Reducing WACC allows the company to have a large volume of cash, as well as to use temporary surplus funds for short-term investments; it is also an important aspect for companies whose main activity is mainly based on the sale of services. Reducing the rate of capital cost allows the company to create a greater volume of economic profit.

In addition to maintaining the required level of profitability, investments in intangible assets and R&D, it is necessary to update the production line guided by the planned changes and recombination. Investments in capital expenditures (CAPEX) allow the company to successfully maintain and develop the principal activities. If the principal activities of the company are oriented to innovations, the purpose of physical assets gets changed on the basis of the products uniqueness, so the investments in physical assets are imperative.

At the stage when a new product is introduced to the market, the consumer evaluates the personal need in the new product. In practice, different companies provide popular film and television actors with an opportunity to attend the presentation or "test drive", as well as to share a positive impression of the product and the need for its everyday use in front of the television camera, kindly provide the consumer with a real opportunity to become an owner of this unique product. This allows to familiarize the consumer with the new and unique properties of the product, which will soon be on the market. Intangible assets (N/INTA) are one of the most important items of the company balance, reflecting the value of patents, know-how, developments, owned by the company. The profitability of this capital is an important criterion for evaluating the company, since it reflects the uniqueness of the products for consumers.

Distribution of unique products depends on the diffusion process in the organization and outside it. One of the main tasks of management is to develop the company's own strategy for goods introduction to the market, while the marketing department is responsible for consumer familiarity with the product and distribution of products for widespread use in accordance with the developed strategy. The costs for this activity are reflected in the financial statements of the company (S&M). Correct supply of goods and its subsequent distribution is one of the key factors to promote products in the consumer market.

Reduction of the effective income tax rate allows us to make larger profits from principal activities. In this case, we rely on the views of Rappaport (1998). This indicator is very important especially for international companies, as in different countries this indicator has different meanings, and the opportunity to carry out principal activities in the territory of other states can increase profits at the expense of lower income tax rates (TAXRATE).

2.5 Innovation factors. Keys performance indicators of the innovation process

We consider the innovative process as a combination of organizational and management activities of a unique, new creative nature, designed to implement the tasks in the implementation of innovation. Recombination

can occur continuously, research in various spheres allows lengthening the life cycle of the product by changing and adding new features, and, hence, the maturity of the company – the period of active profit growth at the expense of constant stimulation of demand for products. Financial relationships are built in accordance with the objectives of the innovation process that affects and permeates the entire economic system of the company. Table 2 shows the comparative analysis of the elements of the innovation process, where we selected financial indicators, which, from our point of view, reflect the influence of a set of factors in numerical terms in the most appropriate way and taking into account the logical connection.

Table 2 - Comparative analysis of the innovation process and financial indicators

Structural elements of the innovation process in the company	The main factors affecting the change in the cost indicator	Activities of the company (financial indicators)	Notations
The availability of innovations, development and preparation for their introduction	The conduct of the company's research activities;	Operating expenses for R&D;	R&D
The uniqueness of the product obtained	The uniqueness of products due to patents and know-how;	Profitability of intangible assets;	NOPAT (Net Operating Profit After tax)
			INTA
The process of the innovations diffusionincreasing the marketing areas of the product sale	Advertising, marketing, salaries of the management staff;	General and administrative expenses;	G&A
		Sales and marketing expenses;	S&M
	Weighted average income tax rate depending on the territory where the economic activity is conducted;	Income tax rate;	TAXRATE
Risks associated with the use of capital and its cost	Refinancing rate on the territory where the economic activity is conducted, the required rate of return on equity capital;	Weighted average capital cost (wass);	RRR (required rate of return)
The need for investments	Acquisition and modernization of physical assets;	Investment in capital expenses;	CAPEX
	Brand value, the acquisition of intellectual property, patents, know-how;	Investment in intangible assets;	PINTA

Source: compiled by the author.

2.6 The structure of the company value oriented to the implementation of innovations

The innovation process is a way to maintain and increment business activity. In other words, innovation in the company is a way to gain additional economic benefits by saving resources, improving the efficiency of production processes, the quality of the company management and by meeting the needs of consumers. As a result, the company provides the extension of the life cycle, again due to gaining additional economic benefits, which ultimately leads to changes in the company value due to the synergy of economic effects.

As far as corporate finance is concerned, the amount of invested financial resources is a quantitative reflection of all the financial resources used by the company on a specific date, and it is defined as the carrying value of the company. It is necessary to remember about the book value that it is the most dependent on the impairment of the company assets; it does not account for the potential and future features of the company's economic growth, and is strictly tied to a specific date of the financial report. For this reason, we need the value that would be subject to changes as a result of the integrated business activity, taking into account economically measured benefits expected in the future. This value is market capitalization, as in terms of the market changes in the market value most dynamically reflects all the company activities.

Market capitalization is justified by market expectations about the future company value, as some currently unrealized "future book value". The book value is subject to impairment. The market capitalization of the company

is the "indicator" of corporate processes and market expectations. The dynamics of the market value of shares includes the intrinsic value of the company and many other cost characteristics that are taken into account by market participants when buying or selling shares, such as investors' expectations about the future growth of the shares' cost. Considered expectations are a subjective category of the discussion of exchange traders because the company may not justify these expectations due to various reasons.

Therefore, the market value of the company's shares cannot be used as fair value characteristics to assess the future benefits of the company. The market value of the company's shares is not a fair value of the future economic benefits of the company, this is an estimate of the value that can be achieved in the future through a set of factors, based on objective and subjective expectations of the stock market participants.

In our opinion, there is a need for using an additional cost indicator, a certain fair value, taking into account the peculiarities of the business conduct – the ability of the business structure to gain economic benefits would exclude the expectations – a size of the fair value. In this case it is the strength of the income approach. Under the income approach the presupposition that the value of the assets in which financial resources have been invested, must comply with the current estimate of the amount of income that these assets can generate.

For example, on the basis of the IVS provisions (IVS 2013, IVS 2007) the market value is a calculated value for the property, which is involved in the exchange on the date of calculation between a buyer and a seller in market conditions, provided that the parties of the deal act rationally. In practice, the market price of the company may be determined by all available methods. However, preference is given to the income approach, because the asset that makes profit is more expensive than the asset, which will not be able to generate profits in the future for assessment of the market value. It turns out that during assessment carried out in the perfect market all three approaches should lead to the same value size. But, as long as the real market is imperfect, in practice different sizes of the market value of the company are most often obtained upon the results of the evaluation. Rutgayzer (2008) notes that in order to obtain a certain fair value size the business appraiser must apply at least one method related to each of the approaches, except in situations where the focus on a certain class of methods is not possible, the appraiser has the right to deny using any method. In accordance with the recommendations of Rutgayzer (2008), for a fair assessment of the market value, it is necessary to productively use the values obtained in the framework of the three approaches. Based on the logic of reasoning, it becomes possible to get "some connector" of values of calculated variables that allowsapproaching the estimated fair value of the business structure.

2.7 The analysis of the applicability of the calculated values to the innovative companies' valuation

Thus, the market capitalization is calculated as the product of the total number of shares on the market value of one share:

$$MC = SP \times Q \quad (1)$$

where:MC – market capitalization of the company;
SP – the market value of one share;
Q – a number of outstanding shares;

and takes into account the subjective assessment of expectations of the market participants about the future company value, it cannot be regarded as a fair assessment of the future company value. When using the elements of the cost approach to valuation of the company, whose shares are quoted on the stock exchange and have a certain value, there is usually a contradiction; there may be significant differences in cost when compared to the book value of net assets and market capitalization, where the book value may be calculated as follows:

$$BV = TA - TL - INTA \quad (2)$$

where: BV – the book value of the assets of the company;
TA – the assets of the company;
TL – the obligations of the company;
INTA – the company's intangible assets.

Returning to the question on the future value of the company, we need to use elements of the income approach, in particular, free cash flow, which reflects the profits of the company, where the free cash flow is defined as:

$$FCF = OCF - CAPEX \quad (3)$$

where:FCF – free cash flow for the reporting period;
OCF – operating cash flow for the reporting period;
CAPEX – capital expenses of the company for the reporting period.

The value indicator is notated symbolically and depends on the used valuation model. So in the analysis we can use such value that reflects the subjective characteristics and conditions of the future company value. We should also mention that the book value is a value at which the assets of the company were acquired based on their impairment, however, the market capitalization is a value that reflects the future value of assets, taking into account the subjective expectations. It turns out that the difference between these values is a market value added due to the market revaluation. As a result, if BV is the book value, MVA is the market value added and defined as follows:

$$MVA = MC - BV \quad (4)$$

where:MVA is the market value added

According to Stewart (1999), Kouplend, Koller and Murrin (2005), the difference between the market value and attracted capital can be defined as the market value added.

The next indicator to be included in the analysis should be an economic value added, or EVA (Damodaran, 2008). From the perspective of the objective picture of the company's ability to create value, it is necessary to use an indicator that would allow to determine the profits or losses of the company through the use of the borrowed capital. This indicator is an economic value added. This indicator is calculated by using the following formula:

$$EVA = NOPAT - IC \times RRR \quad (5)$$

where:EVA – economic value added;
NOPAT – net operating profit after tax;
IC – invested capital;
RRR – required rate of return calculated by CAPM model [1].

It is possible to use each model to estimate the value of the company that introduces innovations in the process of its development. However, the management of the value of the innovation-oriented business structure by identifying and evaluating innovative factors with the help of these models is difficult to obtain. It turns out that it is necessary to consider the stages of the innovation process taking place in the company, separately and assess each stage that can greatly affect the result for the worse.

Therefore, it is necessary to propose such approaches to assess the impact of factors on the value of the innovation-oriented business structure that would allow to metrically describes the presence of the logical dependence (factors or value) and mathematically prove it. For these statistical tools, in particular the methods and techniques of multiple regression analysis may be used. We have made a choice in favor of a linear regression model due to the fact that, as a rule, in the basis of non-linear time models there are linear dependence, as well as the linear model in terms of the interpretation is best understood regarding the processes we have studied. Then the regression equation is as follows:

$$\text{Value indicator}_n = B_1RRR_n + B_2TAXRATE_n + B_3N/INTA_n + B_4S\&M_n + B_5G\&A_n + B_6CAPEX + B_7PINTA + B_8R\&D \quad (6)$$

where: Value indicator$_n$– means the value of the calculated indicator (FCF, BV, EVA, MVA).

2.8. Selection of companies

The selection should include the companies with the long period of a representative selection (extended period). At the same time, in order to form such selection it is necessary to get a free access to the financial statements of such companies. It is also necessary to have published operating expenses by expense items separately (such operating expenses as R&D, administration and management costs, business expenses, etc.).

[1]Using the provided methodology of calculation, we share the point of view of such authors as Graham B. (2008), Hermanson, Roger H., James Don Edwards, Salmonson R.F. (1987)

The main criteria for selecting companies for the practical implementation of the proposed approaches are as follows:

- belonging to subjects of innovative entrepreneurship and the availability of R&D expenses;
- a free access to financial data in a relatively long period of time (about ten years);
- availability of the necessary data on financial indicators performance for the calculation of the cost indicators;
- availability of the necessary data on financial indicators characterizing the influence of factors.

2.8.1 Selection of foreign companies in accordance with the selection criteria

We consider it necessary to draw the attention to the international top brands, due to the fact that the availability of the off-balance sheet capital determines the availability of the company's intellectual capital and it is manifested as the growth of share prices. According to the consultancy agency Brand Finance as of March, 2012 the top three leading positions were occupied by such brands as Apple, Google, Microsoft. At the same time these companies compete with each other in the sphere of information technology. In addition, the reporting of such companies is available on the website of the Securities and Exchange Commission. On the basis of the world's top brands, we consider this more reasonable than if we had used the rating of innovative companies, for example, according to the Forbes magazine. This is due to the fact that when determining the rating the Forbes magazine is guided by comparing the market capitalization and NPV companies. Companies, whose market capitalization is below NPV, possess "valuation allowance through innovations"[2]. As a result, this rating can include companies that have not implemented an innovation, but only developed an innovation, a new development, "know-how" for the purpose of the subsequent sale of rights to use this innovation or the sale of the whole company. Although companies Apple, Google, Microsoft present in the Forbes ranting, but because of their high value in the stock market, these companies do not occupy leading positions in the rating of the Forbes magazine.

As for the scope of activities of companies we have chosen, we assume it is important to pay attention to direct competitors of the industry leader that will allow carrying out a comparative analysis of the impact of innovative factors on the value on the example of public companies. So, the company Apple is the world leader in information technology. Google and Microsoft compete both with the leader and each other in the development and sales of operating systems for personal computers and smartphones.

The principal activity of the company Google includes the development and implementation of software and hardware system providing the ability to search information on the Internet. Thus, one of the major competitors in the development and implementation of search systems is the American company Yahoo!, which period of activity is also more than ten years.

One of the priorities of recent years of companies Apple and Microsoft is the development and sale of video games. Thus, according to the consulting agency Newzoo, at the end of 2012 Apple took only twelfth place in the world, Microsoft was the third, and the first place was occupied by the company Activision Blizzard, with its unique innovation "calculator" and that Blizzard was first to introduce it into the gameplay in 1994.

2.8.2 Selection of Russian companies in accordance with the selection criteria.

All selected companies are public, and R&D expenses are among the operating expenses. These companies publish their financial statements in accordance with GAAP standards, which allow to get an unhindered access to the necessary financial measures. In the process of selecting companies appropriate for our analysis, we drew attention to a number of national innovation companies. According to the data of the Institute of Social and Economic Modernization the Top 50 innovative companies include such companies as Yandex, Kaspersky Lab, Abbyy, Sberbank[3], etc.. Relatively the majority of companies, we cannot agree with this rating and include all mentioned companies of this rating to innovation companies. Most of them are developing and introducing novelties and innovations, but most of these companies have not implemented them yet. For example, the company Kaspersky Lab is not public, and a free access to the financial statements of this organization cannot be obtained.

[2] Explanation of the methodology used for calculating the rating. The online resource of the Forbes Magazine:http://www.forbes.com/sites/innovatorsdna/2011/10/20/the-innovation-premium-our-methodology/

[3] The online resource of the Institute of the Socio-economic modernization: http://socialmodernization.ru/archives/1296

The Fast Company magazine provides the rating of Russian innovative companies, but their period of activities does not exceed six years. Therefore, we consider it necessary to refer to the rating of the most expensive Russian brands provided by the consultancy agency Brand Finance at the end of 2012, in which Sberbank occupying the 78th place in the rating is followed by the company Gazprom (that occupies the 150th place in the rating). The company Gazprom has operated for rather long period of time (since 1989) and carried out R&D in accordance with the financial reporting data since 2004. Unfortunately, other national companies have not been identified in accordance with the selection criteria. The list of chosen companies is presented in Table 3.

Table 3 -The list of the companies to produce a representative sample of financial results

Name of the company	Ticker of shares at stock exchange	Representative sampling period (n)
AppleInc.	AAPL	46
Google Inc.	GOOG	36
Microsoft Corp.	MSFT	48
Yahoo! Inc.	YHOO	48
Activision Blizzard	ATVI	48
Gazprom	GAZP	16

Note. The financial statements of companies are freely available on the Internet site of the American Securities and Exchange Commission. An access to the financial statements is presented on the official website of the company OAO Gazprom. Because of the lack of information on financial indicators required for the analysis, the use of the model of valuation of innovation factors for the company Gazprom is carried out on the basis of the data of annual financial statements.[4]

All the above companies are the leaders in their sector. We managed to form a sample of financial indicators of the business activities for these companies in accordance with Table 2. The required rate of return can be calculated on the basis of financial risks on the invested capital of the company, so in this case, the required rate of return can be calculated on the basis of the rate of weighted average capital cost. But it is impossible to accurately calculate the rate of WACC on the basis of the data from the financial statements. However, it is possible to give some overestimation of financial risks of the company on the basis of the capital asset pricing model (CAPM).

On the basis of the values of financial indicators, where TAXRATE, NOPAT/INTA and RRR are relative indicators and the indicators FCF, EVA, CBV, SG&A, S&M, PINTA, R&D are calculated in absolute terms (USD), we converted indicators for conditions of the analysis as follows:

- The dynamics of the change in financial indicators was estimated as follows:

$$\Delta V_n = \frac{VI_n - VI_1}{|VI_1|}; \quad (7)$$

where: - VI_n means a financial indicator;

- ΔV means the change in the financial indicator in relation to the base value (VI_1 was taken as the base value).

It is also necessary to ensure that variables used in the regression analysis are not multicollinear.

2.9. Hypotheses

The first hypothesis, which requires confirmation, is as follows:

The *hypothesis H0:* inclusion of a large number ($n \rightarrow$ max) of the explanatory variables into the regression model should increase the level of explanation of the dependent variable – $R^2_{adj} \rightarrow 1$ when $n \rightarrow max$, provided that $P_{lvl} \leq P_{model}$ ($P_{model} = |0{,}05|$) and $F_{model} > F_{table}$.In addition to the problem of detection of persistent dependencies between changes in financial indicators and value indicators, there is a problem of detection of negative dependencies, where a negative dependency can be found between the value indicators and the explanatory variables.The availability of multicollinearity complicates the analytical work on detection of persistent dependencies and can adversely affect the indicators of the significance of the regression models. On the other hand, the exclusion of some variables, between which there is a persistent linear relationship ($r_{i,j} >$

[4] The official website of the American Securities & Exchange Commission: http://www.sec.gov/edgar/searchedgar/companysearch.html

$0{,}8$), will improve the quality of the obtained estimates of the explanatory variables. Therefore, the hypothesis is as follows:

- H0: if $R^2_{adj} \to 1$ when $n \to \max and\ \mathrm{r}_{i,j} < 0{,}8$, provided that $\mathrm{P_{lvl}} \geq \mathrm{P_{model}}$ $(\mathrm{P_{model}} = |0.05|)$ and $\mathrm{F_{model}} > \mathrm{F_{table}}$ and $-\infty \leq B_n \leq +\infty$ $=>$. For all obtained regression equations, subject to the given constraints, an impact of the studied factors can be random.Then the alternative hypothesis H1 is as follows:
- H1: if $R^2_{adj} \to 1$ when $n \to \max and\ \mathrm{r}_{i,j} < 0{,}8$, provided that $\mathrm{P_{lvl}} \leq \mathrm{P_{model}}$ $(\mathrm{P_{model}} = |0.05|)$ and $\mathrm{F_{model}} > \mathrm{F_{table}}$ and $-\infty \leq B_n \leq +\infty$ $=>$. For all obtained regression equations, subject to the given constraints, an impact of the studied factors is not accidental.

Further subject to detection of persistent dependencies between the tested variables and indicators of the company value, it will be possible to obtain a model with an intercept, taking into account the values of the regression coefficients. Therefore, we transform the dynamics of changes in the studied variables as follows:

$$\Delta \mathrm{V_n^{count}} = \Delta \mathrm{V_n} - \frac{\sum_{\mathrm{i=1}}^{\mathrm{n}} \Delta \mathrm{V_n}}{\mathrm{n}}, \quad (8)$$

where:$\Delta \mathrm{V_n^{count}}$ means the estimated value of the difference between the relative value of the indicator and its average value (for the entire array) in the dynamics of the financial indicator towards the base value.

In addition, these transformations allow to set an intercept equal to zero $(a_0 = 0)$, while preserving the dynamics of the financial indicators.

2.10. Criteria for selection of the most informative regression models

The basic principle is to select such regression model in which the used criteria AIC, HQC and SBIC tend to a minimum[5].Then the optimal set of variables of the regression equation is selected on the basis of the calculated coefficients $\mathrm{R^2_{adj}}$, Mallow'Cp and information criteria, that allows to obtain an appropriate significance level that we specified: $\mathrm{P_{model}} < 0.05$.

3. Results

In the process of testing for the presence of an influence of innovative factors on the cost, it became clear that it is impossible to consider the full set of factors in the regression analysis because of the strong correlation between the factors, so these factors were estimated separately. As a result, in some cases estimates take negative values, wherein the theoretical basis for the functioning of the innovation enterprise implies that an increase in the value indicator is possible if the goals were successfully implemented.

3.1 Description of results for Required Rate of Rate

We assume that this fact is explicable for a number of reasons. Innovative factors could have a different (negative and positive) influence on value indicators due to the nature of the strategy for implementation of the innovation process, for example, for the company AAPL an influence of a set of factors RRR – a group of factors directly connected with the risks and the cost of the company capital, and an influence on the change in free cash flow have not been observed (Table 4).

Table 4. The results of the regression analysis for a number of companies

Company	Value indicator	Regression parameters B_n								R^2_{adj}
		RRR	TAXRATE	N/INTA	S&M	G&A	CAPEX	PINTA	R&D	
AAPL	$\mathrm{FCF}^{SG\&A}{}_n$		-83.48	-0.68	26.09		0	0	0	0.89
	$\mathrm{FCF}^{CAPEX}{}_n$						3.35	-2.02		0.86
	$\mathrm{FCF}^{R\&D}{}_n$								28.19	0.86

[5]The rating of Russian innovative companies. The online resource of the Fast Company Magazine: http://www.fastcompany.com/most-innovative-companies/2013/industry/russia

Company	Value	Regression parameters B_n							R^2_{adj}
	$EVA^{SG\&A}{}_n$	-8.73	-10.85	-0.08	3.01		-0.1		0.88
	$EVA^{CAPEX}{}_n$	-5.70				0.37	-0.25		0.85
	$EVA^{R\&D}{}_n$	-7.41						3.1	0.83
	$BV^{SG\&A}{}_n$	-4.11	-7.28	-0.05	3.16				0.98
	$BV^{CAPEX}{}_n$					0.32	0.1		0.88
	$BV^{R\&D}{}_n$	-1.90	-4.085	-0.02				3.4	0.99
	$MVA^{SG\&A}{}_n$				33.11				0.94
	$MVA^{CAPEX}{}_n$	96.39		0.82		3.21			0.85
	$MVA^{R\&D}{}_n$	61.11						34.18	0.94
GOOG	$FCF^{SG\&A}{}_n$	16.53	-7.19		0.88	-0.64			0.92
	$FCF^{R\&D}{}_n$	11.12				-0.58		0.67	0.91
	EVA_n	-51.55	-33.94	9.60			0.02		0.62
	$BV^{SG\&A}{}_n$	42.31	-26.66		2.73				0.95
	$BV^{R\&D}{}_n$	33.55	-19.95					2.03	0.96
	$MVA^{SG\&A}{}_n$		-2.24		0.02				0.55
	$MVA^{R\&D}{}_n$		-2.19					0.02	0.55
YHOO	$FCF^{S\&M}{}_n$			0.77	2.61				0.45
	$FCF^{G\&A}{}_n$			0.73		0.92			0.45
	$FCF^{CAPEX}{}_n$			0.77			1.07		0.38
	$FCF^{R\&D}{}_n$			0.76				0.68	0.41
	$EVA^{S\&M}{}_n$			2.44	12.4				0.59
	$BV^{S\&M}{}_n$	-5.98		0.06	1.88			-0.35	0.88
	$BV^{G\&A}{}_n$	-3.4		0.05		0.68		-0.37	0.90
	$BV^{CAPEX}{}_n$	-6.76		0.06			0.89		0.78
	$BV^{R\&D}{}_n$	-2.3		0.07				-0.29	0.6	0.95
MSFT	FCF_n	-1.82	-1.21						0.37
	$EVA^{S\&M}{}_n$		-3.98		1.06				0.49
	$EVA^{G\&A}{}_n$		-5.26	0.80		0.76			0.45
	$BV^{S\&M}{}_n$	-1.04			-0.17				0.29
	$BV^{G\&A}{}_n$	-0.83				-0.15			0.37
	$BV^{R\&D}{}_n$	-0.92						-0.18	0.13
	MVA_n	0.90							0.60
GAZP	$FCF^{G\&A}{}_n$	-2.20			4.17			-0.66	0.35	0.97

Company	Value	Regression parameters B_n								R^2_{adj}
	$FCF^{CAPEX}{}_n$			-2.24			1.12	-0.48	0.42	0.98
	EVA_n	-0.90								0.43
	$BV^{G\&A}{}_n$				-2.58	2.80				0.96
	$BV^{CAPEX}{}_n$	-1.23	0.35		-1.25		0.85		0.12	0.99
	$MVA^{G\&A}{}_n$				-3.75				0.44	0.73
	$MVA^{CAPEX}{}_n$						-1.08		0.40	0.76
ATVI	$FCF^{G\&A}{}_n$	-1.16		0.15	0.04					0.49
	$FCF^{CAPEX}{}_n$	-1.51		0.17			0.03			0.50
	$EVA^{S\&M}{}_n$	-28.84		4.41	-2.80	1.36				0.46
	BV_n	-46.35	-12.50			3.70	2.33			0.89

Source: the author's calculations.

At the same time there is a negative impact of RRR on the EVA and BV indicators and a relatively high positive score for MVA. The AAPL Company has had no long-term debt since 2004, and unsecured bond issue has amounted to no more than 5% of the book value of assets since 2000. Payments associated with debt obligations, had no significant effect on profit after tax, but still the cost of capital depreciates due to inflation and the effects of "loss of profits", in which the same amount of funds being in the Bank would have made a profit equal to the rate on the Deposit. In the case of EVA the impact of RRR is as negative as in the case of BV due to the fact that the impact of financial risk is reflected in the impairment of the company's assets. Concerning the impact of RRR on the MVA indicator it should be noted that the slight increase in required rate of return has a positive effect on the growth of the value of the company's shares on the stock exchange – the market appreciates the company's ability not only to focus on higher yields, but also the ability to provide such high returns. The growth of RRR indicator affects the increase in the value of assets of the company, but from the point of view of market valuation it helps a company to generate profit. The growth of shares value on the stock exchange is influenced by the company's ability to generate profits in the future.

On the example of GOOG Company we can see the negative effect of RRR indicator on the EVA indicator because of the significant impact of financial risks on the added value. But there is an interesting fact of the presence of positive effects of RRR indicator on BV and FCF indicators. If you pay attention to the nature of the activities of the company and how the company develops innovations in the market of high technologies, it is clear that the GOOG company deals with combining existing innovations to create a new product (the search engine, the smartphones on "ANDROID" and sunglasses called "Google glasses" which are not released on sale yet). The GOOG Company accumulates available financial resources and directs them to the purchase of innovations through the purchase of other companies, rights to various developments, the purchase of patents. In this context, the innovation process of the GOOG Company based on the investment of financial resources in the latest developments for the subsequent creation of products and services. The increase in debt in conjunction with the company's ability to successfully implement the innovation process has a positive impact on the company's ability to generate profits. Another case of the existence of positive effects of RRR indicator on the change in the MVA has been stated in the MSFT Company. In our opinion this phenomenon is due to market expectations about the value of the company. In this case, if the company will be able to provide the required level of profitability in the future, market value added will increase, although at the time the MVA is being reduced.

The influence of financial risks on the indicators of FCF, BV, EVA and MVA for YHOO, GAZP, ATVI companies is negative in all cases, indicating a negative impact of financial risks on the results of the performance of the companies.

From the company management point of view, we should seek to reduce the financial risks for the implementation of the innovation process in the company, in particular, we should reduce debt, increase profitability, find ways and implement measures to reduce cost of capital through the use of macroeconomic developments and the use of equity, find a cheap source of funding. Although the amount of funding required for the new project is too high, there is a possibility of separation of the financial risk between third-party participants

in the equity financing. But it must comply with strict condition – return of the capital should be higher than the required rate of return, this means that the innovation is implemented and makes a profit, and the required rate of return should be higher than the cost of capital – this means that the innovation is not implemented and innovation is on the verge of return. We can recognize a company where the profit comes at the expense of innovation by assessing the adjusted coefficient of determination: $(R^2_{adj} \rightarrow 1)$ The high value of the adjusted determination coefficient reports a high efficiency of the innovation process.

3.2 Description of the results for TAXRATE

The impact of effective tax rates on profits of the company in all cases is negative, except for the GAZP Company. The rate of income tax reduces the return on invested capital in the company because of declining of net income. The reduction in effective tax rates of the GAZP Company due to tax benefits and concessions from the government of the Russian Federation with "privilege" to pay taxes. That is why we found a positive influence of the tax liabilities on the change in carrying value of the company.

3.3 Description of the results for PINTA

The negative influence of the factor of profitability of intangible assets reports about the inefficient use of intangible assets by the company. For example, the stock market appreciates the impact of intangible assets on growth of market of added value for the AAPL Company. Though modern tendencies in the form of necessity to protect their own rights to use trademarks, patents, development – uniqueness of its own products, forcing the company to buy up various exclusive rights to a variety of alternative technologies and development for future reference or blocking capabilities to market similar products. For this reason, the influence of investments on acquisition of intangible assets can be negative, as the company acquiring the rights to any intangible asset, sometimes not even going to use it in fully acquired rights, but only blocks the emergence of competitive advantage to other market participants.

3.4 Description of the results for expenditures

The negative impact of operating expenses has a negative impact on the results of the innovation process; this fact demonstrates the negative impact of the innovation process on the performance of the company. On the example of AAPL Company, three types of operating expenditures (S&M, G&A, R&D) have a positive impact on the growth of its value. If there is a negative impact of these expenditures, the innovation process is not effective and the increase of value through innovation becomes impossible. In the example of the GAZP Company we can see that this company is a state monopoly where monopoly is a kind of "artificial innovation" using privileged position in the market before other participants in the form of competitive advantage.

3.5 Optimal level of expenditure of financial resources

The sensitivity analysis allows determining an optimal level of expenditure of financial resources, subject to similar changes in financial indicators in order to ensure the maximum possible growth of value indicators. From our point of view, it would be logically correct to consider not only the maximum increase in possible changes in value indicators, but also to correlate it with the level of increase in financial indicators (g) upon a similar change. The growth of the average predicted value indicator in accordance with a similar change in financial indicators on the example of the company AAPL has been illustrated in the graphs 1-12.

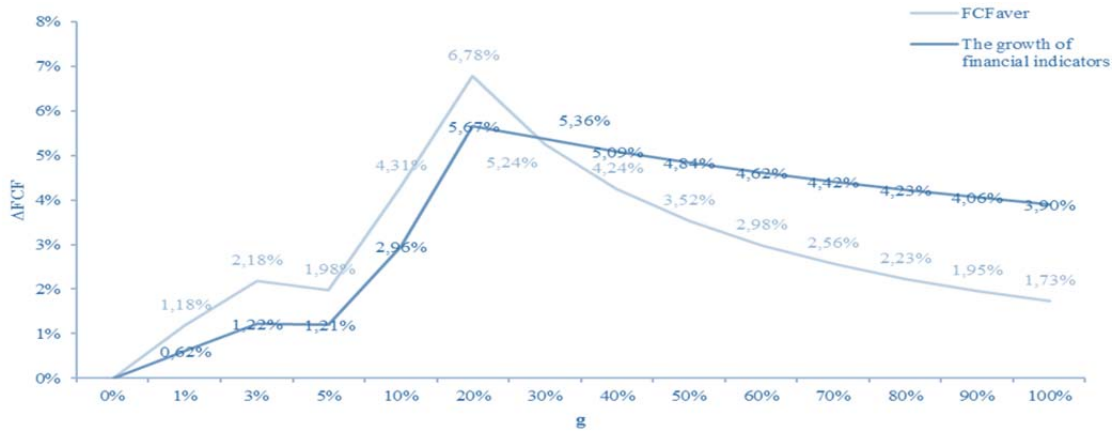


Figure 1 -The ratio of growth of the average value of cash flow on the example of FCF (SG&A)
with the expected growth of financial indicators

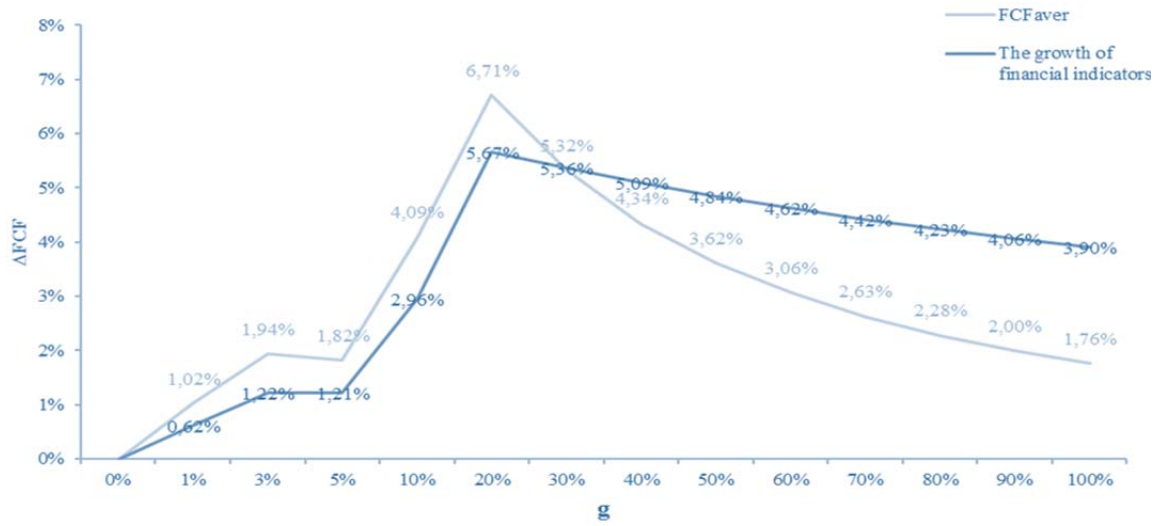
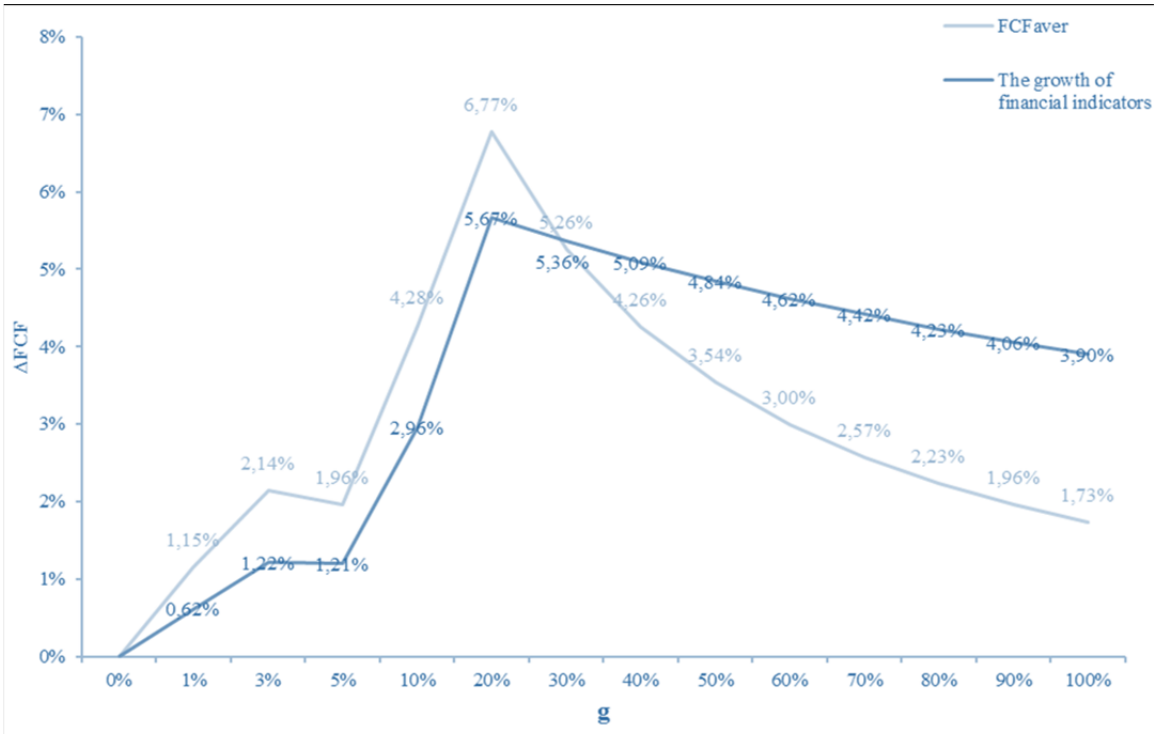


Figure 2 -The ratio of growth of the average value of cash flow on the example of FCF (CAPEX)
with the expected growth of financial indicators



Note. In Figures 1, 2, 3 it is clearly shown that the change in financial indicators is worth in the range of 30%, as after this mark the increase in the level of financial indicators will exceed the increase in cash flow. Moreover, changes in financial indicators by 20% will allow maximizing the increase in cash flow. The optimal level of changes in cash flow indicators is 20%.

Figure 3 -The ratio of growth of the average value of cash flow on the example of FCF (R&D)
with the expected growth of financial indicators

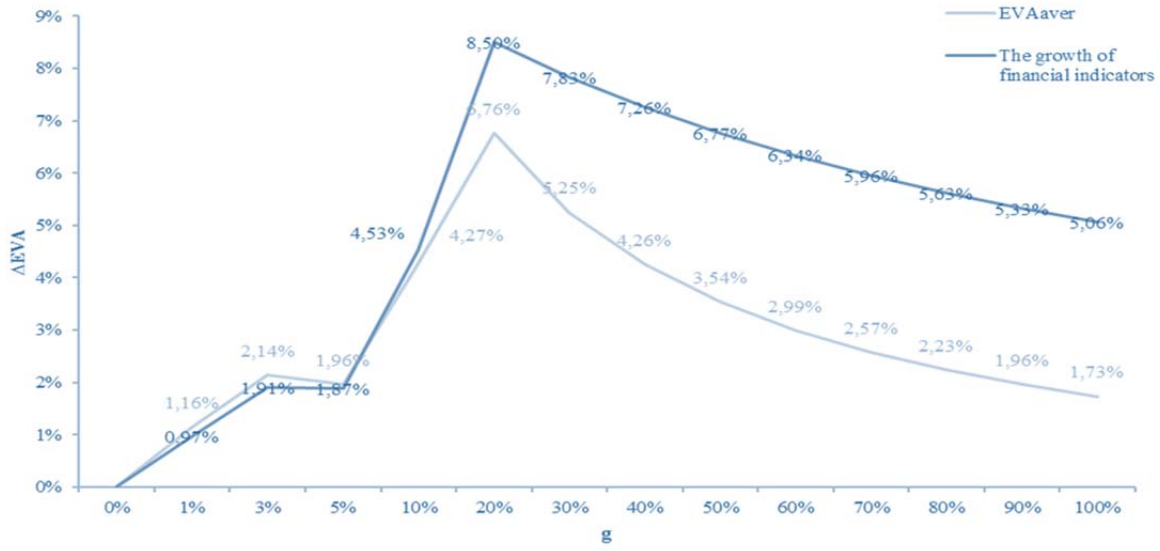


Figure 4 - The ratio of growth of the average economic value added EVA (SG&A) with the expected growth in financial indicators

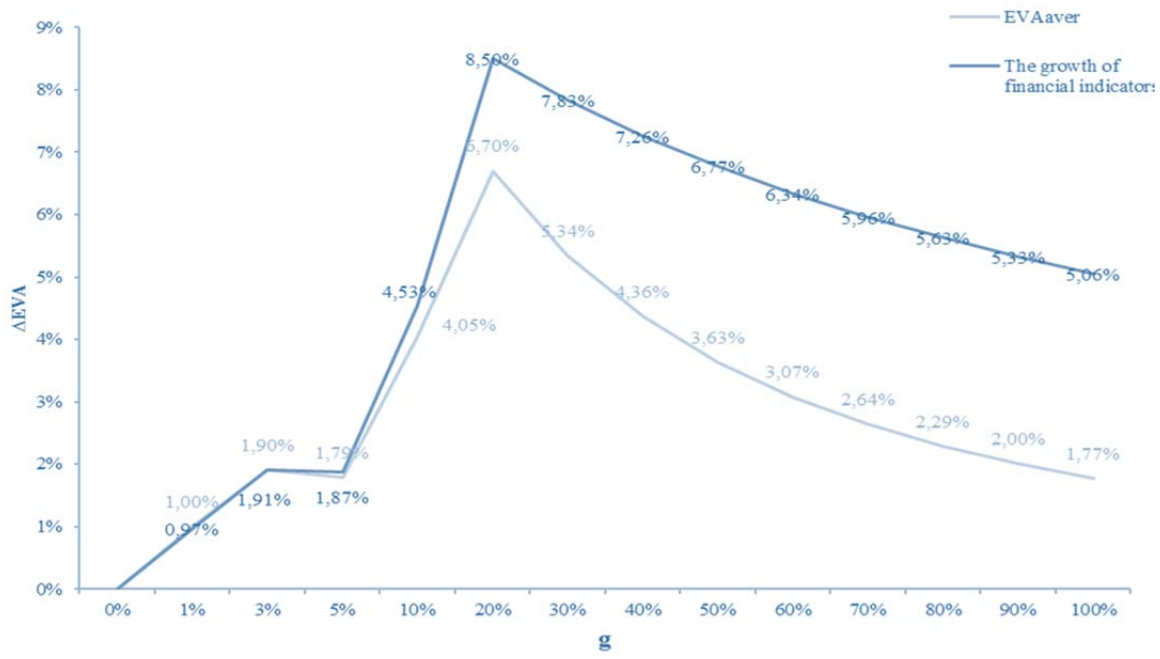
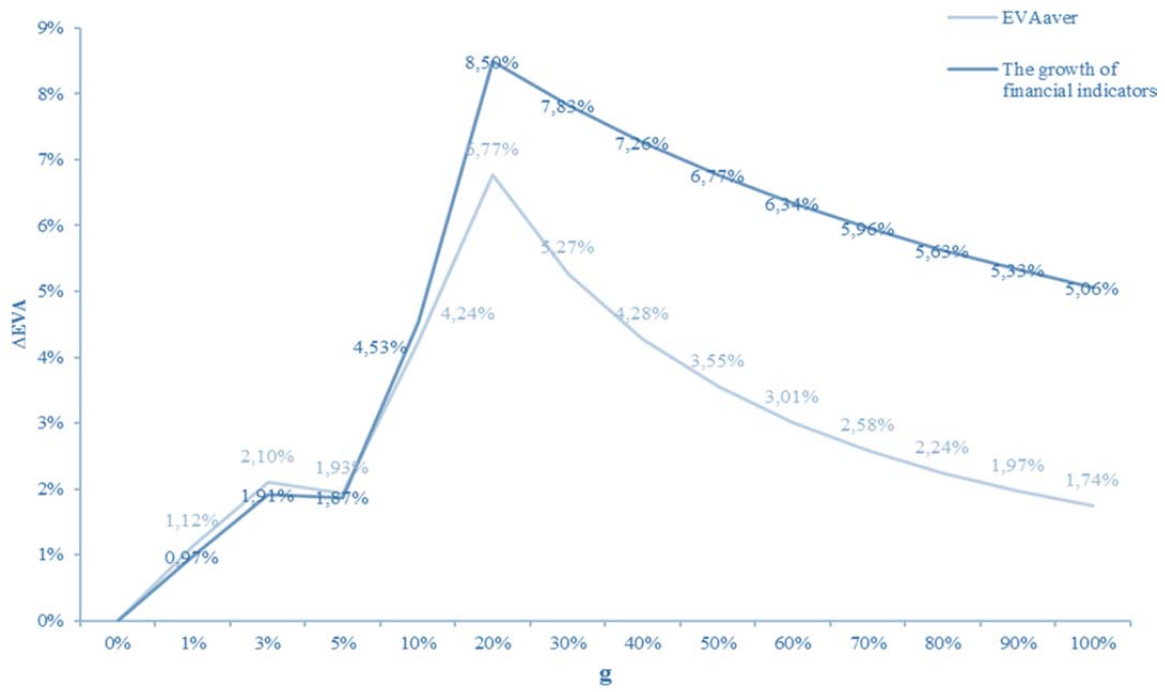


Figure 5 - The ratio of growth of the average economic value added EVA (CAPEX) with the expected growth of financial indicators



Note. The optimal level of change in financial indicators for the economic value added is 5% (see Figures 4-6.) At the same time, the maximum value of the growth is observed at the level of 20%, but subject to the change in financial indicators for more than 5%, the growth of financial indicators overlaps the growth of the economic value added.

Figure 6 - The ratio of growth of the average economic value added EVA (R&D) with the expected growth of financial indicators

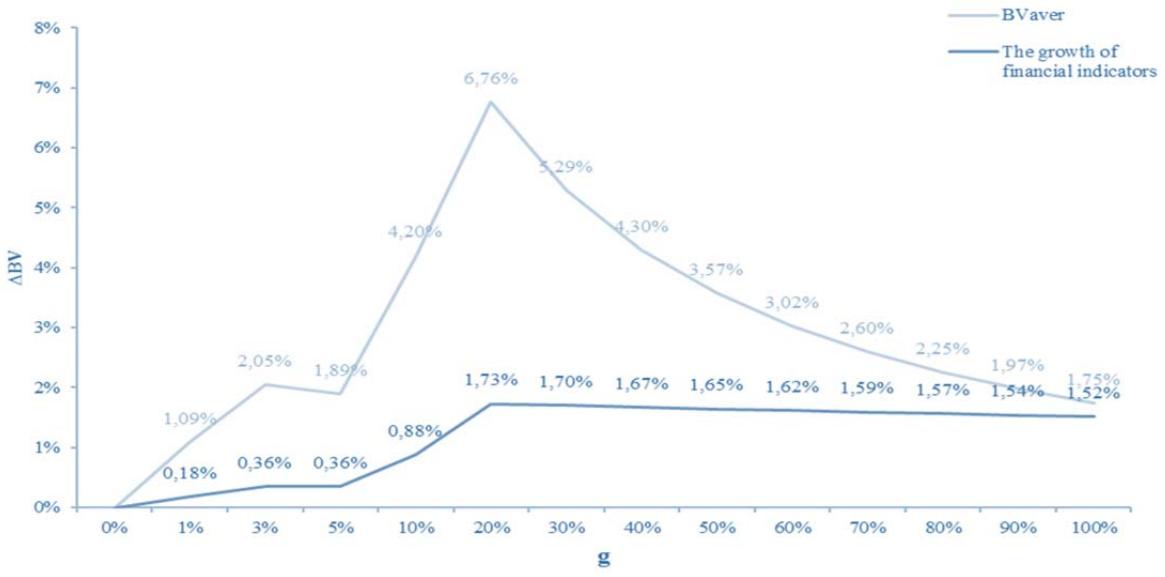


Figure 7 - The ratio of growth of the average book value BV (SG&A) with the expected growth of financial indicators

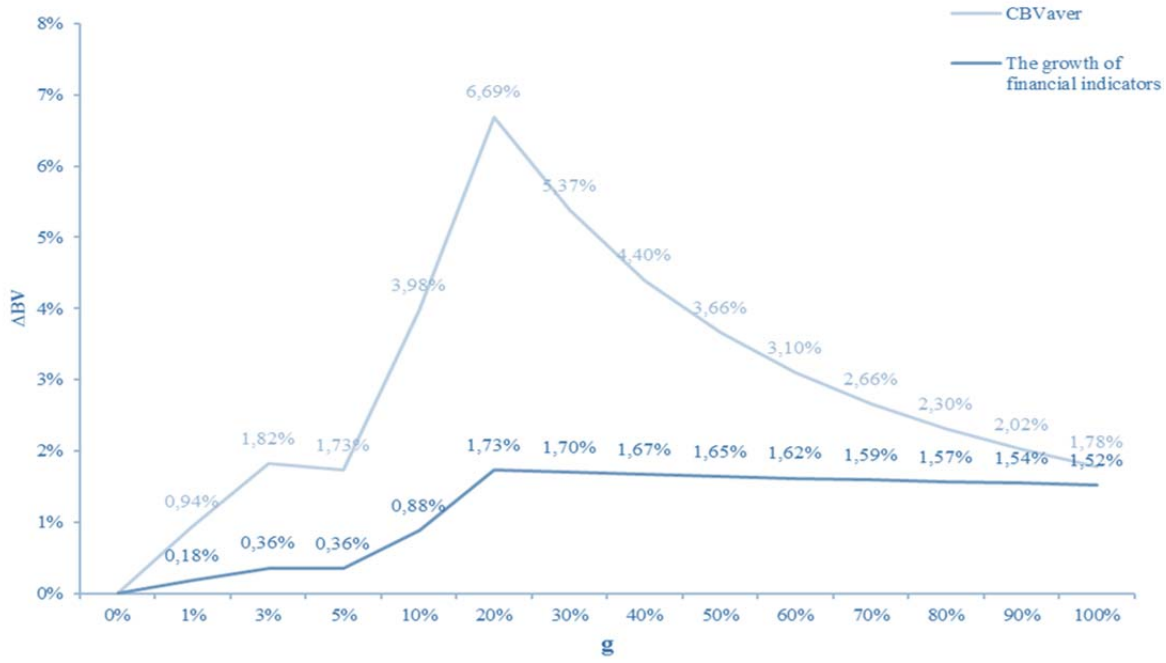
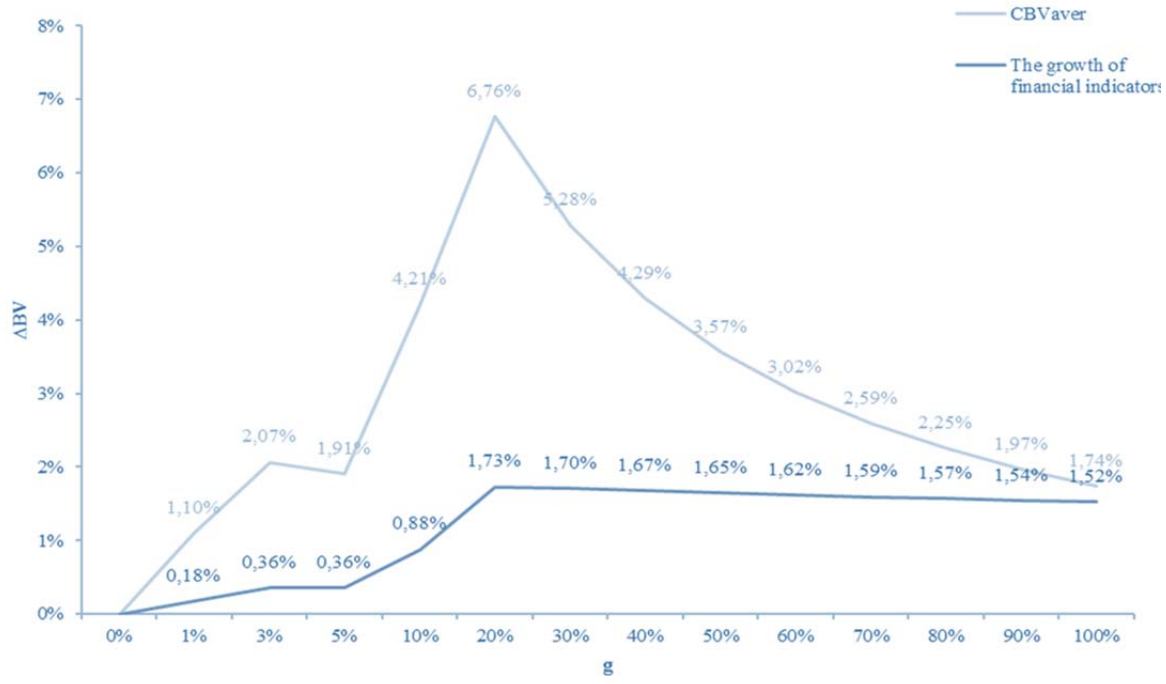


Figure 8 - The ratio of growth of the average book value BV (CAPEX) with the expected growth of financial indicators



Note. The optimal level of the change in financial indicators for the book value on the example of the company AAPL is equal to 20%. The graphs 7, 8 and 9 show that the optimal level of the change in financial indicators for the book value is equal to 20%, which is a condition for the maximization of the economic value added.

Figure 9. The ratio of growth of the average book value BV (R&D) with the expected growth of financial indicators

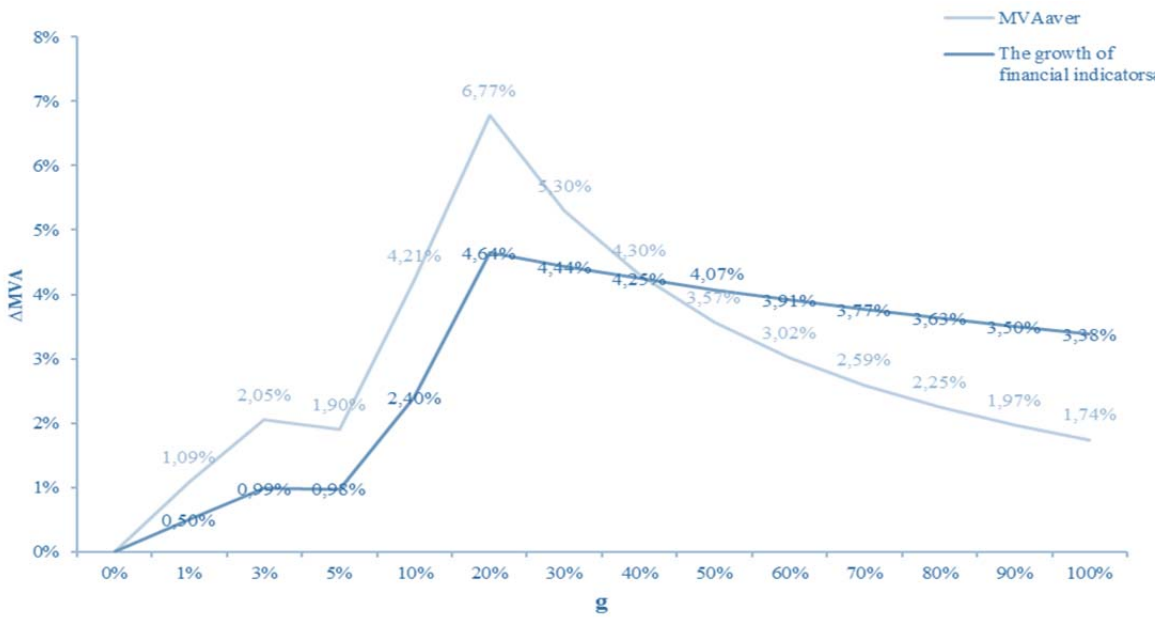


Figure 10 - The ratio of growth of the average market value added MVA (SG&A)
with the expected growth of financial indicators

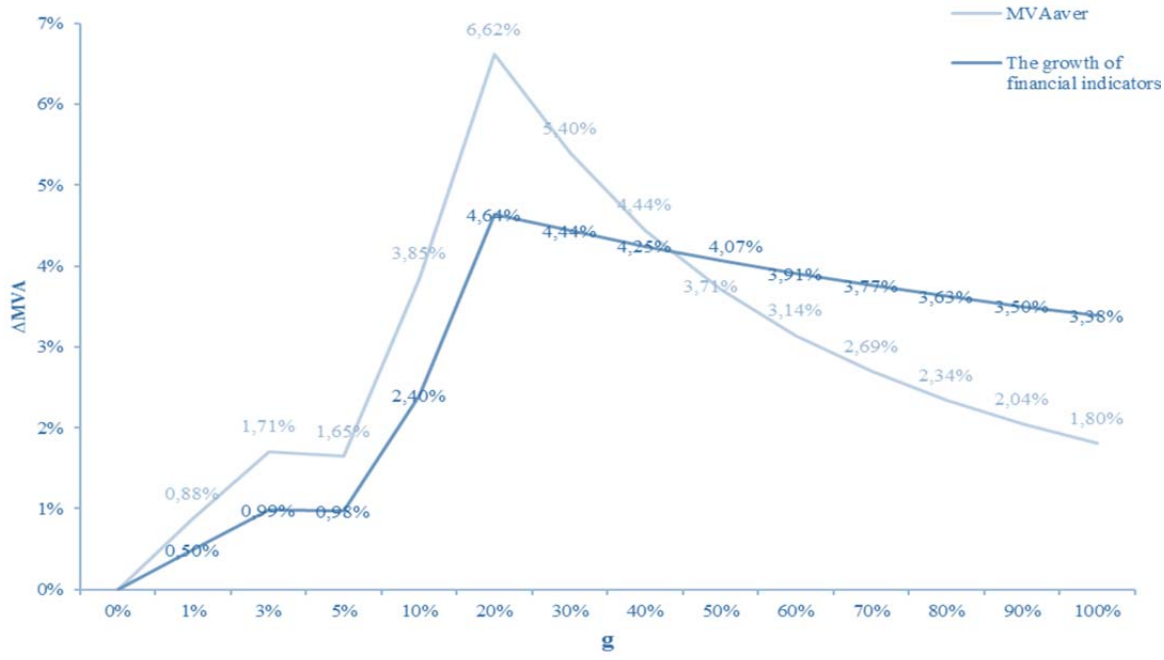
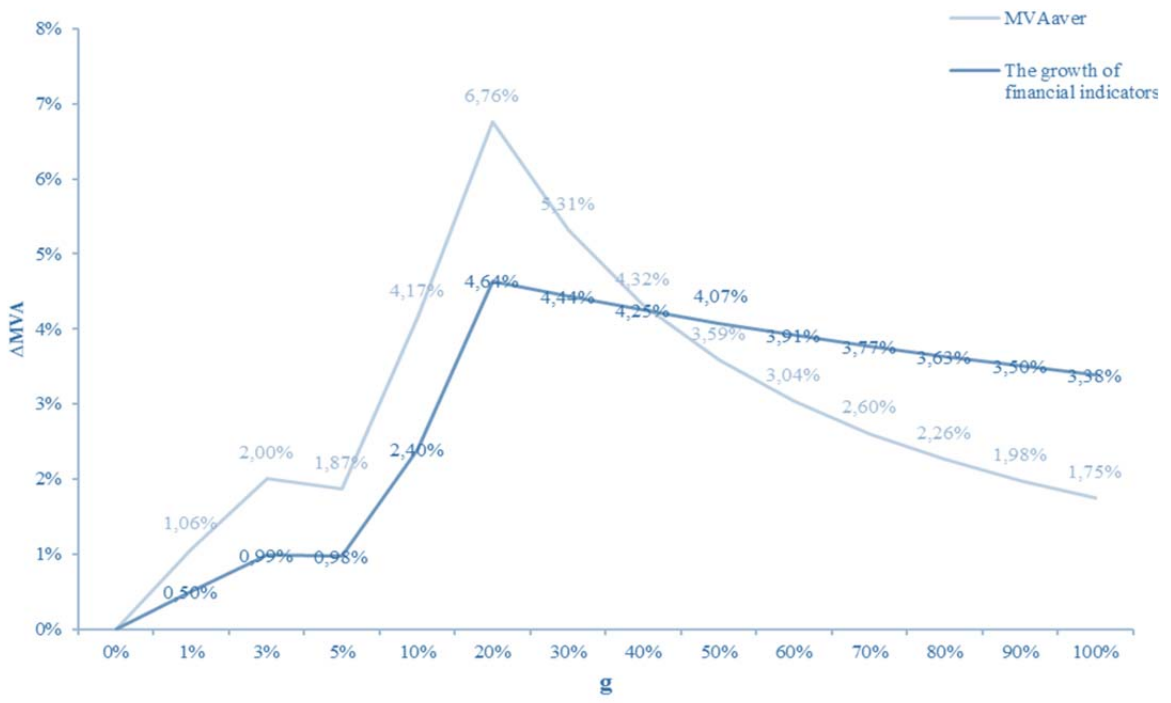


Figure 11 - The ratio of growth of the average market value added MVA (CAPEX)
with the expected growth of financial indicators



Note. The optimal level of the change in financial indicators for the market value added is equal to 30%. Therefore, increasing the growth of cash flow, book value and market value added, the company will be forced to sacrifice a part of the economic value added, which is possible, in our opinion. If the company plans to expand production (acquisition of assets), subject to its position of competitive dominance in the market, the optimal level of the change in financial indicators is from 5% to 30%, but if the company expects to profit from the business, in this case, the optimal level of the change in financial indicators should be left at mark 5%.

Figure 12 - The ratio of growth of the average market value added MVA (R&D)
with the expected growth of financial indicators

4. Discussion

Within the framework of the statistical test we determined the statistical criteria by which we can assess the accuracy of influence of each group of factors on the value of the innovative company;

Proposed approaches to find the optimal level of expenditure of financial resources allow to reasonably insisting upon the opportunity to provide high-quality growth of the company value in the future at the expense of innovations. Described methods also allow recognizing possible losses due to the chosen strategy of "dominance" in the market, as we see on the example of the AAPL Company, which uses its financial strength to repurchase the patents in order to block technological superiority. Based on the formula for calculating the economic value added (EVA), the weighted average capital cost (WACC) explains how much the capital is impaired and the way its increase leads to a reduction of the recoverable income of the company. But based on the results of the statistical test, its positive effect may be explained from the perspective of the necessary condition for the functioning of the innovation process. For this purpose, before using the strategy of maximizing the value in the company, it is necessary to identify the factors that determine each type of expenditures. In the present study this procedure was carried out especially for the innovation processes in the company where the financial mechanisms are known to be altered in order to promote innovations, therefore the test results are different from the theoretical concepts of the influence of the value drivers on the growth of the company value;

Proposed key indicators of the innovation process can be easily decomposed into a group of factors and the chosen strategy of the company can be brought to each link of the innovation process, as well as considered value indicators are meant to include the expectations of the financial results of the innovation process in the future, that allows to assess the prospects of the growth of the company value. When using the proposed approaches to the identification and assessment of significant innovation factors it becomes possible to determine the latent factors specific to a particular company. For example, such factors might include: the creation of "artificial monopoly", blocking alternative technologies, ideas, brands, targeted attraction of a large amount of investments or the existence of large debt obligations, etc;

International and federal valuation standards (FVS, IVS) do not imply valuation of innovation. An innovation involves a set of measures of a unique character; the innovation process needs to involve little explored mechanisms to achieve good financial results. In this context, the problem of obtaining reliable information by external users about an evaluated object of a specific character of innovation is becoming increasingly important. The way to distinguish innovation from pseudo-innovation is based on its economic efficiency, and pseudo-innovation can be detected by the proposed scientific and methodological approaches. Therefore, the owners, shareholders and management as a justification of made financial decisions must be based on reliable information on the results and prospects of the innovation process.

Conclusion

Using the proposed scientific and methodological approaches to the assessment of innovative factors for practical purposes is based on assessing the impact of a set of factors on the results of the innovation process, therefore, due to the set of indicators and their semantic content the use of a mathematical model is limited and can be used for the innovation process only. The issie on the use of a different set of factors in the model is still open, we assume that it is possible to use of the proposed mathematical model for alternative specifics of the company being assessed.

From the viewpoint of the company owners, mentioned methodological approaches for assessment of innovative factors allow to identify key factors and assess the quality of the growth of the company value resulting from the operation of the innovation system in the company. These events allow to control the quality of the use of financial resources from the perspective of the development of innovations in the company. These proposals on assessment of innovative factors are discussed between the company management and the owner in order to ensure the company's competitive advantages in the future by improving the functioning of financial mechanisms directly involved in the innovation process.

From the point of view of investors, assessment of innovative factors allows to assess the impact of innovations on the change in the company value in the future. At the same time investors, using the results of the assessment, will be able to make correct conclusions on activities that ensure the quality of growth in the company value, as a part of the innovation process.

Under the proposed approach it has been found that the use of the linear regression model is possible. Nowadays it is not possible to use non-linear models within the proposed approaches, but there are preconditions allowing to assert that this technique can improve the informativeness of the assessment results.

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Skill`s Management - The Decision on the Turning Point from School to Entrepreneurship

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Abstract:

The examination of the skills` details was based on a set of questionnaires that were trying to point out the importance of skills especially for the marginal entrepreneurs, who may found themselves on the crossroad. The introduction towards the survey, sampling and method of factor analysis and PCA was introduced briefly. The methods were introduced in order to employ the methods for achieving the four factors out of the 20 skills examined in total. Skills were classified into the factor groups and named. These details were set in the framework of the entrepreneurial skills "DNA" that are applicable preferably in the region, where the survey was carried out. The framework allows us to claim some recommendations for the students and teachers and other stakeholders involved in the process of entering the regional labour market. The turning point or the crossroads are mostly with some signs, the one uncovered was labeled as independency factor.

Keywords: regional development, management, principal component analysis.

JEL Classification: J53, R23

1. Introduction

Most of us have the dream of the dream job. Often it is related to freedom of decision, which than overlaps or leads to one possible option of achieving that dream, which is becoming an entrepreneur. Similar intentions have been found when talking to students as potential entrepreneurs along our career at university. They prefer independence to employment loyalty and conformity until they have to choose between security and uncertainty. These discussions among students about their future employment or self-employment (Blanchflower & Oswald 1998) have led to a question of the distribution of skills such as: self-confidence, stress tolerance and the like. Similar study was done for several European countries (Stefanescu,On 2012) using Principal Component Analysis (PCA) method. This method shall be applied in this paper in order to achieve the following contributions: (1) Examine details of the skills selected in a set of questionnaires that were trying to match the tertiary education skills. This is the starting point of the paper – section 1. Those skills could be the key aspect that leads to decision of taking up the entrepreneurial route and be self-employed after finishing school. (2) The introduction towards the survey, sampling and method of PCA and factor analysis was introduced briefly. The methods used were shortly discussed in section 2, for instance in line with the authors (Veinand, Godefroy, Adam, & Delarue 2011) or While preparing data for PCA and Factor analysis (FA) as described above, we have been considering the ordinal data and its traits (Bartholomew 2002, Magidson and Vermunt 2004). (3) This details were set in the framework of the region that some authors consider to play "a critical role in innovative entrepreneurship" (Vaz, Nijkamp 2009). The framework, presented in section 2, allows us to claim some recommendations for the students and teachers and other stakeholders involved in the process of entering the regional labour market. The turning point or the crossroads are mostly with some signs that are discussed in section 3.

2.Skills` management in respect to education and entrepreneurial activities

One can suppose that among the skills selected in the set of questionnaires there exist some relations. Therefore, there could exist some so called "unobservable" skills, for which reason the reduction of relatively high amount of the interrelated skills (competences) was done. That comes down to the task, which aim is to find the relation among these skills (i.e. all together 22 variables) and to answer the question: "Are there any factors (i.e. unobservable skills), which are on the background of the examined skills, abilities? If yes, than what is the substance of these factors and how can such a substance be named?"

The taxonomy should be straightforward immediately, but we uncover more details by employing the methods of factor analysis. FA compared to the PCA involves more explanatory features, i.e. some casual

structure. This casual structure could be used for improving skills` management. This taxonomy is the classifying, which searched for characteristics to enable more easily grasp the total model of skills with an emphasis on entrepreneurship (there were both opinions: of entrepreneurs as well as students which can be considered marginal entrepreneurs). For such a formulation of the problem it was correct to use the method of multivariate data analysis, i. e. analysis of the principle components (PCA) and factor analysis. The later one differs from the first one by the efforts to explain dependence of the variables. Through the analysis of the principle components (PCA), a new view on skills and their classification according to dependency was enabled. This also verified the rightfulness of the query questionnaire.

We used data of the sample, which included students and entrepreneurs. Their status was distinguished according to stage of the turning point from school to business as follows:

- A student of the masters study is at its lower level of the scale, which tends to gauge turning to business or entrepreneurship – "marginal entrepreneur";
- An entrepreneur in business for longer than three years is at the highest level of the scale, which tends to gauge turning to business or entrepreneurship – "entrepreneur".

This paper refers to the survey carried on the sample in eastern Slovakia - the question: "Which of the given abilities or respectively the skills are the important ones for the business?" This question was using Likert scale to evaluate the importance of given 22 skills for business.

2.1 Methodology

The questionnaire survey was conducted in order to investigate, what is the knowledge and what kinds of entrepreneurial skills the students of final years (either Bachelor or Masters) command and what are the competences, which are according to entrepreneurs needed for business. The survey was realized in year 2014. As for the group of students, they were addressed from four universities seated in Košice and Prešov self-governing regions (eastern part of Slovakia). The universities were: the Pavol Jozef Šafarik University in Košice, the Technical University of Košice, the University of Veterinary Medicine and Pharmacy in Košice and the University of Prešov. The email addresses of students were used. The questionnaire was also accessible for other students in the region of East Slovakia by the means of electronic link placed on the official web-page of the university the authors work for.

As for the group of entrepreneurs – it was approached randomly by recommendations made during the visit of web-page of the university the authors work for and as well with help of the recommendation done by students, who were acquaint with the survey`s merits. Students were ready to help the entrepreneur if (s)he wishes to.

There was an exact idea about the population for both groups during the preparation of the survey. The group of university students was approached by emails, which university provides to them. However, it was not possible to estimate the exact population of the respondents due to the questionnaire`s accessibility to the other students of other (not listed) universities via web-page. The group of entrepreneurs regarded as the population was not underpinned, because the free database of email addresses of individual business does not exist.

2.2 Questionnaires

As already mentioned above, the survey was carried on among students and entrepreneurs. One questionnaire was conducted among students and another one was conducted among entrepreneurs. The questions for the two target groups differed a little. The questions for the questionnaires (14 questions for students and 18 questions for entrepreneurs) were created and reflecting the Global Entrepreneurship Monitor (GEM) survey (Pilková 2011, GEM). The first version of questionnaires was delivered to the group of students and entrepreneurs with the aim to gain their preview opinions on the individual questions (pilot survey). The feedback gained was improving the final questionnaires. The final questionnaires were distributed to the large scale target groups.

The basic requirements for the creation of questionnaires were fulfilled in three criteria:

- Discriminatory criteria: respondents were in two groups, which was why they were in some variables similar and were scoring identically.
- Validity criteria: correct content was ensured by the persons with the education of 3rd level in the fields of economics, pedagogy and psychology. Criterion validity of questions was based on the former researches carried on.

This means that the questions were reflecting the reality considerably and the ability to explain the phenomenon in question was presented.

2.3 Applied statistical methods

The purpose of the paper is to provide a modest inside towards better skills management in respect to entrepreneurial activities at the very beginning. Thereupon the analysis dealt with only one question regarding the entrepreneurial skills. This question was evaluated using the quantitative method. Apart from descriptive statistics the following methods of statistical induction were used:

- For comparing the students` and entrepreneurs` opinions on entrepreneurial skills the Mann-Whitney U test was used for the comparison between these two independent groups. The examined populations were of discrete character and small number of possible values (respondents answered in Likert scale of values 1-5).
- In order to achieve the specific classification of skills the reduction of the relatively large amount of skills (22 in total) was used by means of the methods of multivariate statistics –Factor analysis (FA).

The received data have been processed using the statistical software - the IBM SPSS Statistics v. 19.

3. Results and Discussion

The both target groups were respondents, who answered the 894 questionnaires in total - the questionnaire was answered by 631 students and 263 entrepreneurs. In order to introduce the sample a few characteristics of respondents were provided for entrepreneurs – the scope of the business (Table 1) and for the marginal entrepreneurs - the university they study (Table 2).

Table 1 - Sample characteristics of entrepreneurs

Scope of the business *(in line with NACE codes, Rev. 2)*	Number of companies		**Scope of the business** *(in line with NACE codes, Rev. 2)*	Number of companies	
		%			%
Construction	57	21.7%	Machining	9	3.4%
Wholesale and retail trade; repair of motor vehicles and motorcycles	29	11.0%	Education	8	3.0%
Financial and insurance activities	20	7.6%	Manufacture of wood and of products of wood	7	2.7%
Other services activities	19	7.2%	Transporting and storage	7	2.7%
Manufacture of food products	16	6.1%	Real estate activities	7	2.7%
Arts, entertainment and recreation	16	6.1%	Agriculture, forestry and fishing	5	1.9%
Accommodation and food service activities	15	5.7%	Professional, scientific and technical activities	4	1.5%
Administrative and support service activities	14	5.3%	Casting of metals	3	1.1%
Information and communication	12	4.6%	Human health and social work activities	2	0.8%
Manufacture of textiles	12	4.6%	Manufacture of paper and paper products	1	0.4%

Source: Own elaboration

Table 2 - Sample characteristics of marginal entrepreneurs (students)

UNIVERSITY	Number	%	Sex	Number	%
Pavol Jozef Šafárik University in Košice	206	32.6%	female	382	60.5%
Technical University of Košice	179	28.4%	male	249	39.5%
University of Veterinary Medicine and Pharmacy in Košice	167	26.5%			
University of Prešov	79	12.5%			
TOTAL	**631**	**100%**			

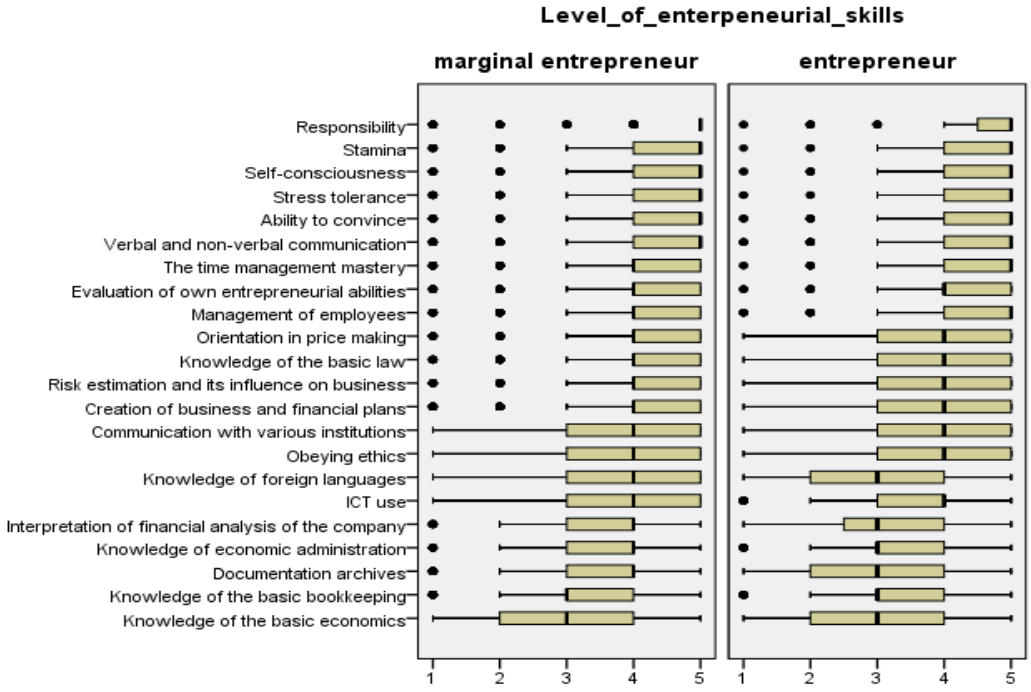
Source: Own elaboration

3.1 Comparison of the students` (marginal entrepreneurs) view contrary to the entrepreneurs` view

Regarding the topic of the paper the following question was analysed: "Which of the given abilities or respectively the skills are the important ones for the business?" Respondents could select from 22 options and could present the opinion about the importance of each skill within the Likert scale of 1 (the least important) to 5 (the most important). The outcomes of the survey are illustrated in the figure below (see box plots for the two

groups, Figure 1). The skills (variables) are sorted in descending order, i.e. from the most important one to the least important ones. Referring to Figure 1 in general one could state that marginal entrepreneurs (students) and entrepreneurs were not very much different in opinions on the skills in question. Nonetheless it is noticeable that marginal entrepreneurs were evaluating the skills slightly higher.

The utmost importance was linked to the skills of *Responsibility, Stamina* and *Self-consciousness*by both groups of respondents (means were the highest, see Tabel 3). In the previously mentioned skills the respondents` opinions had formed the most homogenous groups (standard deviations were the lowest, see Table 3). Despite the fact that students` scores were overall valued higher, the item „*Obeying ethics*" was valued at lower score than entrepreneurs (compare the students: mean= 3.87, st. dev. =1.15 with entrepreneurs: mean=4, st. dev.= 0.97), see Tabel 3. The respondents of both groups were equally heterogeneous in opinions on *Documentation archives, Knowledge of the basic bookkeeping* and *Knowledge of the basic economics*. The both groups also scored the previously listed skills with the lowest importance of the Likert scale.



Source: Own elaboration (output from SPSS)
Note: 1- the least important, 5 – the most important.

Figure 1 - The opinions on skills

Table3 -Basic descriptive statistics (means and standard deviations)

	LEVEL OF ENTERPENEURIAL SKILLS			
	Marginal entrepreneur		Entrepreneur	
	Mean	Standard Deviation	Mean	Standard Deviation
Responsibility	4.59	0.86	4.57	0.82
Stamina	4.43	0.94	4.44	0.89
Self-consciousness	4.42	0.93	4.32	0.92
⋮	⋮	⋮	⋮	⋮
Obeying ethics	3.87	1.15	4.00	0.97
⋮	⋮	⋮	⋮	⋮
Documentation archives	3.52	1.09	3.18	1.32
Knowledge of the basic bookkeeping	3.25	1.06	3.34	1.21
Knowledge of the basic economics	3.28	1.18	3.03	1.32

Source: Own elaboration (output from SPSS)

Differences between groups of marginal entrepreneur and entrepreneur were tested by Mann-Whitney U test. The result of testing for each skill is included in Table 4. There were significant differences between two

groups of respondents (at the 0.01 level) regarding the variables in bold (p-values ≤ 0.01, in table signed as Asymp. Sig.).

Table 4 - Differences between groups (results of Mann-Whitney U test)

Test Statistics[a]			
	Mann-Whitney U	Z	Asymp. Sig. (2-tailed)
Responsibility	72828,5	-0,684	0,494
Stamina	73022,0	-0,154	0,877
Self-consciousness	66641,0	-1,890	0,059
Stress tolerance	67828,5	-1,394	0,163
Ability to convince	63438,5	-1,807	0,071
Verbal and non-verbal communication	67052,0	-0,639	0,523
The time management mastery	65638,0	-0,805	0,421
Evaluation of own entrepreneurial abilities	65573,0	-0,572	0,567
Management of employees	67448,0	-1,450	0,147
Orientation in price making	68106,5	-0,971	0,331
Knowledge of the basic law	58823,5	-4,378	0,000
Risk estimation and its influence on business	60128,5	-3,119	0,002
Creation of business and financial plans	50158,0	-6,728	0,000
Communication with various institutions	63944,0	-2,729	0,006
Obeying ethics	65640,0	-0,912	0,362
Knowledge of foreign languages	47700,0	-7,079	0,000
ICT use	64737,5	-1,823	0,068
Interpretation of financial analysis of the company	52710,0	-3,487	0,000
Knowledge of economic administration	57062,0	-3,355	0,001
Documentation archives	57097,5	-3,326	0,001
Knowledge of the basic bookkeeping	63940,0	-1,432	0,152
Knowledge of the basic economics	58752,0	-2,550	0,010

a. Grouping Variable: Level_of_enterpeneurial_skills

Source: Own elaboration (output from SPSS)

3.2 Factor analysis results

Referring to the relative large number of skills, which had been examined, the intention was to compose the skills to the categories - groups that are helping to explain the importance of skills in the business. This was one of the reasons to apply the factor analysis for the overall data, i.e. both groups.

In order to identify the strength of the relations among the individual variables the correlation coefficients were calculated for each pair of variables. Correlation matrix provided us with information on correlation coefficients of analysed variables in question. Based on the condition that the lowest correlated variables should be discarded, we decided to do so with two variables (the values of coefficient was lower than 0.3, which is in line with recommendations of Hebák *et al.* (2007a, translated). The variables: "*The knowledge of the basic economics*" and "*The knowledge of the bookkeeping*" were neglected for the final factor analysis.

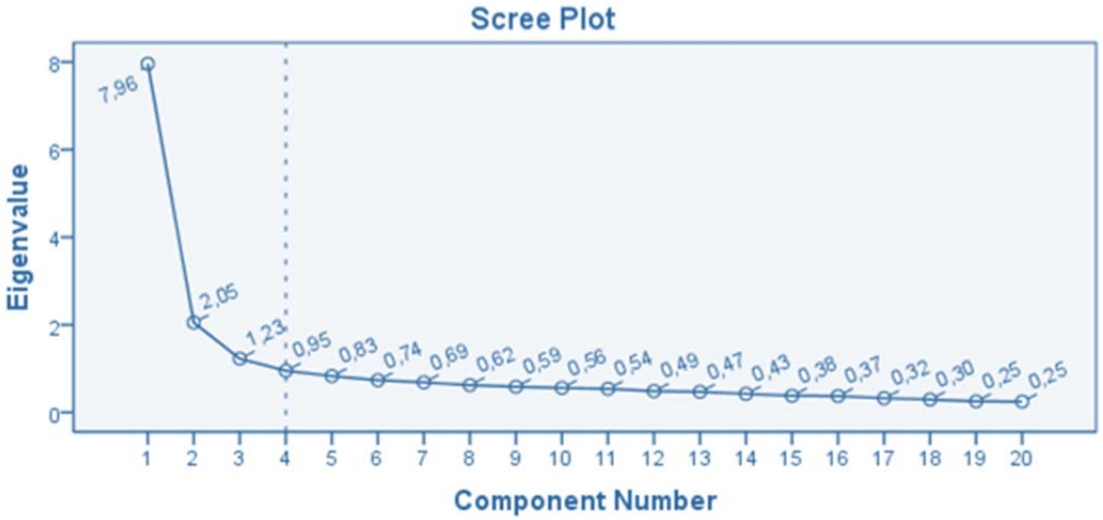
The remaining 20 variables were examined by the principal component analysis (PCA) in order to achieve fewer variables (i.e. unobservable skills). A principal component analysis was conducted on the 20 items with orthogonal rotation (varimax). The Kaiser–Meyer–Olkin measure (Tabel 5) verified the sampling adequacy for the analysis, KMO = 0.934. Bartlett's test of sphericity χ^2 (190) = 8,442.943, $p < 0.001$, indicated that correlations between items were sufficiently large for PCA. An initial analysis was run to obtain eigenvalues for each component in the data. The scree plot (Figure 2) is the tool for finding the "big gap" or "elbow" in multidimensional data (Zhu & Ghodsi 2006, Chen, Kou, Shang, & Chen 2015). Three components had eigenvalues over Kaiser's criterion of 1 and in combination explained 56,190% of the variance (Tabel 6). But in line with authors Meloun, Militky, Hill (2005) the explained variance should exceed the value of 60%, therefore the fourth component was

considered. This is noticeable also in the scree plot, and the eigenvalues were ranked as follows: 7.960 > 2.052 > 1.226 > 0.951. As a consequence of additional fourth component the variance explained is exactly 60.944%.

Table 5 - Factor analysis – sampling adequacy

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.934
Bartlett's Test of Sphericity	Approx. Chi-Square	8,442.943
	df	190.000
	Sig.	0.000

Source: Own elaboration (output from SPSS)



Source: Own elaboration (output from SPSS)

Figure 2 - Scree plot

Table 6 - Explained variance

TOTAL variance explained[a]									
	Initial eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]		
Compo-nent	TOTAL	% of variance	Cumulative %	TOTAL	% of variance	Cumulative %	TOTAL	% of variance	Cumulative %
1	7,960	39,799	39,799	7,960	39,799	39,799	5,555	27,775	27,775
2	2,052	10,261	50,060	2,052	10,261	50,060	2,859	14,296	42,070
3	1,226	6,130	56,190	1,226	6,130	56,190	2,367	11,835	53,906
4	0,951	4,754	60,944	0,951	4,754	60,944	1,408	7,039	60,944
5	0,829	4,147	65,091						
...	...	...	...						
20	**0,246**	**1,230**	**100,000**						

a. Extraction Method: Principal Component Analysis.
Source: Own elaboration (output from SPSS)

After extraction of four components (Table 7), the areas with bold values show the best fitted variables for the components, which are further discussed in the following section.

Table 7 - Components of entrepreneurial skills

Rotated Component Matrix[a]					
SIGN	SKILLS	COMPONENT 1	2	3	4
IF 1	Responsibility	,792	,194	,148	,090
IF 2	Self-consciousness	,819	,137	,067	,121
IF 3	Stamina	,824	,130	,081	,048

Rotated Component Matrix[a]					
SIGN	SKILLS	COMPONENT 1	2	3	4
IF 4	Verbal and non-verbal communication	,715	,198	,074	,230
IF 5	Ability to convince	,670	,172	,058	,274
IF 6	The time management mastery	,711	,182	,196	,046
IF 7	Management of employees	,593	,159	,270	,060
IF 8	Stress tolerance	,793	,124	,144	-,017
IF 9	Evaluation of own entrepreneurial abilities	,601	,299	,106	,031
FF 5	Communication with various institutions	,331	,428	,489	-,192
FF 1	Risk estimation and its influence on business	,341	,686	,175	,122
FF 2	Orientation in price making	,370	,603	,284	-,116
FF 3	Creation of business and financial plans	,193	,787	,134	,195
IRF 1	Knowledge of foreign languages	,188	,237	,163	,712
CF 1	Knowledge of the basic law	,213	,396	,601	-,209
FF 4	Interpretation of financial analysis of the company	,101	,800	,172	,235
CF 4	ICT use	,203	,025	,574	,507
CF 2	Knowledge of economic administration	,099	,192	,734	,305
CF 3	Documentation archives	,097	,146	,718	,166
IF 10	Obeying ethics	,467	,081	,114	,401

Note: Extraction Method: Principal Component Analysis; Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 21 iterations.
Source: Own elaboration (output from SPSS)

4. Skills management - the decision on the crossroad

The framework of skills management may rest upon four groups, which were found in the factor analysis. The four components of the factor analysis were named as follows: independency factors, financial factors, communicational factors, and interrelating factors.

In order to have an improved skills` management, the four groups of skills had been described:

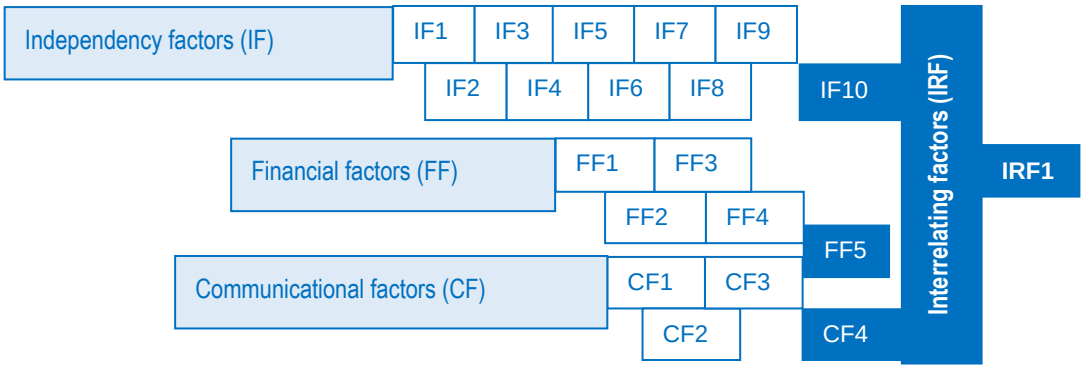
- *Skills supporting the independency factors (IF1-IF10) of entrepreneurship were explained by the variables (components) such as found:* responsibility, self-consciousness, stamina, verbal and non-verbal communication, ability to convince, the time management mastery, management of employees and stress tolerance and additional obeying ethics. The later one is having an overlap with the fourth component. Together there were ten skills included in this independency factors. According to the data surveyed among respondents the business tends to rely heavily on independency factors. All the named skills in this factor group account for the most important ones regarding the turning point from school to entrepreneurship.
- *Skills supporting the financial factors (FF1-FF5) of entrepreneurship were explained by the variables (components) such as found:* communication with various institutions, risk estimation and its influence on business, orientation in price making and creation of business and financial plans and interpretation of financial analysis of the company. Together five skills, out of which there was - the communication with various institutions – the skill, which was also found in the following group of components labelled as the communicational factors.
- *Skills supporting the communicational factors (CF1-CF4) of entrepreneurship were explained by the variables (components) such as found:* knowledge of the basic law, ICT use, knowledge of economic administration, documentation archives. Altogether five factors, not forgetting the overlapping one mentioned afore, i.e. the communication with various institutions. The communicational factors of entrepreneurship are crucial at times. In case of unjust information comes to multiplication of errors, which may lead to closing the business. Respondents were probably aware of such occasions, when answering the question. The skills are probably not so demanding to quire. To manage them or to delegate them to the subordinates is not a problem. However, one cannot underestimate their potential on the crossroad.
- *Skills supporting the interrelating factors (IRF1, IF10, CF4) of entrepreneurship were explained by the variables (components) such as found:* knowledge of foreign languages was the only one factor especially linked with this component. The rest of the skills linked with this component were: ICT use (component 3 and 4), communication with various institutions (component 2 and 3) and obeying ethics (component 1 and 4). Thus one could rather consider only three variables here, despite the fact that the interrelated factor “communication with various institutions” was mentioned here as an overlap between components 2 and 3.

After researching the data and variables given the methods and scope of the paper, one could state some recommendations addressed to students and teachers and other stakeholders involved in the process of entering the regional labour market. The more of the features described in the factors` group characteristics the closer the marginal entrepreneur is to his (her) dream or to the turning point where (s)he starts to realize some entrepreneurial activities. Thereupon could be recommended to strengthen the features and support them, if possible. It is likely that some teachers may be inspired by these results and they would employ some of the skills in the syllabus more often using various styles of teaching. There were a few skills left out from the groups mentioned afore.

From the regional point of view, all stakeholders (e.g. parents, NGOs etc.) may be giving signs leading towards the turning points. This means that parents are giving examples of the behaviour in the family. Then the students meet friends also outside the school curricula, where (s)he is influenced by obeying the ethics or other mentioned skills.

The survey carried on is also in line with other surveys that are including further details on the regional development for instance: (Cardon, Gregoire, Stevens, & Patel 2013). These authors introduced even the concept of entrepreneurial passion and they linked it with innovative efficiency with help of the PCA. This proves that the provided survey and its analysis have its potential in seeing the marginal entrepreneur as a person that is at crossroads not only ones. The first time it in the time of decision making to enter the business. Then the many crossroads are waiting in respect towards the sustainability of the business, where the passion and innovation are the next signs for the skills management of individual in question.

The Figure 3 suggests the possible casual structure as a result of FA. Based on this could be confirmed and recommended that entrepreneurial skills develop on the crux of the independence, which is supported by knowledge of financial issues as well as communicational skills. The knowledge of foreign languages seems to be a sort of an "outlier". But for some business it is the crux, *e.g.* business field of relaxation, where you may get in touch with tourists from abroad. On the other hand in some fields you need the skill rarely, thus you may pay a professional to help you with the issue. If one should be found on the crossroads of taking up a new challenge in a life, one shall strive for better rooted sense of independence and communicational abilities. Those shall be practice on the continual terms preferably for they had revealed higher homogeneity in the opinions among respondents (as presented in section 2). The two prevailing factors were the basic construction for building the "DNA" of skills for entrepreneurs and their own management, not forgetting the other two factors that are the remaining "genes" for the "entrepreneurial DNA" to be complete.



Source: Own elaboration

Figure 3 - Entrepreneurs "DNA" of skills

Conclusion

The marginal entrepreneurs and entrepreneurs were examined in terms of opinion about their skills. Both groups are managing themselves in their struggle for the dream job. Often it is regarded as a job, where you are independent. This was found to be true and at the same time it was measured by the unobservable variables to what extent you ought to be independent, because it includes several factors (IF1-IF10). The ten factors account for the meaning of independence in real life of an entrepreneur. It is also included in the management of skills, where you can concentrate at some skills each at a time or overall as a factor. The financial factors (FF1-FF5) are self-evident as crucial for the entrepreneurship. Communicational factors (CF1-CF4) are considered for self-evident too, but often neglected in the personal development. Even in other occupations, a professional starts

working with a "lump sum" (because skills can be turned into money) of his (hers) set of skills after the graduation (Kaňková 2010). Later (s)he founds him(her)self in the routine, which may bring some positive as well as negative aspects for the job performance. This is way the skills management is important for the career during the life-time (Horváthová 2011).

The overall an analysis found the possible characteristics for skills that were gauging how much do you diverge from "goal of the dream job" at the turning point towards business or entrepreneurship. The four artificial (unobservable) variables could be used as predictors with the regression analysis, but the scale of the paper is rather limited thus it remains as an intention for further paper, which can also focus on the interrelating factors (IRF1, IF10, CF4) However, in essence this is what was accomplished by factor analysis, which applies to the region covered by the survey.

The crossroad many of us have been through, finding the right position or your own way in life, the turning point to entrepreneurship does not have to take place from school necessarily. The time for the turning point may come later or sooner in your life. But it would be most probably influenced by some of the factors mentioned in the paper.

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Consumer Acceptance of Contactless Payments in Slovakia

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Abstract:

The contactless payments are novel technology in the fields of electronic banking, electronic finance and electronic payment systems. Contactless payments are electronic payments using radio-frequency identification (RFID) or near field communication (NFC) provided by various devices at point-of-sale terminal with contactless payments allowed. The most providers indicate contactless transactions being approximately twice as fast as cash or standard payments by credit or debit card. Multiple studies worldwide investigate the acceptance of various electronic banking technologies among customers based on various factors and attributes. The most of the studies investigate consumer acceptance of any electronic banking technology by using of the Technology Acceptance Model. This study uses technology acceptance model with adjustments for investigation of the contactless payments acceptance in conditions of Slovak market. The data for model testing was gathered by questionnaire survey conducted among potential Slovak contactless payments users. The hypotheses based on the developed of model were tested using the factor analysis of gathered data. The results of analysis indicated positive effect of perceived usefulness, perceived ease of use and perceived security on consumer acceptance of contactless payments. The amount of information about contactless payments and perceived enjoyment were not identified as statistically significant factors of contactless payments acceptance.

Keywords: contactless payments, acceptance, technology acceptance model, RFID, NFC.

JEL Classification: G29, L86

1. Introduction

Information and communication technologies (ICT) are rapidly developing, bringing innovations also in areas that operated for decades or even centuries in the same way. ICT revolutionized banking and mainly transactions by introducing various forms of electronic banking. Development of ICT used in electronic banking area brought us the possibility to replace coins, bank notes, bank checks or embossed cards in combination with imprinters with electronic payments systems. The latest innovation in area of retail consumer payments is called contactless payment.

Contactless payments are electronic payments using radio-frequency identification (RFID) or near field communication (NFC) provided by various devices. Payment cards, smart cards, pay stickers, key fobs, smartphones or some other mobile devices and are some examples of the devices which might provide contactless payments. Contactless payment systems include embedded chip and antenna that allow performing of payment by inclosing payment device in short range of point-of-sale (POS) terminal adapted for contactless payments.

The most suppliers adduced that contactless transactions are approximately twice as fast as cash or standard payments by credit or debit card. This is so because no PIN or handwritten signature verification is generally needed. On the other hand, contactless payments are the most often limited. Furthermore, consumers can block any further contactless transactions in very short time period to prevent occurrence of any fraudulent activities. The limits of contactless payments are around 20 € to 30€ (or equal amount in local currency), making them ideal for retail users. Therefore mainly fast-food chains, gas stations and retail stores, where lots of small payments are performed, adopted contactless payments as first.

Firstly (around year 2008) contactless payments were introduced into praxis via cards, stickers and fobs using RFID chips. Slightly later (early 2010) also contactless payments via NFC technology in mobile devices were inducted in everyday life. Major card companies (MasterCard, Visa) also supported this extension of contactless payments into area of smartphones and other mobile devices. In mobile contactless payments, secure SIM cards are used to store encrypted personal information. Contactless payments use the same framework as normal card transactions. Payment limit on single transactions protects users from more extensive PIN-less transactions abuse in time shortly after theft of card until owner blocks it. In addition to that, some contactless cards can only be used without PIN for a number of times before insertion of PIN is required. In some cases, certain financial amount of transactions without PIN required during period of time is allowed until PIN verification is asked by the system. Furthermore, fraud guarantees in the case of contactless payments are the same as of standard payments. Another precaution is that first payment with newly issued card is not allowed to perform without PIN authorization in order to detect if contactless card was delivered to the intended card holder.

Contactless payments bring question as all novel electronic banking technologies, how fast and successfully will they be accepted and used by consumers.

2. Literature review

Contactless payments are specific part of electronic banking or electronic finance and electronic commerce. Researchers were investigating various areas related to contactless payments such as whole field of electronic banking or electronic payments. First group of researchers investigated trust in electronic banking and electronic finance adoption. Hawkins and Sato (2004) indicated that all technical and non-technical aspects oftrust in electronic finance must be addressedby financial services' providersto promote their acceptance. Dráb (2011) adduced that trust building is key issue in electronic commerce environment. Bálint *et al.* (2011) identified that electronic identity as important prerequisite of e-finance acceptance by consumers. Simpson (2002) indicated that financial and payment services providers should create and enforce reliable security policy and procedures to promote trust in their services. Available information on electronic payments influences consumers in decision to adopt technology of electronic finance (Claessens *et al.*, 2002).

Another group of studies is dedicated to investigation of the consumer acceptance of various technologies. The most considered studies were devoted to customer adoption of electronic banking (in some of forms). The most of these studies are based on the Technology Acceptance Model (TAM) developed by Davis (1989) on basic factors of perceived usefulness, perceived ease of use and awareness of given technology. Pavlou (2013) confirmed TAM as reliable instrument with very good measurement properties and empirical soundness. TAM also allows explanation of a substantial proportion of the variance in usage intentions (Venkatesh and Davis, 2000).

In later studies TAM was further extended by other specific aspects of given technology investigated. Pikkarainen *et al.* (2004) detected web information on electronic banking service being also significant factor affecting its acceptance. Cheng *et al.* (2006) used Technology Acceptance Model for investigation of internet banking adoption indicating that TAM robustly predicted consumers' adoption of internet banking. Teo *et al.* (1999) extended TAM also with perceived enjoyment as factor of motivation to use information system. Suh and Han (2002) detected significant impact of security on acceptance of internet banking. Results of Qureshi *et al.* (2008) showed highly significant effects of perceived usefulness and perceived security of online banking and payments on customers'transition from traditional banking to online banking. Geetha and Malarvizhi (2011) found that increasing level of security increases also acceptance of electronic banking services. In contrast, Pikkarainen *et al.* (2004) did not detect significant effect of security on the e-banking services adoption. Also results of Widjana and Rachmat (2011) did not show influence of security on acceptance.

Alsajjan and Dennis (2006) found a significant impact of trust on users' willingness to use electronic payments and sensitive information related to these payments. In later study (Alsajjan and Dennis 2010) they detected perception of electronic transactions as easy and safe is crucial for internet banking and electronic payment adoption. The influence of privacy and security on electronic banking adoption and was investigated also by Grabner-Kräuter and Faullant (2008). They confirmed influence of privacy on risk perception and customer attitudes towards electronic banking. Banks in general should build up their innovative reputation. Obtaining positive word of mouth will enhance the positive their perception by potential customers and improves the trustworthiness of given banks.

Dahlberg *et al.* (2003) investigated acceptance of mobile payments and detected perceived ease of use, perceived usefulness and trust as its significant factors. Zmijewska *et al.* (2004) classified mobile payments systems and investigated factors of security, simplicity and costs. Schierz *et al.* (2010) detected perceived compatibility as very significant factor of mobile payments adoption.

New users when adopting contactless payments seek their speed and usefulness. On the other hand, they might fear of possible security issues of contactless payments use. All these factors might influence decisions of potential users to contactless payments. Kočišová (2014) found that the use of credit cards has significant impact on banks efficiency. Cards with contactless payment capabilities were not investigated in Slovakia specifically, although they might increase the efficiency of payment process and therefore also bank processes. The question of acceptation of contactless payments not only in form of card payment but also in form of mobile device payment in Slovak conditions will be investigated in this article. The Slovak contactless payments' market is rapidly developing during recent years. According to major card companies (MasterCard, VISA Europe) Slovakia is among top countries in contactless cards and terminals penetration in Europe. At the end of 2014, over 65 percent of payment cards in Slovakia allowed contactless payments (Visa Europe, 2015). Banks in Slovakia also

distribute other mobile devices like key fobs and payment stickers among their clients increasing their possibilities to pay using contactless payment systems. Moreover, card companies (Barnett 2012) indicate that consumers are spending more because of the ease of small transactions with contactless cards at rate about 30%.

In the case of NFC contactless mobile payments penetration in Slovakia is much lower. Only two major banks in Slovakia provide such payments to its clients. Contactless payments using mobile phones occur in small scale, but numbers of payments are increasing permanently with rise of new mobile phones with NFC options integrated. While the investigation of Slovak electronic banking acceptation regarding internet banking and mobile (smart) banking e-banking was conducted (Vejačka 2014), the investigation of acceptation of contactless payments in particular is still missing. Our investigation will be aimed at consumer acceptation of contactless payments in Slovak conditions.

3. Research methodology

Many studies on consumer acceptance some of electronic banking services were conducted in various countries, for example in Australia (Sathye, 1999), Turkey (Polatoglu, Ekin 2001), United Kingdom (Howcroft *et al.*, 2002), Hong Kong (Cheng *et al.*, 2006) or Pakistan (Qureshi 2008). Those studies were dedicated mainly to investigation of internet banking using Technology Acceptance Model. As long as contactless payments are technology belonging to electronic banking, our study will use TAM for investigation of consumer acceptance of contactless payments.According to results of literature review, following model of consumer acceptation of contactless payments was developed. The model includes original technology acceptance model with some changes made by Pikkarainen *et al.* (2004).

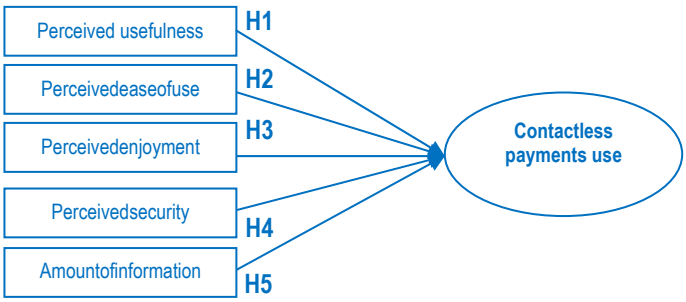

Figure 1 – The research model of contactless payments use

Technology acceptance model developed by Davis (1989) was often extended and modified. The model of Pikkarainen *et al.* (2004) was extended with factors of perceived security and the amount of information about technology investigated and quality of Internet connection (specifically for online banking usage). Our model does not include the quality of Internet connection, while it is not necessary for consumer to use Internet while paying contactless every time. Contactless payments using cards do not use Internet connection on the client's side at all and in the case of smart device payments, it depends on technical solution of NFC payments system. Moreover contactless payments use only small amount of data easily transferable in 3G mobile networks. It is expected that internet connection would not have significant impact on acceptance in this case. Results of Pikkarainen *et al.* (2004) and Qureshi *et al.* (2008) confirmed that the quality of internet connection did not influence the acceptance of technology. So according to our model, following research hypotheses were formulated.

H1. Perceived usefulness has a positive effect on consumer acceptance of contactless payments.

H2. Perceived ease of use has a positive effect on consumer acceptance of contactless payments.

H3. Perceived enjoyment has a positive effect on consumer acceptance of contactless payments.

H4. Perceived security has a positive effect on consumer acceptance of contactless payments.

H5. The amount of information about contactless payments has a positive effect on consumer acceptance of contactless payments.

Constructed TAM hypotheses about consumer acceptance of contactless payments were tested on data gathered by survey. Survey questionnaire investigated basic demographic information and data for hypothesis testing from our model. Data for hypothesis testing were gathered by questions constructed to represent investigated factors influencing the acceptance of contactless payments. Five-point Likert scale was used to

measure answer options. Data were further analysed by regression analysis, correlation analysis and factor analysis.

Data was collected by questionnaire survey during period from May 2015 until August 2015 in Slovakia. Questionnaires were distributed at university classes, by emails and in printed form to address potential consumers of contactless payments. In total 183 answered questionnaires were gathered.

4. Results

The demographic data of respondents were gathered to get overview of answering groups of potential consumers paying with contactless devices. The frequency of contactless payments was also investigated. Approximately 51 percent of respondents were male and almost 49 percent female. From 183 respondents 125 indicated the use of contactless payments (at least once), what represents roughly 68 percent of answers. The remaining almost 32 percent of respondents (58 respondents) do not use contactless payments yet. The most numerous age group of respondents was between 30 and 39 years old (45 respondents) and the least numerous group of younger than 20 years old (12 respondents).

Following Table 1 provides overview of basic acquired information on respondents' demographics and usage of contactless payments.

Table 1 –Demographic data and contactless payments usage results

Demographics and usage		Frequency	Percent (%)
Sex	Male	94	51,36
	Female	89	48,63
	Total	183	100.00
Age groups	<20 years	12	6,56
	20-29 years	41	22.40
	30-39 years	45	24.59
	40-49 years	33	18.04
	50-59 years	29	15.84
	>60 years	23	12.57
Usage of contactless payments	Do not use	58	31.69
	Once per month	27	14.75
	2-3 times per month	34	18.58
	4-5 times per month	39	21.31
	More than 6 times per month	25	13.67
Contactless payment device	Contactless card	111	60.65
	Payment sticker	7	3.83
	Key fob	2	1.09
	Smartphone with NFC	5	2,74
	None	58	31.69

*Source:*own

Respondents also indicated frequency of contactless payments usage. Almost 15% of respondents use contactless payment approximately once a month. Over 18% of respondents make 2 or 3 contactless payments per month. The highest percentage of contactless payments users (21.31%) uses them roughly 4 or 5 times a month. Very frequent use of contactless payments (over 6 payments per month) indicated almost 14% of users. It shows that consumers in Slovakia use contactless payments in quite large extent and frequently. This result corresponds with surveys of major card companies (Visa Europe, 2015). The most of customers (over 60%) use contactless payments with use of debit or credit card. Less than 5% of respondents together use payment stickers or contactless key fobs to conduct contactless payment. Below 3% of respondents adduced payments with smartphone NFC function. Such a low rate of contactless payments using mobile phones is probably caused by low support of such payments by banks, when only two major banks in Slovakia provide NFC contactless payments and also small range of supported devices.

Table 2 – The factor analysis

Variables\ Factors	Perceived usefulness	Perceived ease of use	Perceived enjoyment	Perceived security	Amount of information
Using contactless payments allows me faster payments	0.912				
Using contactless payments makes payments simpler	0.841				
Using contactless payments brings me advantages	0.853				
Overall, I consider using contactless payments to be advantageous	0.823				
Using contactless payments is easy for me		0.887			
Using contactless payments is clear and understandable for me		0.856			
It is easy for me to improve myself in using of contactless payments		0.735			
Overall, I consider using contactless payments to be easy		0.849			
Using contactless payments is pleasant			0.837		
Using contactless payments is positive experience			0.881		
Overall, using contactless payments is a good idea			0.803		
I have enough information about secure use of contactless payments				0.674	
I use contactless payments securely				0.758	
Sensitive data are safe during contactless payments				0.690	
Overall, using contactless payments is secure				0.731	
I have enough information about contactless payments					0.690
I have enough information about the benefits of contactless payments					0.722
% of variance explained	22.181	19.895	16.502	19.370	11.896

*Source:*Own survey data processed by SPSS Principal Axis Factoring with varimax rotation

In the second part of our survey, data for verification of our developed model of possible factors influencing consumer acceptance of contactless payments were gathered. Respondents indicated level of consent with the statements using five point Likert scale. These statements are stated in above stated table 2. The groups of multiple statements represented one of the constructs or factors from our research model. Further analysis of data was conducted in SPSS. Perceived usefulness (PU), perceived ease of use (PEOU), perceived enjoyment (PE), perceived security and amount of information about contactless payments were analysed confirmatory factor analysis using principal axis factoring with varimax rotation and Kaiser normalization. This method is standard in studies using technology acceptance model (used by for example Pikkarainen *et al.*2004, Geetha, Malarvizhi 2011).

For analysis, only variables that fitted the model were included. All five factors were detected with eigenvalue above 1.0. Kaiser-Meyer-Olkin measure of sampling adequacy indicated level of common variance at 0.881. The Bartlett's test of sphericity confirmed correlation between variables and so the factor analysis was appropriate method. All identified factors together represent 89.84% of variable's variance.

The first factor identified was perceived usefulness. It comprised of four variables with Cronbach's alpha at 0.85. The acceptable value of Cronbach's alpha is above 0.7 for this type of analysis. The second identified factor of consumer acceptance of contactless payments was perceived ease of use with four variables loaded and Cronbach's alpha at level of 0.91. The third factor of perceived enjoyment of contactless payments consisted from three variables with Cronbach's alpha at 0.87. The fourth factor was perceived security consisting four variables

with Cronbach's alpha at 0.89. The last fifth factor identified in factor analysis was amount of information about contactless payments with only two variables and Cronbach's alpha at level of 0.76. The total reliability of the factor analysis conducted was 0.88. The dependent value in our proposed model was the use of contactless payments. The factor of perceived ease of use explained the most of variance (22.18%). Subsequently, the regression analysis was conducted to indicate how identified factors influence the use of contactless payments by the consumers.

Table 3 –Regression analysis

Regresion	Standardized coefficients: Beta	*t*	Significance
Perceived usefulness	0.217	2.913	0.008
Perceived ease of use	0.194	2.386	0.036
Perceived enjoyment	0.091	1.006	0.153
Perceived security	0.163	1.883	0.043
Amount of information	0.183	1.674	0.047
R^2 = 0.114			

The Table 3 shows the results of the regression analysis of data gathered. The statistical significance of identified factors was tested. Our results showed as statistically significant factors perceived usefulness (t=2.91, p<0.01), perceived ease of use (t=2.38, p<0.05), perceived security (t=1.88, p<0.05) and amount of information about contactless payments (t=1.67, p<0.05). The factor of perceived enjoyment (t=1.006, p=0.15) was not detected as statistically significant. Furthermore, our hypotheses were tested by correlation analysis of data gathered. The results of correlation analysis show that perceived usefulness, perceived ease of use and perceived security are positively correlated with use of contactless payments by consumers in Slovakia (p<0.05). The overall model was statistically significant (R^2=0.114, p<0.01).

Table 4 –Correlation analysis

Variables\ Factors	Use	Perceived usefulness	Perceived ease of use	Perceived enjoyment	Perceived security	Amount of information
Pearson correlation	1	0.289	0.301	0.129	0.216	0.090
Significance		0.011	0.036	0.098	0.044	0.122

In Table 4 correlations of all factors with use of contactless payments are indicated. Our results indicated that perceived usefulness, perceived ease of use and perceived security have a positive effect on the use of contactless payments by consumers in Slovakia. Therefore our model hypotheses H1, H2 and H4 were supported. On the contrary, perceived enjoyment and amount of information about contactless payments do not have statistically significant influence on the use of contactless payments. So hypotheses H3 and H5 were not supported by the data.

Conclusion

This study investigated consumer acceptance of contactless payments in Slovakia. The Technology Acceptance Model (TAM) was used and adjusted to propose model of acceptance in accord with other studies aimed at acceptance of various forms of electronic banking. The proposed model of contactless payments acceptance consisted from two TAM variables - perceived usefulness and perceived ease of use, and three extending variables referring to perceived security, perceived enjoyment and amount of information on contactless payments. These new variables were incorporated in to model according to study of Pikkarainen *et al.* (2004).

Proposed model of contactless payments acceptance was then tested on data gathered by questionnaire survey with 183 Slovak consumers attending. Following factor analysis detected all five proposed factors of acceptance namely perceived usefulness, perceived ease of use, perceived enjoyment, perceived security and amount of information Moreover regression and correlation analysis was performed to verify significance of these factors. Results indicated that perceived usefulness, perceived ease of use and perceived security have positive effect on consumer acceptance of contactless payments. Our results correspond with other studies using TAM, e.g. Davis *et al.* (1989). Perceived enjoyment and amount of information about contactless payments have not statistically significant effect on their acceptance. This corresponds with studies investigating electronic banking

acceptance (e.g. Pikkarainen *et al.* (2004), Geetha and Malarvizhi (2011)) where contactless payments can be classified. Effect of perceived security on acceptance was statistically significant. This result corresponds to results of Roboff and Charles (1998), Sathye (1999), Hamlet and Strube (2000), Polatoglu and Ekin (2001), Black *et al.* (2002) or Howcroft *et al.* (2002).

This study contributes to the field of technology acceptance studies. It shows local preferences of customers in using contactless payments. Further it identifies perceived usefulness, perceived ease of use and perceived security as statistically significant factor of consumer acceptance of contactless payments in Slovak market. However our study is limited in validity, while our sample of respondents was relatively smaller and less representative than in many other studies. In future consumer acceptance of contactless payments might be tested by extended or adjusted technology acceptance model to investigate any other potential factors influencing their acceptance.

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The Assessment of Customers' Values formed by Different Kinds of Retailers

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Abstract:

The paper notes that different kinds of retailers prefer value approach today. This research is aimed at detecting gaps between expected and derivable customers' values formed by different kinds of retailers (hypermarket, supermarket, corner shops, etc.) in cities with population under 1 million people. In this research, the authors created a method to evaluate customers' values formed by different kinds of retailers. Besides, the authors found and counted the main factors that form customers' benefits; the main types of customers' expenditures including material and non-material (time, physical and psychological efforts). The results of the research help retailers to develop marketing programs.

Keywords:customers' values; profit; expenditures; customers' value coefficient.

JEL Classification:L8, G3.

1. Introduction

Since the beginning of the 21st century, the value approach became of first priority in business economics. Customers' value is put into the basis of new business models. The value approach allows supplying not a "pure product" but a customers' value in which the product itself is only a part of value.

At present, the theory of customers' value has no distinct limits of notion "customers' value". Researchers give this term various definitions based on the psychology and behavior of customers. Such scientists as Rokeach (1974), Cullen (2005), Sheth (1991) and Menger (1992) define customers' value as the maximum benefit one can get by owning some product. Another approach to the definition of customers' value can be traced in the papers of Slywotzky (1995) and Parasuraman (1997). In the opinion of these researchers, customers' value is expressed in the highest price a customer is ready to pay for a certain product. If one company does not have the necessary product, a customer switches over to another company. The authors think that such researchers as Slater (1997), Zeithaml (1988), Lapierre (2000), Busacca (2008), Morrisson (2010) and Yuldasheva (2012) consider customers' value from different points of view. They take into account both consumers' benefits and his expenditures. It is no accident that this approach became the most useful in the theory of consumer value. This approach considers customers' value as the ratio of benefits that a customer gets from a certain product to the expenditures needed to purchase this product. It should be noted that expenditures include not only the price of a product but also psychological, temporal and other expenditures. It means that customers' value is regarded as a category providing the unity of quality and price of a product or service. The authors of this paper adhere to the same approach to the definition of customers' value.

The questions of quantitative evaluation of customers' value including benefits and expenditures remain debatable in today's theory of customers' value. A number of researchers subdivide customers' benefits into functional and emotional (Monroe 2002). Noel Capon and James M. Hulbert distinguish functional, psychological and economic benefits (Capon, Hulbert 2001). Functional benefits reflect customers' basic expectations. The psychological benefits satisfy customers' need for status, respect, security and his belonging to some group. The economic benefits characterize the financial aspects of purchasing (prices, crediting, etc.). The classification of benefits is accompanied by a classification of customers' expenditures. According to the theory of marketing, customer hopes for a number of benefits, while the expected value of these benefits exceeds their cost (Lovelock, Wirtz 2011). Customers' expenditures are divided into material expenditures and non-material expenditures (temporal and physical expenditures – tiredness and discomfort; psychological expenditures – mental work, negative feelings and emotions, etc.; and unpleasant sensations).

The performed analysis of theory and methods of customers' value assessment showed that the methods for the survey and quantitative evaluation of customers' values are poorly studied. There are no common approaches for measuring the elements of customers' benefits and expenditures. Besides, these questions are not analyzed in respect to different kinds of retailers though some aspect is elucidated in the papers of some

scientists. (Jayasankaraprasad and Kathyayani 2014, Seock and Lin 2011, Brosdahl and Carpenter 2012, Omar and Musa 2011, To *et al.* 2013) The present paper tries to solve the problems mentioned above.

2. Methodology

The research in this paper is aimed at detecting gaps between expected and derivable customers' values formed by different kinds of retailers (hypermarket, supermarket, corner shops, etc.) in cities with population under 1 million people.

The problems are:

- to be solved: to increase customers' value formed by different kinds of retailers;
- to be studied: to find and assess customers' value formed by different kinds of retailers by benefits (emotional, functional and material) and expenditures (material and non-material).

The goals of the research. According to the aim, this research has the following goals:

- to classify benefits formed by different kinds of retailers;
- to classify customers' expenditures he bears while he effects a purchase in different kinds of retailers;
- to develop a toolkit to measure and assess customers' value formed by different kinds of retailers;
- to survey customers;
- to perform a statistical analysis of survey data;
- to calculate the coefficient of expected and derivable customers' value formed by different kinds of retailers.

The main hypotheses of the research:

H1: The list and structure of benefits formed by retailers depend on the kind of a retailer.

H2: Hypermarkets form more emotional benefits of customers.

H3: In analyzed kinds of retailers, the largest gaps between expected and derivable benefits are in "material benefits"; the smallest gaps are in "emotional benefits";

H4: The list and structure of customers' expenditures depend on the kind of a retailer.

This is an appraisal survey which sustains (or disproves) hypotheses with the help of certain empirical methods. The object of the research is how consumers derive benefits from goods and expenditures connected with these goods and services. The subject of the research is the assessment of customers' values formed by different kinds of retailers.

The coefficient of customers' value is calculated by the following formula:

$$\text{Customers'value} = \frac{\text{Functional} + \text{Pecuinary} + \text{Emotional benefits}}{\text{Financial} + \text{Time} + \text{Physical} + \text{Psychological costs}}$$

Functional benefits correspond to consumer's basic expectations. In the present research, functional benefits are defined as the range of goods; the quality of goods; the presence of in-house goods; retailer's location; shop floor layout; retailer's schedule; shop floor navigation system; wide passageways between shelves; the presence of cash machines and bag lockers; parking area; toilets; front design; merchandising; service rate at a cash desk.

Material benefits connected with the financial aspects of purchasing, such as price, crediting, etc. In this research, material benefits are considered as price level and the presence of discount cards.

Emotional benefits allow satisfying the needs for status, respect, security, etc. In this research, emotional benefits are considered as the presence of unique products; the presence of different brands; handy and clean trolleys; pleasant smell and soft music; personnel's reputation and benevolence.

This research considers customers' expenditures in the context of financial expenditures; the time needed to get to the shop; time to stay in the shop; physical expenditures (tiredness and discomfort) during the purchase process; psychological expenditures (mental work and negative emotions) and unpleasant sensations during the purchase.

The respondents assessed customers' benefits by the scale from 0 to 5 points from the viewpoint of importance (expected benefit) and contentment (derivable benefit). The most important factor received 5 points. Besides, expenditures were assessed according to their importance (expected expenditures) and contentment

(incurred expenditures). As long as expenditures are a negative factor which reduces customers' value, then the expenditures with the highest importance received 5 points.

3. Results

Using the developed method, the authors surveyed the customers of different kinds of retailers (hypermarket, supermarket and corner shop). The results allowed ascertaining and assessing benefits formed by different kinds of retailers (Table 1-3, Figure 1-3). The assessment of expected and derivable benefits in hypermarket (Table 1, Figure 1) showed that the largest gaps between the expected and derivable benefits are among material benefits (0.54 pts). Gaps in functional benefits rank second (0.38 pts). The smallest gaps are detected in emotional benefits (0.24 pts).

Table 1 - The comparative assessment of the customers' expected and derivable benefits in hypermarket

Factor	Expected benefit, pts	Derivable benefit, pts	The gap between expected and derivable benefit, pts
GOODS			
Range	4.21	3.86	-0.35
Quality	4.21	3.79	-0.42
The presence of unique products	3.55	3.26	-0.29
The presence of different brands	3.60	3.21	-0.39
The presence of in-house goods	3.38	2.84	-0.54
PRICE			
Level	4.36	3.44	-0.92
PLACE			
Location	3.45	3.28	-0.17
Layout	3.54	2.86	-0.68
Schedule	3.75	3.45	-0.30
Handy and clean trolleys	3.63	3.22	-0.41
Navigation system	3.32	2.93	-0.39
Wide passageways	3.64	3.37	-0.27
The presence of cash machines, bag lockers, etc.	3.87	3.72	-0.15
The presence of parking area	3.92	3.67	-0.25
The presence of toilets	3.37	3.16	-0.21
PROMOTION			
Front design	3.54	2.50	-1.04
Merchandising	3.67	3.53	-0.14
Pleasant smell and soft music	3.57	3.56	-0.01
The presence of discount cards	3.44	3.26	-0.18
Reputation	3.71	3.59	-0.12
PERSONNEL			
Benevolence	3.79	3.53	-0.26
Service rate at a cash desk	3.89	3.45	-0.44
Total benefits, pts	**81.41**	**73.48**	**-7.93**
Average point	**3.70**	**3.34**	**-0.36**

In hypermarket, the lowest customers' contentment (derivable benefit) is detected for such factors as the front design of shops; price level; shop floor layout; the presence of in-house goods and service rate at a cash desk. The professional retailers should consider bridging these gaps. This will favor the increase of benefits provided by shops, the loyalty of customers and competitiveness.

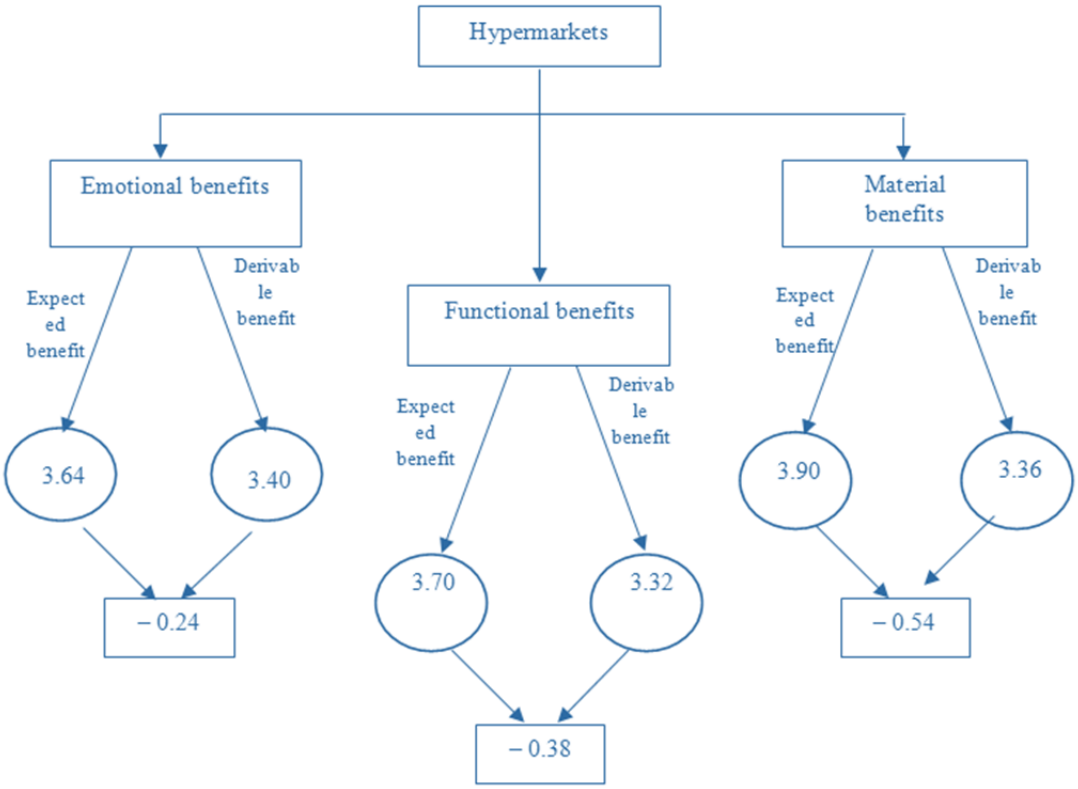

Figure 1 - The gaps between customers' expected and derivable benefits in hypermarket (emotional, functional and material)

The assessment of customers' benefits formed by supermarkets show that the trend of dominating gaps in material benefits detected in the analysis of hypermarkets persists (Table 2, Figure 2).

Table 2 - The comparative assessment of customers' expected and derivable benefits in supermarket

FACTOR	Expected benefit, pts	Derivable benefit, pts	The gap between expected and derivable benefit, pts
GOODS			
Range	4.29	3.71	-0.58
Quality	4.37	3.70	-0.67
The presence of unique products	3.46	3.35	-0.11
The presence of different brands	3.45	3.16	-0.29
The presence of in-house goods	3.60	3.06	-0.54
PRICE			
Level	4.28	3.12	-1.16
PLACE			
Location	4.02	3.38	-0.64
Layout	3.52	3.21	-0.31
Schedule	3.83	3.69	-0.14
Handy and clean trolleys	3.57	3.45	-0.12
Navigation system	3.49	3.02	-0.47
Wide passageways	3.60	3.56	-0.04
The presence of cash machines, bag lockers, etc.	3.84	3.70	-0.14
The presence of parking area	3.73	3.43	-0.30
The presence of toilets	3.18	3.13	-0.05
PROMOTION			
Front design	3.53	2.91	-0.62

FACTOR	Expected benefit, pts	Derivable benefit, pts	The gap between expected and derivable benefit, pts
Merchandising	3.62	3.62	0.00
Pleasant smell and soft music	3.61	3.50	-0.11
The presence of discount cards	3.42	3.36	-0.06
Reputation	3.57	3.43	-0.14
PERSONNEL			
Benevolence	3.81	3.44	-0.37
Service rate at a cash desk	3.94	3.50	-0.44
Total benefits, pts	**81.73**	**74.43**	**7.3**
Average point	**3.72**	**3.38**	**-0.34**

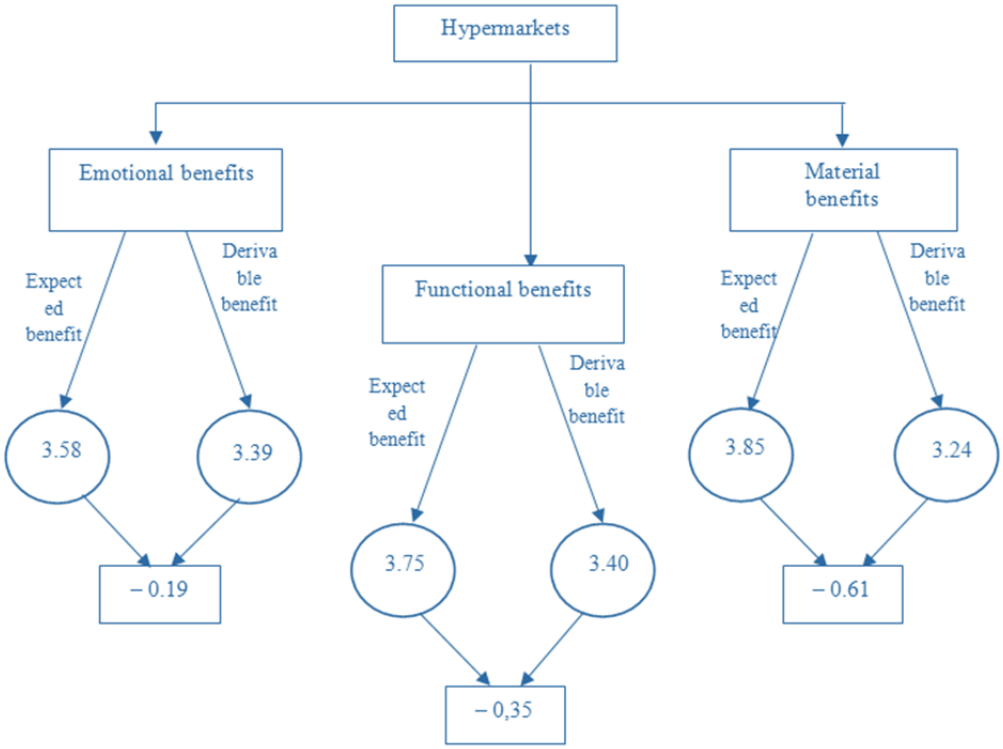

Figure 2 - The gaps between customers' expected and derivable Benefits in supermarket (emotional, functional and material)

It should be noted that the size of gaps in material benefits became even bigger. Probably it can be explained by the higher level of prices in supermarket as compared to hypermarket. At the same time, the gaps in functional and emotional benefits are smaller as compared with hypermarket. In our opinion, this is because supermarket is more comfortable format. It is confirmed by the fact that customers are more contented with the layout of shop floor (the gap is 0.31 pts) and service rate at a cash desk (the gap is 0.44 pts) in supermarket as compared to hypermarket.

In supermarkets, the largest gaps between customers' expected and derivable benefits are detected in such factors as price level, product quality, location, front design and the range of goods. In our opinion, this situation is mainly caused by a wider and deeper range of goods, a higher speed of goods turnover and, as a result, a higher freshness and quality of products in hypermarkets.

The analysis of customers' expected and derivable benefits formed by corner shops showed that this format has the largest gaps in material, emotional and functional benefits as compared to other kinds of retailers (Table 3, Figure 3).

Table 3 .The comparative assessment of customers' expected and derivable benefits in corner shop

FACTOR	Expected benefit, pts	Derivable benefit, pts	The gap between expected and derivable benefit, pts
GOODS			
Range	3.68	3.18	-0.50
Quality	4.15	3.51	-0.64
The presence of unique products	2.81	2.50	-0.31
The presence of different gaps	2.83	2.50	-0.33
The presence of in-house goods	2.82	2.60	-0.22
PRICE			
Level	4.15	2.94	-1.21
PLACE			
Location	4.22	4.13	-0.09
Layout	3.41	2.61	-0.80
Schedule	3.73	3.44	-0.29
Handy and clean trolleys	2.97	2.26	-0.71
Navigation system	3.01	2.34	-0.67
Wide passageways	3.06	2.50	-0.56
The presence of cash machines, bag lockers, etc.	2.76	2.71	-0.05
The presence of parking area	2.85	2.66	-0.19
The presence of toilets	2.57	2.18	-0.39
PROMOTION			
Front design	3.12	2.39	-0.73
Merchandising	3.26	3.18	-0.08
Pleasant smell and soft music	3.04	2.79	-0.25
The presence of discount cards	2.71	2.65	-0.06
Reputation	3.34	3.08	-0.26
PERSONNEL			
Benevolence	3.73	3.53	-0.20
Service rate at a cash desk	3.63	3.41	-0.22
Total benefits, pts	**71.85**	**63.09**	**8.76**
Average point	**3.27**	**2.87**	**0.40**

The lowest customers' contentment in corner shop is in price level, shop floor layout, front design, handy and clean trolleys, navigation system, the quality of goods and the range. Such trend is explained by the analyzed format which presupposes a limited range, a limited area and higher prices. The advantage of corner shops is in their favorable location.

So, the comparative analysis of customers' expected and derivable benefits formed by different kinds of retailers confirmed the hypotheses that the list and structure of benefits formed by retailers depend on the kind of the retailer. The bigger share of emotional benefits is formed by hypermarkets. In the studied kinds of retailers, the largest gaps between expected and derivable benefits are detected in material benefits, while the smallest gaps are detected in emotional benefits.

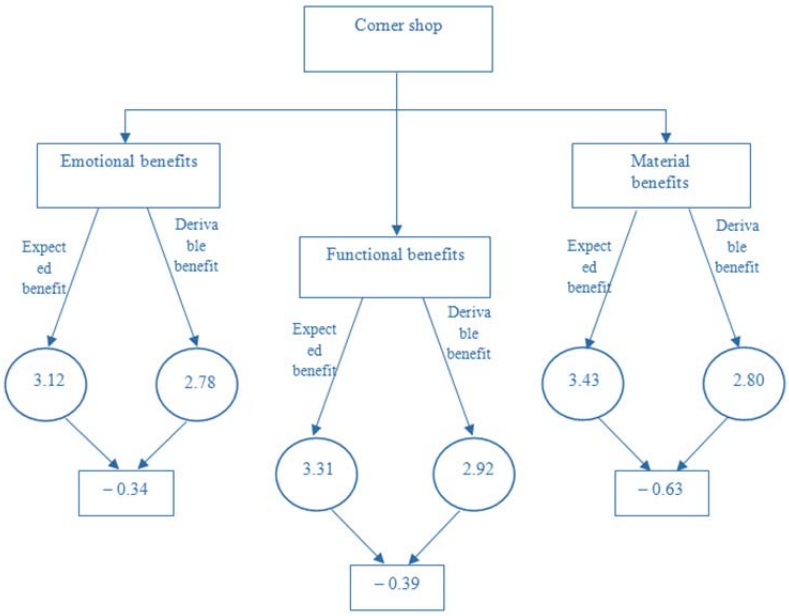

Figure 3 - The gaps between customers' expected and derivable benefits in corner shop (emotional, functional and material)

The level of customers' expenditures is an important factor for the calculation of customers' value coefficient. In this research, expenditures were studied in the context of financial, temporal and psychological expenditures (Table 4-6).

It should be noted that hypermarket has the lowest level of expected and derivable financial costs. This is explained by the format of retailer. The level of unpleasant sensations ranks second. Although, the highest, are the temporal expenditures and physical expenditures (tiredness and discomfort). Such assessments are explained by the large shop floor of hypermarkets.

Table 4 - The comparative assessment of customers' expenditures in hypermarket

FACTOR	Expected expenditures, pts	Incurred expenditure, pts	The gaps between expected and incurred expenditures, pts
Low financial costs	0.77	0.79	0.02
Low temporal expenditures for getting to hypermarket	1.25	1.27	0.02
Low temporal expenditures for staying in hypermarket	1.59	1.78	0.19
Low physical expenditures (tiredness and discomfort)	1.38	1.49	0.11
Low psychological expenditures (mental work and negative emotions)	1.34	1.47	0.13
Low level of unpleasant sensations	0.99	1.08	0.09
Average expenditures, pts	**1.22**	**1.31**	**0.09**

In general, the gaps between expected and incurred expenditures in hypermarket are inessential (0.09 pts).In supermarket, the gaps between expected and incurred expenditures are slightly higher than in hypermarket. The largest gaps are detected in the time needed to get to the shop, the level of unpleasant sensations and financial costs (Table5).

Table 5 - The comparative assessment of customers' expenditures in supermarket

FACTOR	Expected expenditures, pts	Incurred expenditures, pts	The gaps between expected and incurred expenditures, pts
Low financial costs	0.79	0.97	0.18
Low temporal expenditures for getting to supermarket	1.16	1.54	0.38
Low temporal expenditures for staying in supermarket	1.48	1.65	0.17
Low physical expenditures (tiredness and discomfort)	1.20	1.20	0.00
Low psychological expenditures (mental work and negative emotions)	1.42	1.50	0.08
Low level of unpleasant sensations	0.80	1.05	0.25
Average expenditures, pts	**1.14**	**1.32**	**0.18**

The analysis of customers' expenditures in corner shop showed a higher level of expected and incurred expenditures. This reduces the customers' value coefficient for the studied format. Among all the studied formats, the largest gaps between expected and incurred expenditures are detected in such factors as unpleasant sensations, financial costs and temporal expenditures for staying in shop (Table 6).

Table 6 - The comparative assessment of customers' expenditures in corner shop

FACTOR	Expected expenditures – points	Incurred expenditures - points	The gaps between expected and incurred expenditures, points
Low financial costs	1.29	1.60	0.31
Low temporal expenditures for getting to shop	0.74	0.75	0.01
Low temporal expenditures for staying in shop	1.11	1.38	0.27
Low physical expenditures (tiredness and discomfort)	1.00	1.20	0.20
Low psychological expenditures (mental work and negative emotions)	1.69	1.81	0.12
Low level of unpleasant sensations	1.50	1.98	0.48
Average expenditures, pts	**1.22**	**1.45**	**0.23**

So, the performed analysis confirmed the hypothesis that the list and structure of customers' expenditures depend on the kind of retailer.

The performed research and customers' assessment of benefits and expenditures allowed calculating the coefficient of customers' value formed by different kinds of retailers. The research showed that the highest expected customers' value coefficient is formed by supermarket, while the lowest expected customers' value coefficient is formed by corner shop. However, customers' contentment (derivable value) is much lower than the expected level. The smallest gap between expected and derivable level is detected in hypermarket, while the largest gaps are detected in supermarket and corner shop (Table 7).

Table 7 - The calculation of customers' value coefficient for different kinds of retailers

Factor / Calculated value	Benefits, average point	Expenditures, average point	Customers' value coefficient
HYPERMARKETS			
Expected level	3.70	1.22	3.03
Derivable level	3.34	1.31	2.55
The gap between expected and derivable levels	– 0.36	0.09	– 0.48
SUPERMARKET			
Expected level	3.72	1.14	3.26
Derivable level	3.38	1.32	2.56

Factor / Calculated value	Benefits, average point	Expenditures, average point	Customers' value coefficient
The gap between expected and derivable value	– 0.34	0.18	– 0.70
CORNER SHOP			
Expected level	3.27	1.22	2.68
Derivable level	2.87	1.45	1.98
The gap between expected and derivable level	– 0.40	0.23	– 0.70

This situation testifies to a considerable discontent of customers both in the benefits and expenditures they get from retailers. The recommendations to change the situation should correlate with the discontent of customers by certain positions (benefits and expenditures) for certain kinds of retailers.

4. Discussion

At the present stage of customers' value theory, scientists pay much attention to the classification of customers' benefits (Monroe 2002, Capon and Hulbert 2001) and expenditures (Lovelock and Wirtz, 2011). However, benefits and expenditures are usually classified at the group level without sustaining by concrete factors. This impedes their practical use. In the present research, the authors tried to study benefits and expenditures with isolated factors and the algorithm of their calculation. The merit of this research is the assessment of expected and real benefits and expenditures and the gaps between them. Besides, the suggested methodological toolkit was tested by the example of different kinds of retailers. This approach will make it possible to develop proposals for different retailers how to increase customers' value.

The lines of further research within the framework of the emphasized problem can be connected with the calculation of weight coefficient for both benefits and expenditures of customers (with a glance to the income level, life style, etc.) and the coefficient of expected and real benefits and expenditures during purchase. The search for standard coefficients of customers' values for different kinds of retailers can be of great interest.

Conclusion

In the present research the authors developed a method to assess customers' value formed by different kinds of retailers (hypermarket, supermarket and corner shop) in cities with population under 1 million people. Also, the authors suggested a group classification of benefits formed by different kinds of retailers, listed factors within groups and found the algorithm for their assessment:

- functional benefits (the range of goods; the quality of goods; the presence of in-house products; location; shop floor layout; schedule; navigation system; wide passageways between shelves; the presence of cash machines and bag lockers; the presence of parking area; the presence of toilets; front design; merchandising; service rate at a cash desk);
- material benefits (price level and discount cards);
- emotional benefits (the presence of unique products; different brands; handy and clean trolleys; pleasant smell and soft music; reputation and benevolence of personnel).

The authors suggested a classification of customers' expenditures and found the algorithm of their assessment: financial costs, temporal expenditures (for getting to the shop and for staying in the shop), physical expenditures (tiredness and discomfort) from purchasing in a certain shop, psychological expenditures (mental work and negative emotions) and unpleasant sensations during the purchase.

The authors studied customers' value formed by different kinds of retailers, obtained quantitative assessments of customers' value coefficient and detected the gaps between expected and real expenditures, benefits and customers' value. It is noteworthy that different kinds of retailers show a low expected level of customers' benefits (3.27–3.7 pts out of 5). In our opinion, this situation can be explained by the poor development of enterprises of such kinds. This influences consumer perception and causes low assessments. It was ascertained that the smallest gaps between expected and derivable benefits are in emotional benefits, while the largest gaps are in material benefits. In general, the smallest gaps between customers' values formed by different kinds of retailers are detected in hypermarket.

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Exchange Rate Pass-Through in the Euro Area

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Abstract:

Time-varying exchange rate pass-through effects to domestic prices under fixed euro exchange rate perspective represent one of the most challenging implications of the common currency. The problem is even more crucial when examining crisis related redistributive effects associated with relative price changes. The degree of the exchange rate pass-through to domestic prices reveals its role as the external price shocks absorber especially in the situation when the leading path of exchange rates is less vulnerable to the changes in the foreign prices. Adjustments in domestic prices followed by exchange rate shifts induced by sudden external price shocks are associated with changes in the relative competitiveness among member countries of the currency area. In the paper we examine exchange rate pass-through to domestic prices in the Euro Area member countries to examine crucial implications of the nominal exchange rate rigidity. Our results indicate that absorption capabilities of nominal effective exchange rates clearly differ in individual countries. As a result, an increased exposure of domestic prices to the external price shocks in some countries represents a substantial trade-off of the nominal exchange rate stability.

Keywords:exchange rate pass-through, inflation, Euro Area, VAR, impulse-response function

JEL Classification: C32, E31, F41

1. Introduction

Exchange rate pass-through to domestic prices represents one of the most discussed topics in the recent literature dealing with a wide area of effects associated with exchange rate flexibility. The establishment of the Euro Area and introduction of the euro represent a crucial milestone in the ongoing discussions highlighting positive and negative implications of the nominal exchange rate rigidity. On the other hand, we suggest that it is still convenient to analyze the wide spectrum of effects related to the abortion of the relative flexibility of the national exchange rates after the euro adoption (Barhoumi 2006).

Among many of impulses that the exchange rate transmits from the external environment to the domestic market we highlight price related effects associated with sudden changes in the foreign prices and related responsiveness of the domestic price indexes. The degree of the exchange rate pass-through to domestic prices reveals its role as the external price shocks absorber especially in the situation when the leading path of exchange rates is less vulnerable to the changes in the foreign nominal variables (Campa, Goldberg and González-Mínguez, 2005).

In the paper we analyze the exchange rate pass-through to domestic prices in the Euro Area member countries. Our motivation follows an idea (Bussière2013) of asymmetric exchange rate pass-through to domestic prices across internal price chain. Our methodology consists of two partial stages. In the first stage we examine the responsiveness of nominal effective exchange rates to the exogenous price shock to observe the dynamics (volatility) in the exchange rate leading path followed by the unexpected exogenous oil price shock. By doing so we investigate a capability of exchange rates to transmit or absorb the external inflation pressure to domestic prices (Corsetti, Dedola and Leduc 2008). In the second stage we investigate effects of the unexpected exchange rate shift to the domestic price indexes (import prices, producer prices, consumer prices) to examine its distribution across the internal pricing chain (Choudhri, Faruqee and Hakura 2005). Our results contribute to understand the key features of the exchange rate transmission of the inflation pressures initiated by external price shifts and related responses of the domestic price indexes. We employ a vector autoregression (VAR) model. True shocks are identified by the Cholesky decomposition of innovations. From estimated VAR model we compute (1) responses of exchange rates in each individual country to the positive one standard deviation oil price shock and (2) responses of import prices, producer prices and consumer prices to the positive one standard deviation exchange rate shock. To provide more rigorous insight into the problem of the exchange rate pass-through to domestic prices in we estimate models for each particular country employing monthly data for two subsequent periods 2000-2007 (pre-crisis period) and 2000-2014 (extended period). This approach should be helpful to examine country specific features of the transmission of external inflation pressures to the domestic prices. We suggest that comparison of results for models with different time periods is crucial to understand

spurious effects of the economic crisis in both exchange rate responsiveness to the external price shocks as well as associated pass-through pass-through effects to domestic price measures.

2. Exchange rate pass-through in the Euro Area

Euro Area member countries are still suffering from lagging recession. While internal devaluation in countries with nominal exchange rate anchor may improve price competitiveness and boost both internal and external demand, risk of deflationary pressures substantially reduce vital growth incentives (Hetzel 2015). Moreover, ECB by inflating its monetary base fueled by another wave of quantitative easing does not primarily follow idea of economic recovery (Christensen and Gillan 2015). Low interest rate environment may be followed by euro depreciation improving competitiveness of European producers on the foreign markets. However, as the most of transactions on the EU single market are conducted in euro among its member countries, Euro Area seeks common reasonable automatic mechanisms that would help to improve its internal competitiveness (Peersman 2011).

There are still many opened issues according to the suitability of the common monetary policy in the Euro Area provided a relative heterogeneity of the single market (Micossi 2015). Time-varying exchange rate pass-through effects to domestic prices under fixed euro exchange rate perspective represent one of the most challenging implications of the common currency (Bussière 2013). The problem is even more crucial when examining crisis related redistributive effects associated with relative price changes. The degree of the exchange rate pass-through to domestic prices reveals its role as the external price shocks absorber especially in the situation when the leading path of exchange rates is less vulnerable to the changes in the foreign nominal variables (Campa, Goldberg and González-Mínguez 2005). Resulted adjustments in domestic prices followed by exchange rate shifts induced by sudden external price shocks are associated with changes in the relative competitiveness among member countries of the currency area (Team of the Working Group on Econometric Modelling of the ESCB, 2012). Moreover, distribution of the exogenous price shock across the internal pricing chain may be biased by country specific conditions and cross-country distortionary effects induced by the recent economic crisis.

Fixed exchange rate environment represented by credible nominal anchor (i.e. sound foreign currency of a country with a low and stable inflation) or common currency in the currency union provides very efficient tool in fighting high inflation while helping to stabilize inflation expectations (Calvo and Reinhart 2002). As a result, countries with fixed exchange rate benefit from disinflationary periods provided that a decision to adopt fixed exchange rate originated from high inflation pressures in the past. On the other hand, countries in the common currency area obviously experience intensified price level convergence due to higher price transparency that may result in the increased inflation rates over the medium-term period. However, stable inflation expectations anchored by fixed exchange rate and common monetary policy following explicit inflation target obviously induces price stability (Wehinger 2000). On the other hand, increased volatility of exchange rate of the common currency may cause domestic price level to adjust accordingly in the short period, though persisting inflation or disinflation pressures are not expected. It is especially due to positive effects of stable inflation expectations that (we suggest) do not seem to be affected for longer period of time.

Quite specific seems to be a situation in countries with common currency that serves as a local or global currency widely used in foreign transactions. Price effects of increased volatility in such a common currency may be reduced provided that a large number of trading partners are also participating on the common currency. Even when the large portion of mutual foreign transactions in member countries of the common currency area are immune to the exchange rate volatility, remaining transactions are still exposed to the unexpected shifts in the common currency exchange rate against other currencies (Hahn 2003). On the other hand, sudden shifts in the real exchange rate are not exclusively caused by the nominal exchange rate volatility. Increased intensity of price adjustments associated with crisis related effects on real output are usually followed by accelerated deviations of real exchange rates from their equilibrium leading path especially in the short period. This scenario is even more biased provided that crisis period induced diverse effects on the price level dynamics in the heterogeneous group of countries (Choudhri and Hakura 2012).

3. Overview of the literature

Vulnerability of the exchange rates to the exogenous shocks came to the center of an academic discussion shortly after a break-down of a Bretton Woods system of fixed exchange rates at the beginning of the 1970s. Uncertainty on the foreign exchange markets together with higher volatility of exchange rates increased a

sensitivity of domestic economies to the foreign partners' economic development as well as to the world leading economies' exchange rate movements. Exchange rate pass-through as the relationship between exchange rate movement and price adjustments of traded goods came to the center in academic and policy circles (Lian 2007). Toshitaka (2006) estimated exchange rate pass-through of six major industrial countries using a time-varying parameter with stochastic volatility model. Author divided an analysis into impacts of exchange rate fluctuations to import prices and those of import price movements to consumer prices. Takatoshi *et al.* (2005) examined the pass-through effects of exchange rate changes on the domestic prices among the East Asian countries using the conventional pass-through equation and a VAR analysis. In order to identify the VAR model authors used a Cholesky decomposition to identify structural shocks and to examine the pass-through of the exchange rate shock to the domestic price inflation. They conclude that while the degree of exchange rate pass-through to import prices is quite high in the crisis-hit countries, the pass-through to CPI is generally low. Takatoshi and Kiyotaka (2006) estimated five and seven variable VAR model (including all three price variables to check the robustness and to investigate directly the pass-through effect across the prices.) in order to examine the pass-through effects of exchange rate changes on the domestic prices. Cortinhas (2007) also tested the sensitivity of results from the VAR models using several alternative ordering of the variables with mixed results. Ca' Zorzi *et al.* (2007) on the sample 12 emerging markets in Asia, Latin America, and Central and Eastern Europe investigated that exchange rate pass-through declines across the pricing chain, i.e. it is lower on consumer prices than on import prices. Choudhri and Hakura (2012) analyzed exchange rate pass-through to import prices and export prices employing both regression- and VAR-based estimates considering local currency pricing and producer currency pricing assumptions. Authors suggest that exchange rate pass-through to import prices for a large number of countries is incomplete and larger than the pass-through to export prices. McCarthy (2007) investigated the impact of exchange rates and import prices on the domestic PPI and CPI in selected industrialized economies by employing VAR model. His Impulse-response analysis indicates that exchange rates have a modest effect on domestic price inflation while import prices have a stronger effect. He suggests that pass-through is larger in countries with a larger import share and more persistent exchange rates and import prices. Bussière and Peltonen (2008) estimated export and import price equations for a large number of countries. Their results indicate, inter alia, that exchange rate pass-through to import prices in advanced countries is falling over time indicating the increased role of emerging economies in the world economy. Campa, Goldberg and González-Mínguez (2005) analyzed the transmission rates from exchange rates movements to import prices, across countries and product categories, in the Euro Area during 1990s. Their results show that the transmission of exchange rate changes to import prices in the short run is high, although incomplete, and that it differs across industries and countries; in the long run, exchange rate pass-through is higher and close to one. Anderton (2003) employed both time series and panel estimation techniques to investigate exchange rate pass-through for euro. His results points to the relatively high degree of the pass-through changes in the effective exchange rate of the euro to the price of extra-Euro Area imports of manufacturers. Bergin and Feenstra (2007) studied how a rise in China's share of U.S. imports could lower pass-through of exchange rates to US import prices. Barhoumi (2006) investigated exchange rate pass-through into import prices in a sample of 24 developing countries over the period from 1980 to 2003. His analysis revealed differences in exchange rate pass-through in his sample of developing countries explained by three macroeconomics determinants: exchange rate regimes, trade distortions and inflation regimes. Shambaugh (2008) examined the relationship between exchange rates and prices. He employed long-run restrictions VAR to identify shocks and explore the way domestic prices, import prices and exchange rates react to a variety of shocks. He suggests that consumer price pass-through is nearly complete in response to some shocks, but low in response to others. Alternatively, import prices and exchange rates typically respond in the same direction, and pass-through seems quick.

4. Econometric model

VAR models represent dynamic systems of equations in which the current level of each variable depends on past movements of that variable and all other variables involved in the system. Residuals of vectorε_t represent unexplained movements in variables (effects of exogenous shocks hitting the model); however as complex functions of structural shocks effects they have no economic interpretation. Structural shocks can be still recovered using transformation of the true form representation into the reduced-form by imposing a number of identifying restrictions. Applied restrictions should reflect some general assumptions about the underlying structure of the economy and they are obviously derived from economic theory. There are two general (most used) approaches to identify VAR models. (I) Cholesky decomposition of innovations implies the

contemporaneous interactions between exogenous shocks and the endogenous variables are characterized by a Wald causal chain. Ordering of endogenous variables then reflects expected particular economy structure following general economic theory assumptions. However, the lack of reasonable guidance for appropriate ordering led to the development of more sophisticated and flexible identification methods - (II) structural VAR (SVAR) models. Identifying restrictions implemented in SVAR models reflect theoretical assumptions about the economy structure more precisely. However, restrictions based on the theoretical assumptions employed in both identifying schemes should be empirically tested to avoid shocks identification bias and imprecisions associated with endogenous variables responses to the shocks.

We employ a VAR methodology to investigate the exchange rate pass-through to domestic prices in the Euro Area member countries. Cholesky decomposition of variance-covariance matrix of reduced-form VAR residuals is implemented to examine responsiveness of (1) exchange rate to the unexpected oil price shock followed by (2) investigation of responses of different domestic price indexes to the unexpected exchange rate shock (Takatoshi and Kiyotaka 2006).

First stage in exchange rate pass-through reveals ability of exchange rate to absorb or accelerate the transmission of external price shock (positive one standard deviation oil price shock). The overall dynamics in the exchange rates response patterns provide crucial information about the exposure of exchange rate to the price related external shock in each particular country from the group (McCarthy 2007). At the same time it reveals vital features of the exchange rate leading path toward pre-shock equilibrium and associated volatility patterns followed by the initial exogenous price shock.

Second stage in exchange rate pass-through highlights effects of the unexpected exchange rate shifts (positive one standard deviation exchange rate shock) on domestic price indexes and thus reveals the responsiveness of prices at different stages of the pricing chain (import prices, producer prices, consumer prices). At the same time it allows to investigate a distribution channel of the external price shock along the internal pricing chain. This approach is helpful for understanding the responsiveness patterns of domestic price indexes following principles of the pricing chain mechanism across different price measures.

Examination of the two stage exchange rate pass-through employing a multivariate VAR for each individual country from the group of the Euro Area member countries follows the side objective of the paper to investigate possible implications of different exchange rate arrangements on estimated results and thus to contribute to the fixed versus flexible exchange rates dilemma from the prospective of the transmission of the external inflation pressures to the domestic price inflation associated with the exchange rate conditional variability.

True model is represented by the following infinite moving average representation:

$$X_t = A_0\varepsilon_t + A_1\varepsilon_{t\text{-}1} + A_2\varepsilon_{t\text{-}2} + \ldots = \sum_{i=0}^{\infty} A_i\varepsilon_{t\text{-}i} = \sum_{i=0}^{\infty} A_i L^i\varepsilon_t = A(L)\varepsilon_t \quad (1)$$

where X_t represents n x 1 a vector including endogenous variables of the model, $A(L)$ is a n x n polynomial consisting of the matrices of coefficients to be estimated in the lag operator L representing the relationship among variables on the lagged values, ε_t is n x 1 vector of identically normally distributed, serially uncorrelated and mutually orthogonal errors (white noise disturbances that represent the unexplained movements in the variables, reflecting the influence of exogenous shocks):

$$E(\varepsilon_t) = 0, \quad E(\varepsilon_t\varepsilon_t') = \Sigma_\varepsilon = \mathrm{I}, \quad E(\varepsilon_t\varepsilon_s') = [0] \quad \forall t \neq s \quad (2)$$

Vector X_t in our baseline model similar to those by Takatoshi and Liyotaka (2006) consists of five endogenous variables - oil prices $(p_{oil,t})$, nominal exchange rate $(er_{n,t})$, money supply (m_t), real output $(y_{r,t})$, domestic price index (p_t). In the five-variable VAR model $(X_t = [p_{oil,t}, er_{n,t}, m_t, y_{r,t}, p_t])$ we assume five exogenous shocks that contemporaneously affect endogenous variables - external (oil) price shock $(\varepsilon_{p_{oil},t})$, nominal exchange rate shock $(\varepsilon_{er_n,t})$, liquidity shock $(\varepsilon_{m,t})$, demand shock $(\varepsilon_{y_d,t})$ and internal price shock $(\varepsilon_{p,t})$.

Structural exogenous shocks from equation (1) are not directly observable due to the complexity of information included in true form VAR residuals. As a result, structural shocks cannot by correctly identified. It is then necessary to transform true model into following reduced form

$$X_t = C(L)X_{t-1} + e_t \quad (3)$$

where $C(L)$ is the polynomial of matrices with coefficients representing the relationship among variables on lagged values and e_t is a n x 1 vector of normally distributed errors (shocks in reduced form) that are serially uncorrelated but not necessarily orthogonal (shocks in the reduced form can be contemporaneously correlated with each other):

$$E(e_t)=0, \quad \Sigma_u = E(e_t e_t') = A_0 E(e_t e_t') A_0' = A_0 A_0', \quad E(e_t e_s') = [0] \quad \forall t \neq s \quad (4)$$

Relationship between reduced-form VAR residuals (e_t) and structural shocks (ε_t) can be expressed as follows:

$$e_t = A_0 \varepsilon_t \quad (5)$$

As we have already noted at the beginning of the section we implement a Cholesky identification scheme to correctly identify structural shocks. In order to identify our model there must be exactly $n^2 - \left[\left(n^2 - n\right)/2\right]$ relationships among endogenous variables of the model, where *n* represents a number of variables. We have to impose $\left(n^2 - n\right)/2$ restrictions on the matrix A_0 based on the Cholesky decomposition of the reduced-form VAR residual matrix that define matrix A_0 as a lower triangular matrix. The lower triangularity of A_0 (all elements above the diagonal are zero) implies a recursive scheme (structural shocks are identified through the reduced-form VAR residuals) among variables (the Wald chain scheme) that has clear economic implications and has to be empirically tested as any other relationship. Identification scheme of the matrix A_0 implies that particular contemporaneous interactions between some exogenous shocks and some endogenous variables are restricted reflecting causal (distribution) chain of interaction transmission. It is clear that the Wald causal chain is incorporated via convenient ordering of variables.

Considering lower triangularity of a matrix A_0 the equation (5) can be rewritten as follows:

$$\begin{bmatrix} e_{p_{oil},t} \\ e_{er_n,t} \\ e_{m,t} \\ e_{y_r,t} \\ e_{p,t} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 & 0 \\ a_{41} & a_{42} & a_{43} & 1 & 0 \\ a_{51} & a_{52} & a_{53} & a_{54} & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{p_{oil},t} \\ \varepsilon_{er_n,t} \\ \varepsilon_{m,t} \\ \varepsilon_{y_r,t} \\ \varepsilon_{p,t} \end{bmatrix} \quad (6)$$

Correct identification of exogenous structural shocks reflecting Cholesky ordering of variables denotes following assumptions:

- Oil prices do not contemporaneously respond to the shock from any other endogenous variable of the model.
- Exchange rate doesn't contemporaneously respond to liquidity, demand and internal price shocks, while it is contemporaneously affected only by the external price shock.
- Money supply doesn't contemporaneously respond to demand and internal price shocks, while it is contemporaneously affected by external price and exchange rate shocks.
- Real output doesn't contemporaneously respond to the internal price shock, while it is contemporaneously affected by external price, exchange rate and liquidity shocks.
- Domestic price index is contemporaneously affected by the shocks from all of the endogenous variables of the model.

After initial period endogenous variables may interact freely without any restrictions.

Ordering of variables is crucial not only for a correct identification of structural shocks but also to reveal a convenient transmission mechanism of the external price shock into the domestic price level as well as a suitable distribution chain of the price effect across various domestic price indexes. However, the overall accuracy and robustness of the empirical results may be tested by examining the effects of the changed ordering of endogenous variables to exchange rate pass-through to the domestic prices.

To investigate the pass-through effect of the exchange rate shock to domestic price indexes at particular stages of distribution we include three different types of domestic prices (import prices, producer prices, consumer prices). All three types of internal price indexes are included in one model to examine a distribution channel of the external price shock along the internal pricing chain. As a result, the equation (6) is rewritten as follows:

$$\begin{bmatrix} e_{p_{oil},t} \\ e_{er_n,t} \\ e_{m,t} \\ e_{y_r,t} \\ e_{p_{imp},t} \\ e_{p_{ppi},t} \\ e_{p_{cpi},t} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 & 0 & 0 & 0 \\ a_{41} & a_{42} & a_{43} & 1 & 0 & 0 & 0 \\ a_{51} & a_{52} & a_{53} & a_{54} & 1 & 0 & 0 \\ a_{61} & a_{62} & a_{63} & a_{64} & a_{65} & 1 & 0 \\ a_{71} & a_{72} & a_{73} & a_{74} & a_{75} & a_{76} & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{p_{oil},t} \\ \varepsilon_{er_n,t} \\ \varepsilon_{m,t} \\ \varepsilon_{y_r,t} \\ \varepsilon_{p_{imp},t} \\ \varepsilon_{p_{ppi},t} \\ \varepsilon_{p_{cpi},t} \end{bmatrix} \quad (7)$$

Following theoretical assumptions as well as empirical results we expect that the highest degree of exchange rate pass-through would be identified for import prices and lowest for consumer prices. We suggest that the initial effect of the external price shock will be reduced during its transmission along the internal price distribution channel.

Estimated VAR model is employed to compute impulse response functions to analyze (1) the responses of the exchange rate to the positive one standard deviation external (oil) price shock and (2) responses of particular internal price indexes to the positive one standard deviation exchange rate shock in the Euro Area member countries (Lian and Wang 2012). To check the robustness of empirical results we estimate the model considering different ordering of the endogenous variables in models and thus employing different identifying restrictions resulting from the recursive Cholesky decomposition of the reduced form VAR residuals:

- model A1, B1 $\left(X_t = \left[p_{oil,t}, er_{n,t}, m_t, y_{r,t}, p_{imp,t}, p_{ppi,t}, p_{cpi,t}\right]\right)$
- model A2, B2 $\left(X_t = \left[p_{oil,t}, m_t, er_{n,t}, y_{r,t}, p_{imp,t}, p_{ppi,t}, p_{cpi,t}\right]\right)$
- model A3, B3 $\left(X_t = \left[p_{oil,t}, y_{r,t}, er_{n,t}, m_t, p_{imp,t}, p_{ppi,t}, p_{cpi,t}\right]\right)$

Different ordering of variables enables us to examine exchange rate pass-through via alternative distribution channels of external inflation pressures transmission to the domestic prices assuming that different ordering of variables follows the economic logic of the chain of pricing and the structure of the economy. It also allows us to compare results with those of other studies. Additionally, if estimated results from the impulse-response analysis confirm the model is not very sensitive to the endogenous variables ordering than the Cholesky decomposition of the reduced-form VAR residuals with the initial ordering of variables provides significant and robust results.

Following the main objective of the paper we also estimate VAR models employing time series for two different periods (pre-crisis period (model A, 2000M1-2007M12) and extended period (model B, 2000M1-2014M12)) to examine effects of the crisis period on the exchange rate pass-through to import prices, producer prices and consumer prices in the Euro Area member countries.

Investigation of the exchange rate responsiveness to the unexpected exogenous price shock in countries with de-facto fixed exchange rates reveals substantial implications of exchange rate rigidity according to the absorption capabilities of exchange rates (Hahn 2003). We expect that limited exchange rate volatility in terms of its vulnerability to the country specific determinants should reduce exchange rate exposure to the external price shock while it should simplify its transmission to the domestic prices.

5. Data and results

To investigate the exchange rate pass-through to domestic prices in the Euro Area member countries we employed monthly data for period 2000M1-2007M12 (model A) consisting of 96 observations and for period 2000M1-2014M12 (model B) consisting of 168 observations for the following endogenous variables - oil prices, nominal exchange rate (nominal effective exchange rate), money supply (monetary aggregate M2), industrial production (nominal volume of the industrial product deflated by averaged PPI) and inflation (import prices index, producer prices index, consumer prices index).

A. Testing procedures

Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were computed to test endogenous variables for the unit roots presence. Both ADF and PP tests indicate that most of variables are non-stationary on values so that the null hypothesis of a unit root presence cannot be rejected for any of time series. Testing variables on first differences indicates that time series are stationary. We may conclude that variables are integrated of order 1 I(1).

Because there are endogenous variables with a unit root on values it is necessary to test time series for cointegration using the Johansen and Juseliuscointegration test (we found reasonable to include variables I(0) for testing purposes following economic logic of expected results). The test for the cointegration was computed using three lags as recommended by the AIC (Akaike Information Criterion) and SIC (Schwarz Information Criterion).

Results of Johansen cointegration tests confirmed our results of unit root tests. Both trace statistics and maximum eigenvalue statistics (both at 0.05 level) indicate that there is no cointegration among endogenous variables of the model.

To test the stability of VAR models we also employed a number of diagnostic tests. We found no evidence of serial correlation, heteroskedasticity and autoregressive conditional heteroskedasticity effect in disturbances. The model also passes the Jarque-Bera normality test, so that errors seem to be normally distributed. VAR models seem to be stable also because inverted roots of the model for each country lie inside the unit circle. Detailed results of time series testing procedures are not reported here to save space. Like any other results, they are available upon request from the author.

Following results of the unit root and cointegration tests we estimated the model using variables in first differences so that we can calculate impulse-response functions for all nineteen Euro Area member countries. Following the main objective of the paper we focus on interpretation of responses of the (1) exchange rate to the positive one standard deviation oil price shock and (2) domestic price indexes (import prices, producer prices and consumer prices) to the positive one standard deviation exchange rate shock.

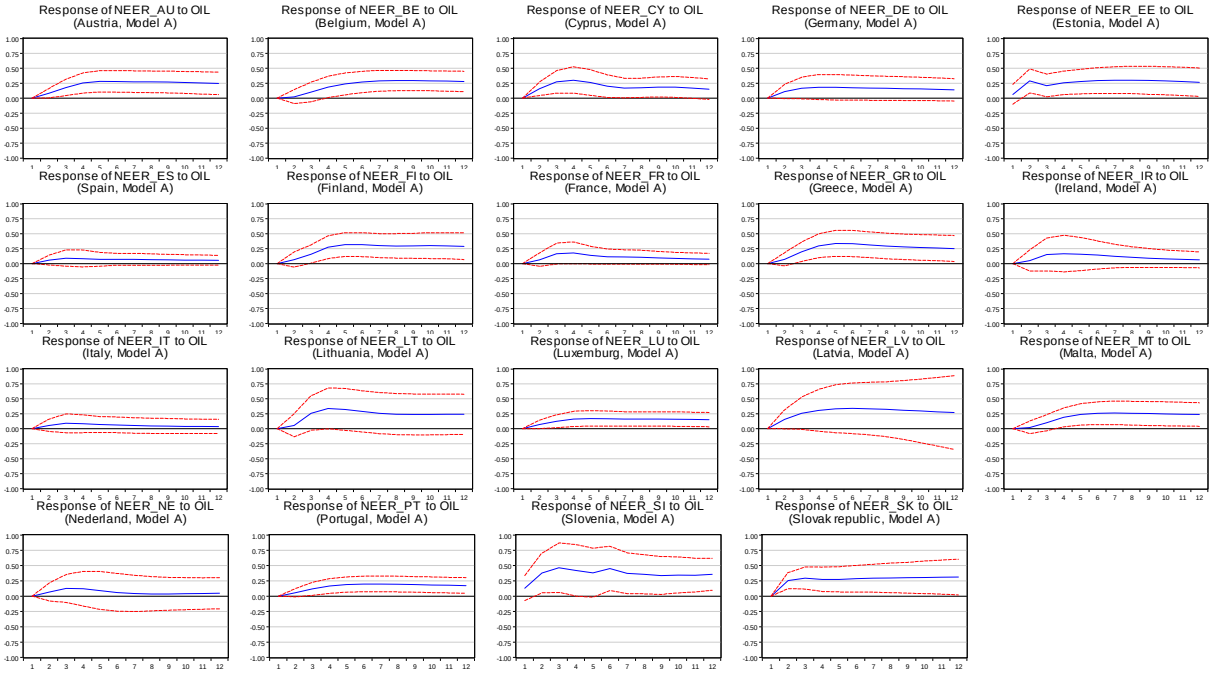
We also observe effects of the crisis period on the both exchange rate responses to oil price shock and domestic prices responses to the exchange rate shock in the Euro Area member countries by comparing results for estimated models using time series for two different periods - model A (2000M1-2007M12) and model B (2000M1-2014M12). Changed ordering of variables didn't seem to affect results of the analysis. Considering that impulse-response functions are not very sensitive to the ordering of endogenous variables we present results of both models (model A1 and B1) with default ordering of endogenous variables (detailed results for models A2, A3, B2, B3 are available upon request from the author).

B. Impulse-Response functions

Examination of the first stage in the exchange rate pass-through includes estimation of exchange rates responses to the positive one standard deviation oil price shock employing monthly data for two subsequent periods 2000-2007 (model A) and 2000-2014 (model B).

In the Figure 1 we summarize results of impulse-response functions of exchange rates to the positive (increase in) oil price shocks in both models in Euro Area member countries. Estimations of the exchange rates responsiveness to the Cholesky positive one standard deviation oil price shocks revealed interesting implications of the relative heterogeneity of the Euro Area. Unexpected increase in the oil price was followed by the exchange rate appreciation in all countries from the group.

(Model A) (2000M1-2007M12)



Note: Curves represent responses of exchange rates (NEER) to the positive one standard deviation oil price (OIL) shock in each country from the group of the Euro Area member countries.
*Source:*Author's calculations.

Figure 1 - Responses of exchange rates to oil price shock

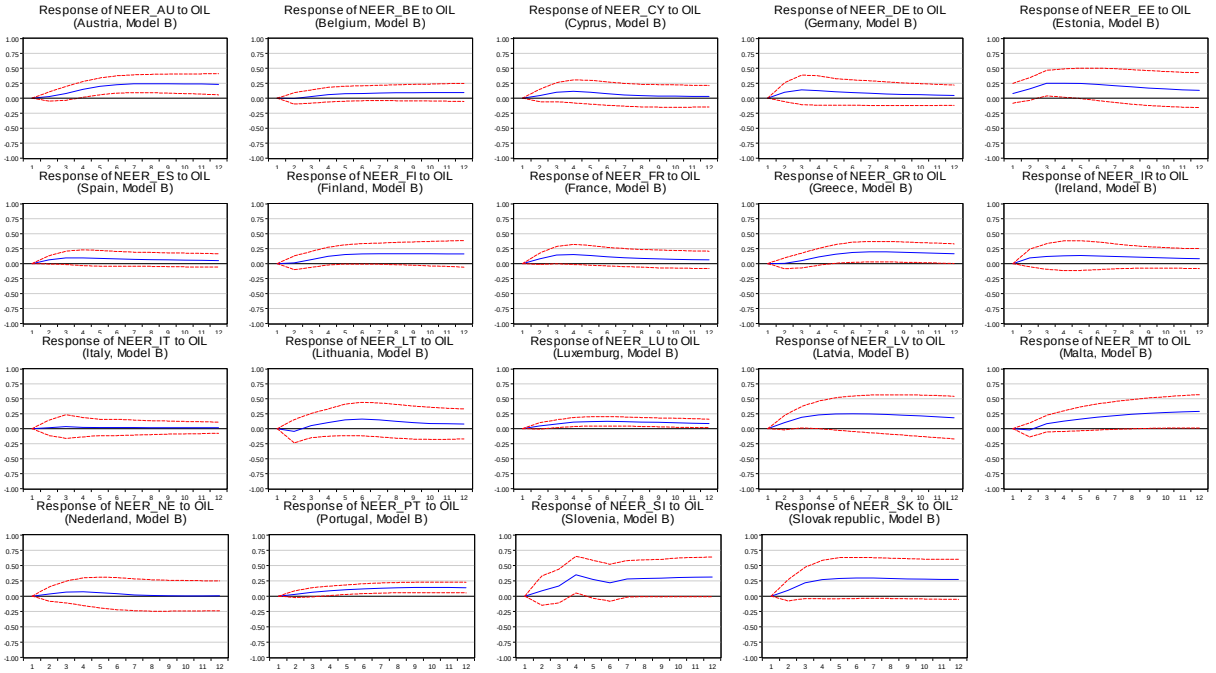
However, we have observed different patterns in the exchange rate responsiveness among individual countries. Oil price shock caused a moderate and less dynamic increase in the exchange rate in large economies (Germany, Spain, France, Italy) countries of Benelux (except for Belgium) and Portugal. Exchange rate responsiveness to the external price (oil) shock in countries with large and less opened economies seems be to less dynamic in comparison with the rest of countries from the Euro Area. Reduced responsiveness of NEER in sizeable economies corresponds with theoretical assumptions about low exposure of exchange rates to exogenous shocks in less opened economies. In Luxemburg, Nederland and Portugal our results indicate reduced absorption capabilities associated with price related effects of unexpected oil price shock.

In the rest of countries we observed more dynamic initial response of NEER to the positive oil price shock. Higher absorption capability of exchange rates in these countries reduces inflation pressures associated with external price shock and its transmission to domestic prices.Our results also indicate different durability of the effect of the external price shock on NEER in the Euro Area member countries. In large economies and Euro Area outliers the overall positive effect of the oil price shock clearly died out earlier in comparison with the rest of countries from the group. While generally temporary in most of countries, NEER appreciation seems to be permanent in just three economies (Finland, Slovenia and Slovak republic[6]).

Low exposure of the exchange rate to the oil price shock reduces its absorption capabilities. We expect that this feature of exchange rates will be crucial consideration in examining the second stage in the exchange rate pass-through. Reduced exchange rate responsiveness to the external price shocks increases the transmission of the price effect to the domestic prices. Imported inflation is clear implication of the exchange rate rigidity in such cases and it is also a contrary example to thetraditional views emphasizing positive effects of the (fixed) exchange rate based stabilization economic policies. On the other hand, higher and durable responsiveness of exchange rates to the oil price shock in the second group of countries reduces the transmission of the price effect to domestic prices and thus contributes to offset the expected inflation pressures originated in the negative external price shock. As a result, exchange rates in these countries operate more as an external price shock absorber. Assumptions about expected transmission or absorption capabilities of exchange rates in both groups of countries will be comprehensively evaluated by assessing the second stage in the exchange rate pass-through to import prices, producer prices and consumer prices.

[6] It is necessary to note that Slovenia and Slovakia operated during the most of the pre-crisis period outside the Eurozone.

(Model B) (2000M1-2014M12)



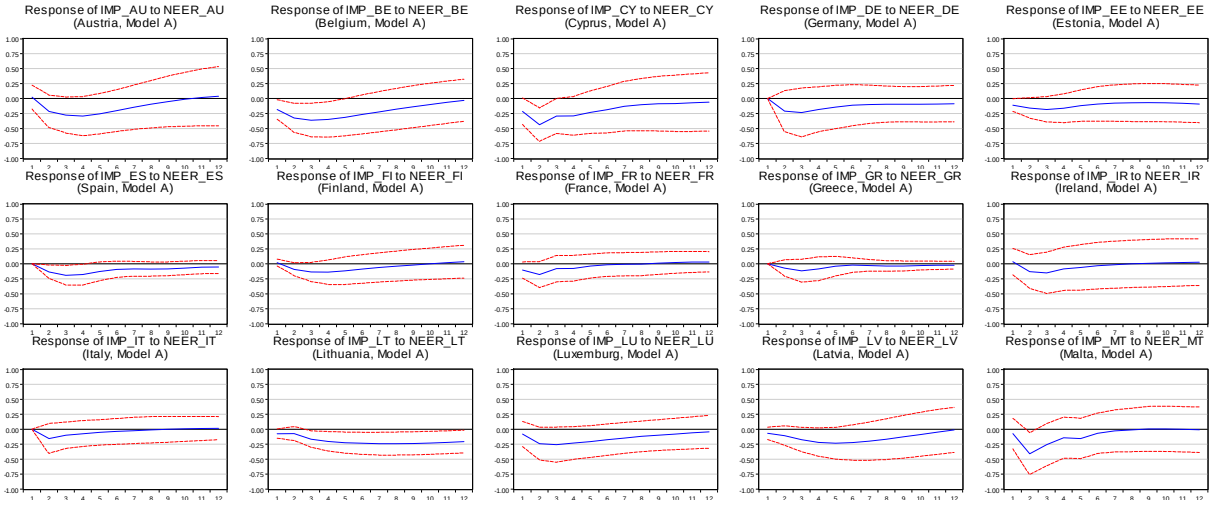
Note: Curves represent responses of exchange rates (NEER) to the positive one standard deviation oil price (OIL) shock in each country from the group of the Euro Area member countries.
Source: Author's calculations.

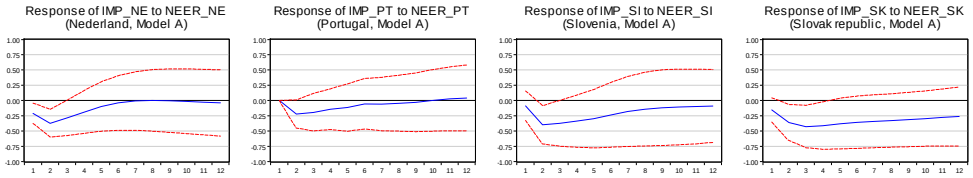
Figure 2 -Responses of exchange rates to oil price shock

Crisis period affected short-term responsiveness of exchange rates to the positive one standard deviation oil price shock in all Euro Area member countries (Figure 2). In general, the NEER response during the extended period followed slightly lagged less intensive and less durable path toward its long-run pre-shock equilibrium in all countries. Permanent feature in the NEER response was preserved in Slovenia and Slovak republic. Generally lower responsiveness of NEER to the exogenous price shocks during the extended period indicates reduced absorption capabilities of exchange rate due to crisis related effects. As a result, the crisis period increased the overall vulnerability of the Euro Area member countries to the external price shocks.

Examination of the second stage in the exchange rate pass-through includes estimation of the import prices, producer prices and consumer prices responses to the positive one standard deviation exchange rate shock (unexpected exchange rate appreciation) employing monthly data for two subsequent periods 2000-2007 (model A) and 2000-2014 (model B).

(Model A) (2000M1-2007M12)



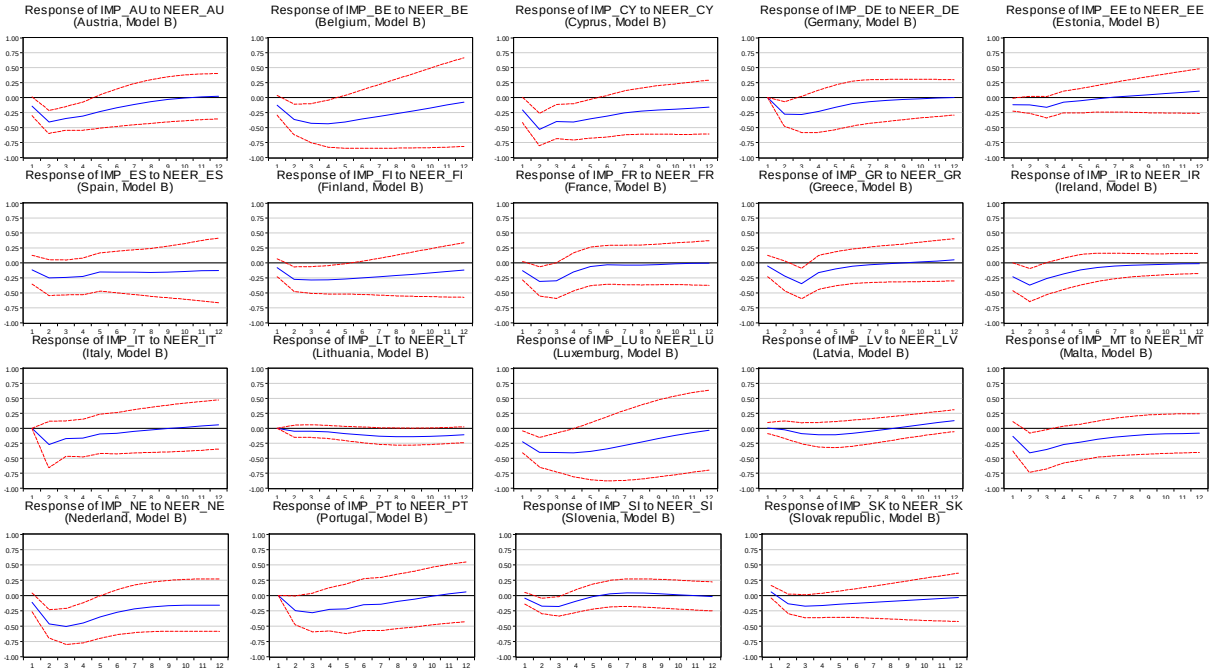


Note: Curves represent responses of import prices (IMP) to the positive one standard deviation exchange rate (NEER) shock in each country from the group of the Euro Area member countries.
Source: Author's calculation.

Figure 3 - Responses of import prices to exchange rate shock

In the Figure 3 we summarize results of impulse-response functions of the import prices to the positive (increase in) exchange rate shocks in both models in the Euro Area member countries. While we observed some similar patterns in the import prices responsiveness in the whole group of countries there are still some differences than need to be discussed. Most of the initial effect of the exchange rate shock affected import prices in all countries within first 2-3 months and then steadily decreased. Only exception we observed in Latvia and Lithuania where import prices decreased with a reduced intensity. Effect of the exchange rate shock on import prices seems to be neutral in the long run in all countries. Moreover, smaller and more opened economies experienced more dynamic initial decrease in import prices followed by the exchange rate shock. Increased vulnerability of import prices contributed to higher absorption capabilities of NEER in these countries. Moreover, import prices, as the first element in the internal price chain, initiated impulse that will spread across remaining two price indexes (producer prices and import prices). Responsiveness of the latest two indexes to the unexpected exchange rate shock may provide crucial information about efficiency of the transmission mechanism of the external price shock across internal price chain in individual countries.

(Model B) (2000M1-2014M12)



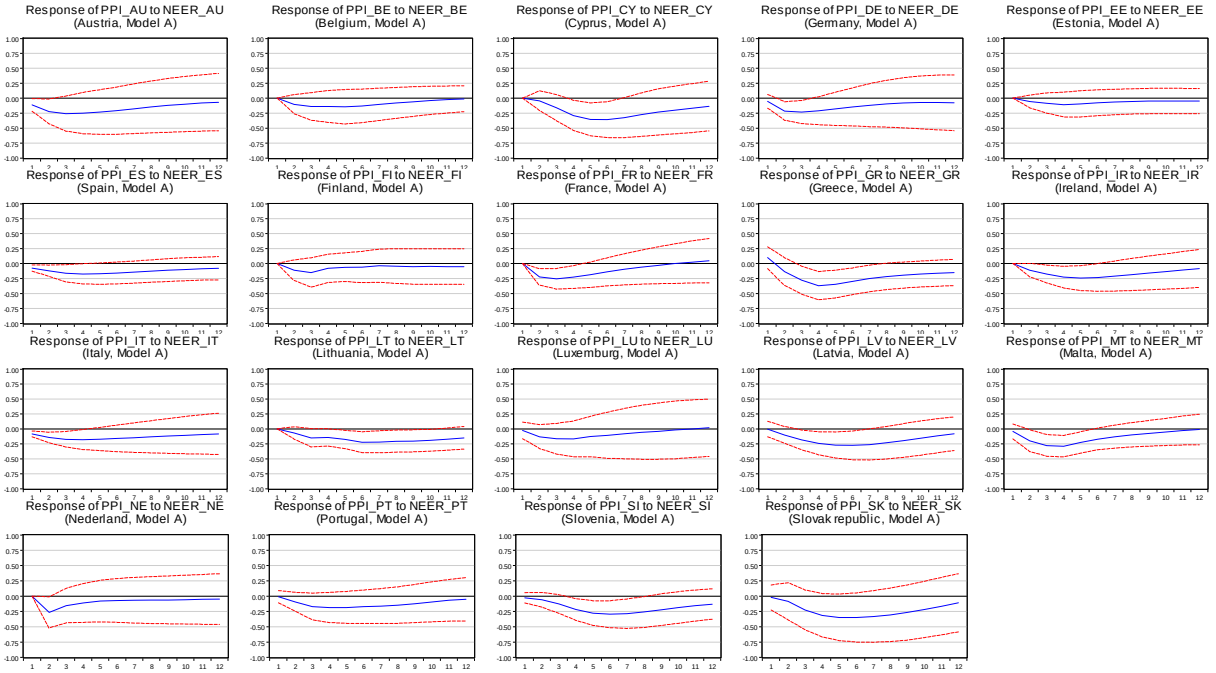
Note: Curves represent responses of import prices (IMP) to the positive one standard deviation exchange rate (NEER) shock in each country from the group of the Euro Area member countries.
Source: Author's calculation.

Figure 4 - Responses of import prices to exchange rate shock

Crisis period affected responsiveness of import prices to the positive one standard deviation exchange rate shock in the Euro Area member countries though we observed some differences that need to be discussed (Figure 4). In general, all Euro Area member countries except for new members (Baltic countries, Slovakia and Slovenia) experienced increased short term vulnerability of import price to the unexpected NEER shock. Similarly

to the results for the pre-crisis period, negative effect (decrease in prices) of the shock culminated within first three months (except for Lithuania) and was neutral in the long run as its effect completely died out mostly within one year since the shock. Higher short-term sensitivity of the import prices to the exchange rate shock induces increased absorption capabilities of NEER in most of the Euro Area member countries. However, our results for producer prices and consumer prices did not confirm the idea of the transmission of the exchange rate absorption capabilities across the internal price chain.

(Model A) (2000M1-2007M12)



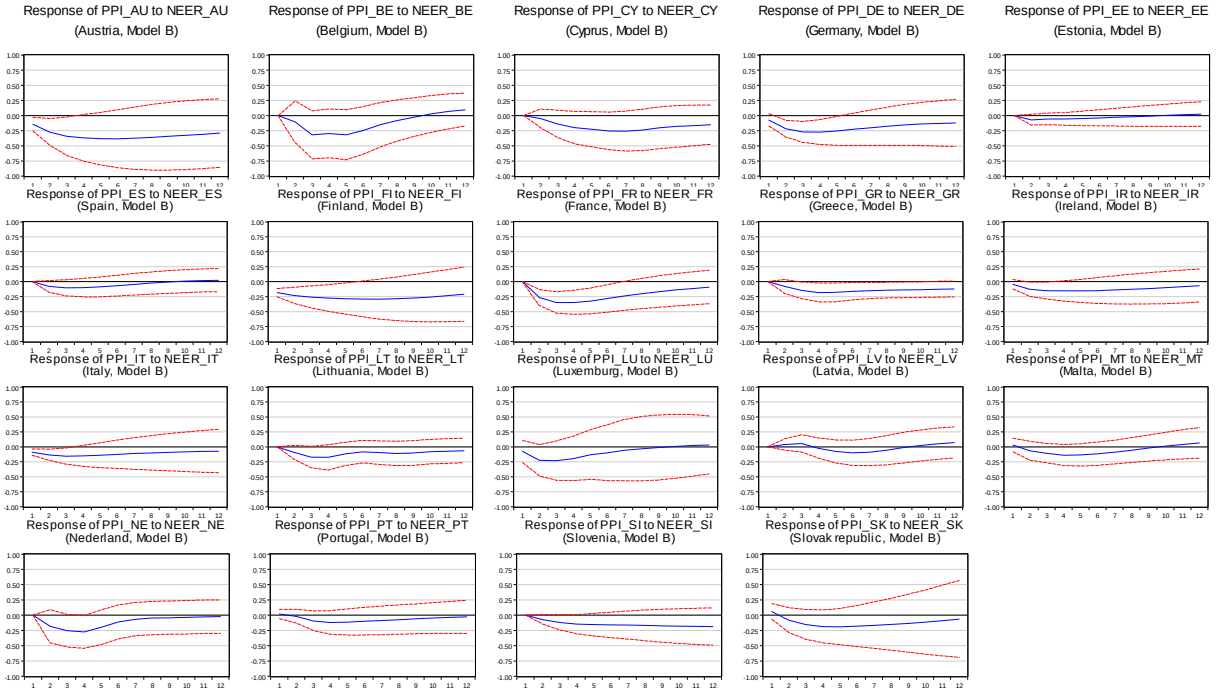
Note: Curves represent responses of producer prices (PPI) to the positive one standard deviation exchange rate (NEER) shock in each country from the group of the Euro Area member countries.
Source: Author's calculation.

Figure 5 - Responses of producer prices to exchange rate shock

In the Figure 5 we summarize results of impulse-response functions of the producer prices to the positive (increase in) exchange rate shocks in both models in the Euro Area member countries. Exchange rate appreciation, in models with time series for the pre-crisis period, was followed by a drop in producer prices in all nineteen economies. However, while the positive effect of the shock culminated within first six months, the response pattern of producer prices in individual countries followed unique leading path to its pre-shock equilibrium. New Euro Area member countries from past Eastern bloc (except for Estonia) experienced more dynamic and more lagged decrease in producer prices in comparison with the rest of the Euro Area. Similar response patterns (more dynamic and durable) were observed in Cyprus and Greece. In remaining countries we observed mostly less dynamic and less durable responsiveness of producer prices. Overall effect of the shock in all countries seems to be just a temporary and thus neutral in the long run. Finally, in most of the less performing countries (mostly periphery economies) we observed higher dynamics in the responsiveness pattern of producer prices in comparison with responsiveness of import prices. Overreaction of producer prices combined with low responsiveness of NEER to the external price shock may refer to reduced efficiency of the transmission mechanism across the internal price chain.

Examination of the exchange rate pass-through to producer prices revealed interesting differences in the absorption capabilities of the common currency among member countries of the Euro Area. Generally higher responsiveness of producer prices in the new Euro Area member countries from the past Eastern bloc (together with Cyprus and Greece) indicates better transmission of the asymmetric effect of the external price shock from exchange rate (appreciation) to producer prices (decrease) in the short-run period. As a result, higher flexibility of the exchange rate pass-through in these countries reduces their vulnerability to the exogenous price shocks. At the same time, less dynamic response of producer prices in the most of the Euro Area member countries increase their exposure to the unexpected external price shocks.

(Model B) (2000M1-2014M12)

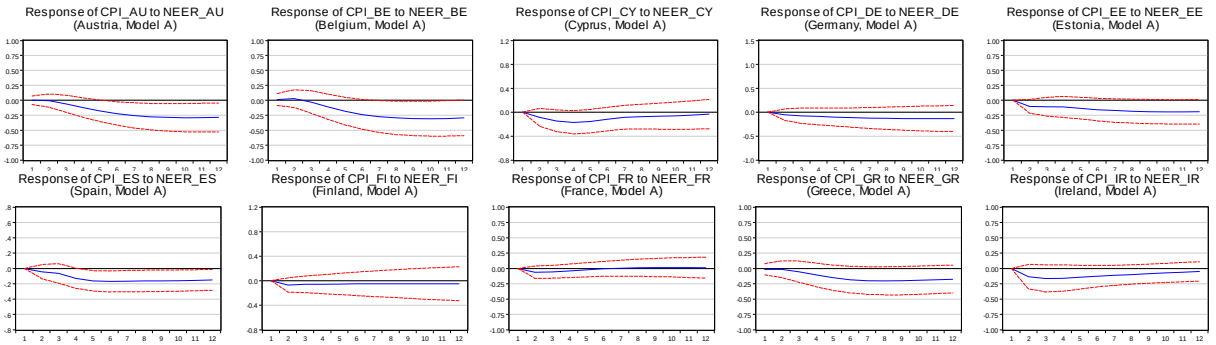


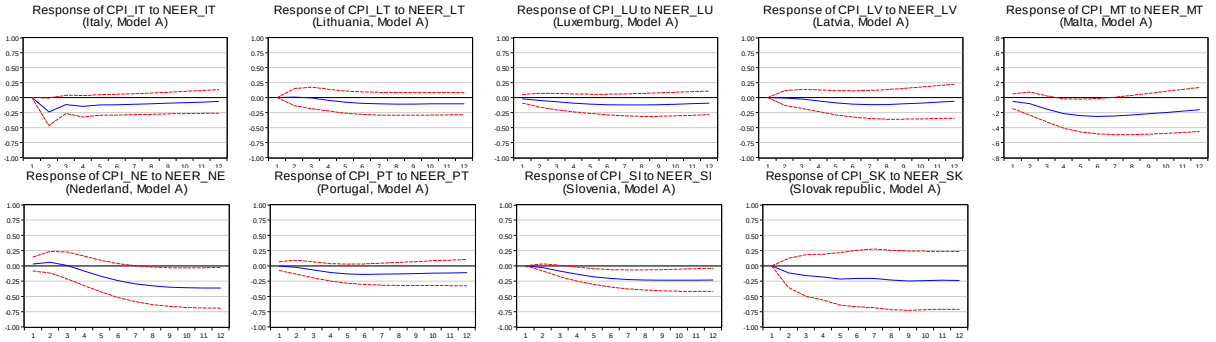
Note: Curves represent responses of producer prices (PPI) to the positive one standard deviation exchange rate (NEER) shock in each country from the group of the Euro Area member countries.
Source: Author's calculation.

Figure 6 - Responses of producer prices to exchange rate shock

Crisis period affected responsiveness of producer prices to the positive one standard deviation exchange rate shock in our group of countries though we have recognized some differences that need to be discussed (Figure 6). NEER appreciation was followed by general decrease in producer prices. However, crisis period reduced responsiveness of producer prices (mostly in terms of dynamics and in some cases also in the speed of adjustment) to the unexpected exchange rate shock in group consisting of the new Euro Area member countries (Baltic countries, Slovakia and Slovenia) and the less performing core Euro Area members represented by periphery countries (PIGS), Cyprus, Ireland and Malta. We suggest that these countries experienced a reduction in efficiency of the exchange rate pass-through to producer prices that increased their vulnerability to external price shocks due to reduced absorption capabilities of their NEER. Moreover, remaining countries from the core of the Euro Area experienced an increased dynamics in the response pattern of their producer prices to the unexpected exchange rate shock. It seems that generally better macroeconomic conditions in these countries resulted in the overall improvement of the exchange rate pass-through to producer prices. As a result, absorption capabilities of NEER in the core countries were improved and the vulnerability and exposure of the core countries to the external price shocks was generally reduced. We suggest that less performing economies of the Euro Area seem to be more vulnerable to the external price shocks and thus more prone to deflationary pressures driven by external shocks.

(Model A) (2000M1-2007M12)



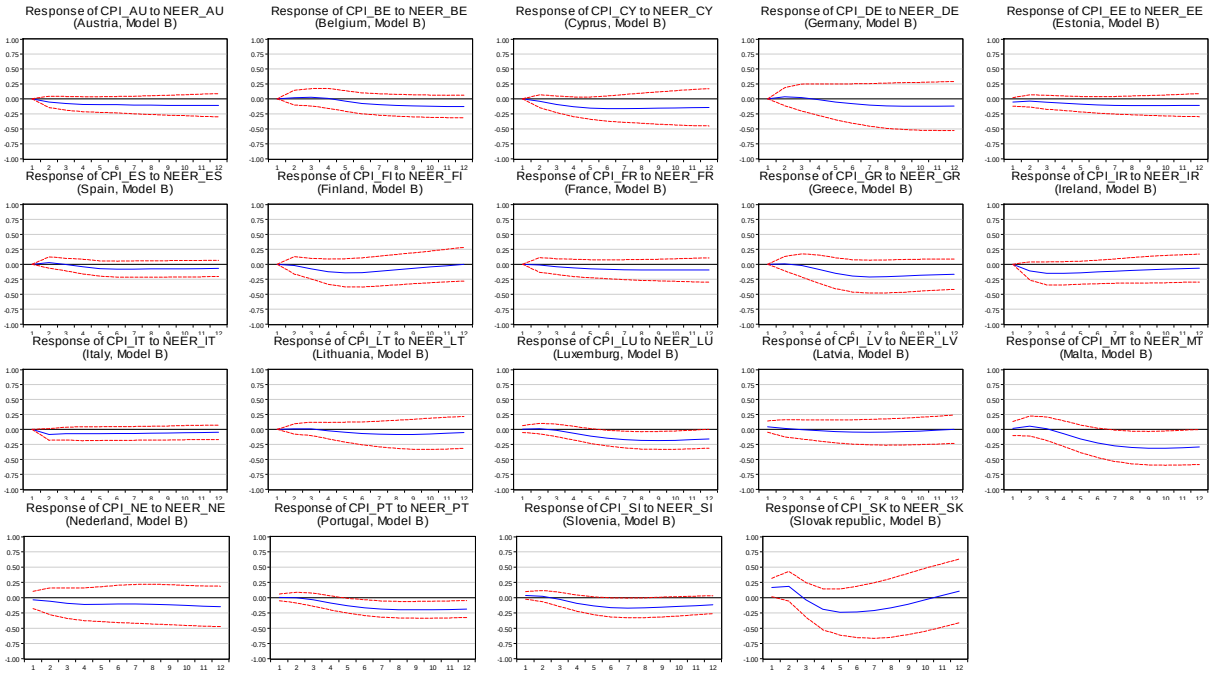


Note: Curves represent responses of consumer prices (CPI) to the positive one standard deviation exchange rate (NEER) shock in each country from the group of the Euro Area member countries.
Source: Author's calculation.

Figure 7 - Responses of consumer prices to exchange rate shock

In the Figure 7 we summarize results of impulse-response functions of the consumer prices to the positive (increase in) exchange rate shocks in both models in the Euro Area member countries. We observed that unexpected exchange rate appreciation was followed by a decrease in consumer prices in all countries though we observed some differences in the response patterns of domestic prices. Large economies and most of outliers experienced lagged and moderate decrease in consumer prices followed by the positive NEER shock. Effect of the shock in this group of countries seems to be just a temporary and gradually died out in the long run. Cyprus, Finland and Ireland experienced only small and short-term decrease in consumer prices. The rest of countries experienced lagged though more dynamic decrease in consumer prices followed by the exchange rate shock. Effect of the shock seems to be just a temporary and thus neutral in the long run in all countries but Estonia and Slovenia. Finally, in some economies (Belgium, Estonia, Spain, Ireland, Italy, Malta, and Nederland) we observed increased dynamics in the responsiveness pattern of consumer prices in comparison with responsiveness of producer prices. Overreaction of producer prices combined with low responsiveness of import prices to the NEER shock indicates reduced efficiency of the transmission mechanism across the internal price chain.

(Model B) (2000M1-2014M12)



Note: Curves represent responses of consumer prices (CPI) to the positive one standard deviation exchange rate (NEER) shock in each country from the group of the Euro Area member countries.
Source: Author's calculation.

Figure 8 **-** Responses of consumer prices to exchange rate shock

Crisis period affected responsiveness of consumer prices to the positive one standard deviation exchange rate shock in the Euro Area member countries though we observed some differences that need to be discussed (Figure 8). In general, the overall short-term decrease in consumer prices seems to be reduced and slightly lagged in the most of countries. Higher medium term dynamic in the consumer prices response pattern was observed in Cyprus, France, Luxemburg, Malta and Portugal.

Conclusion

Investigation of the first stage in the exchange rate pass-through revealed reduced absorption capabilities of NEER in large economies (Germany, Spain, France, Italy), countries of Benelux (except for Belgium) and Portugal in comparison with the rest of countries from the Euro Area. Reduced exchange rate responsiveness to the external price shocks increases the transmission of the price effect to the domestic prices.

While the examination of the first stage in the exchange rate pass-through during the pre-crisis period generally confirmed higher absorption capabilities of NEER in countries from the past Eastern bloc (due to more dynamic responsiveness of producer prices to the exchange rate shock), reduced absorption capabilities of NEER in Portugal, Italy and Spain indicates increased vulnerability of less performing periphery members of the Euro Area to the external price shocks. Moreover, reduced absorption capabilities of NEER in all countries during the crisis period just highlighted higher exposure of all Euro Area members operating under common currency to the external price shocks. Most of the countries from the core of the Euro Area experienced more dynamic NEER response to the oil price shock. As a result, fixed exchange rate operated more as the external price shock absorber reducing effect of so called imported inflation (or deflation) in these countries.

Second stage of the exchange rate pass-through revealed interesting differences in the absorption capabilities of NEER among the Eurozone member countries. Exchange rate shock was followed by immediate decrease in import prices (within first three months) in all countries but Latvia and Lithuania. As a result, initial effect of the exchange rate shock (followed by oil price shock that appreciated NEER) was adequately transmitted to the import prices. Import prices, as the first element in the internal price chain, initiated impulse that will spread across remaining two price indexes (producer prices and import prices). Crises period generally increased short-term responsiveness of import prices to the exchange rate shock except for Baltic countries, Slovakia and Slovenia. However, our results for producer prices and consumer prices did not confirm the idea of the transmission of the exchange rate absorption capabilities across the internal price chain.

Higher responsiveness of producer prices in the new Eurozone member countries from the past Eastern bloc (together with Cyprus and Greece) indicates better transmission of the asymmetric effect of the external price shock from exchange rate (appreciation) to producer prices (decrease) in the short-run period. As a result, higher flexibility of the exchange rate pass-through in these countries reduces their vulnerability to the exogenous price shocks. At the same time, less dynamic response of producer prices in the most of the Eurozone member countries increase their exposure to the unexpected external price shocks. Crisis period clearly reduced absorption capabilities of NEER in PIGS countries, Cyprus, Ireland and Malta due to reduced responsiveness of their producer prices to the unexpected exchange rate shock. As a result, these countries experienced increased vulnerability to external price shocks due to reduced absorption capabilities of their NEER while absorption capabilities of NEER in the core countries generally improved and thus reduced their vulnerability to the external price shocks.

Summary of the response patterns to the unexpected positive NEER shock for the last component in the internal price chain, consumer prices, revealed mixed results. Most of the countries experienced lagged and moderate decrease in consumer prices followed by the exchange rate shock. However, combination of low NEER exposure to oil price shock and reduced responsiveness of consumer prices to the NEER shock mostly in less performing economies of the Euro Area intensifies the transmission of the external inflation pressures to domestic prices. As a result, negative external price shocks in the time of crises may operate as a vehicle of imported deflation and contribute to the domestic demand driven deflationary pressures in bad times. On the other hand, most of the remaining countries experiencing more dynamic NEER response to the oil price shock that together with increased responsiveness of consumer prices to the NEER shock reduced the effect of the exchange rate pass-through to domestic prices. Crisis period reduced vulnerability of both NEER and consumer prices to above mentioned unexpected structural shocks. As a result, exchange rate pass-through to domestic prices was intensified due to crisis related effects reducing external price related absorption capabilities of NEER in the most of the Euro Area member countries.

Finally, analysis of the transmission of the price impulse initiated by the external price shock across the internal price chain revealed interesting implications of the heterogeneity problem in the Euro Area. In most of the Euro Area periphery and less performing countries we examined the pattern of small dynamics in import prices, higher dynamics in producer prices and even higher responsiveness of consumer prices followed by the positive NEER shock. Some sort of overreaction in the internal price chain indicates competitiveness issues in the less performing group of Euro Area member countries. However, while the crisis period mostly reduced the effect of overreaction across the internal price chain (except for the response patterns in import prices), reduced vulnerability of producer prices and consumer prices to the unexpected positive NEER shock clearly reduced absorption capabilities of the exchange rates mostly in the weaker part of the Euro Area resulting in their higher vulnerability to the external price shocks. At the same time, increased differences in response patterns between a) import prices (overreaction) and b) producer prices (reduced responsiveness) and consumer prices (reduced responsiveness) indicates distortionary effects of the crisis period on the price transmission mechanism across internal price chain.

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Optimization Models of Rolling Planning for Project Portfolio in Organizations Taking Into Account Risk and Corporate Social Responsibility

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Abstract:

Modified multiperiod optimization models to support decision-making about the choice of the project portfolio under the program of strategic development of the organization are suggested. Corporate social responsibility of the organization is shown at setting goals, taking into account the interests of all stakeholders. Risks are accounted in the framework of portfolio investment theory of H. Markowitz using the scenario approach. The specific function of general utility, whose arguments are the levels to achieve the strategic objectives of the organization as a result of the project for the periods given the importance of the objectives and values of reduced costs for the project, is used as a target function. It is expected that the utility of the project will depend on how growth in levels to achieve the strategic objectives by periods occurs, while different growth rate of their level is preferred for different purposes. It is also expected that different structures of investing resources differ by preference for periods, due to which additional resource limitations for each time period are introduced in the model. The main difference between the proposed models is the ability to review the composition of the previously selected project portfolio at each step depending on the already achieved results and changes in internal and external conditions.

Keywords: program of strategic development of the organization, project portfolio, corporate social responsibility, utility function, scenario approach.

JEL Classification: O22, M15.

1. Introduction

The main instrument for implementing the strategy of any organization is an investment program consisting of a specific set of projects for the reconstruction and development (strategic measures), the result of which is to achieve (more or less) the strategic objectives of the organization. At the formation of the strategic development program within the constraints of available resources, a manager (decision maker, DM) is faced with the necessity of preliminary selection of projects. By choosing a certain set of projects, the DM in fact chooses a way to achieve the objectives.

Assessment of possible consequences (including social) and emerging risks must be no less important than resource constraints at the selection of projects. The approach taking into account the need for corporate social responsibility in the development of strategic plans (Maltseva 2009a), including the strategic cards of objectives (Maltseva 2009b, Solodukhin 2009), allows to consider the levels of achievement of the objectives achieved by the implementation of projects as utilities of these projects. As a result, there is no need for artificial introduction of indicators that reflect social importance of the projects. This takes into account the responsibility of the organization to its stakeholders.

The study (Mazelis & Solodukhi 2012) offered one-period models of optimization of the project portfolio under the investment development program, taking into account corporate social responsibility of the organization that adhered to stakeholder management as a discrete institutional alternative (on the example of a university).

The study (Mazelis & Solodukhin 2013) generalized one-period models for the case of several time periods, taking into account the fact that for the various strategic objectives, the speed of achievement has a different value to the organization. Thus, some of the objectives may require unconditional achievement by a certain date. Some strategic objectives "favor" the rapid growth of their level of achievement, while other objectives may prefer more moderate growth. On the other hand, resource cost and the difficulty of access to them in different periods can vary.

The study (Mazelis & Solodukhin 2014) demonstrated the use of the proposed multiperiod models (on the example of a university). In particular, it was shown that the risk limitation may lead to the fact that the portfolio does not include projects whose budgets allow this (given the limitations on the overall cost).

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This article is devoted to the modification of these models in two directions. Firstly, the revision of the composition of the previously selected project portfolio is allowed at each step, depending on the already achieved results and changes in internal and external conditions. Secondly, additional resource limitations for each time period are introduced.

2. Methodology

So, we continue to consider the problem of optimizing the development program of the organization, taking into account corporate social responsibility and resource constraints, volumes of investment and risks. This problem is seen as a problem of portfolio investment (Markowitz 1952, Sharpe 2000).

The central element of the strategy of any social and economic system is a system of strategic objectives. The system of objectives is the core of the strategic process, which occurs only when the organization has strategic objectives (Barry 1987). None of the schools of strategic management disputed the fact that the company itself (as an object) cannot have objectives. Only subjects (animated thinking beings) have objectives, and they bring their own interests in the activities of the firm. The conflict revolves around the question whose interests the firm must (first) take into account (Gurkov 2007).

Let the organization have *N* projects $P_1, P_2, \ldots, P_N$ affecting *K* strategic objectives $G_1, G_2, \ldots, G_K$. Recall that $G_1, G_2, \ldots, G_K$ are objectives of the top-level strategy card (objectives of the "stakeholder" perspective), the achievement of which is directly related to the satisfaction of the stakeholders (Solodukhin, 2009). In this regard, these objectives can be considered independent because there are no direct causal relationships between them (such relations are at the level of the underlying prospects).

At goal setting, the contradictory interests of stakeholders are taken into account (Clarkson 1995, Lugovoy *et al.* 2012a, Jensen 2001). At the same time, objectives have different significance (importance) in terms of the impact on the organization's mission. Weights of the objects $w_1, w_2, \ldots, w_K$ can be defined using one of the methods described in (Lugovoy *et al.* 2012a, Andreychikov & Andreichikova 2000).

It is necessary to form an optimal project portfolio, taking into account the available resources of the organization, risks of projects and their utility.

L scenarios of possible changes in internal and external environment $S_1, S_2, \ldots, S_L$ are considered, where $p_1, p_2, \ldots, p_L$ are the probabilities of these scenarios.

Each of the P_n projects is described with the following indicators:

- levels of achievement of the objectives $A_n^l = \left(a_{n1}^l, a_{n2}^l, \ldots a_{nK}^l\right)$ at the implementation of the project within the S_l scenario;
- volume of the B_n resources necessary for its realization.

It is expected that resources are invested in the project by unequal installments over *T* time periods, i.e. $B_n = \sum_{t=1}^{T} B_n^t$ .In each period, there is an increase in levels of achievement of the relevant objectives. Thus, the sequences emerge:

$$\left(a_{nk}^{l1}, a_{nk}^{l2}, \ldots, a_{nk}^{lT}\right), \sum_{t=1}^{T} a_{nk}^{lt} = a_{nk}^{l}, k = 1, \ldots, K, n = 1, \ldots, N, l = 1, \ldots, L.$$

In the one-period models, the utility of the P_n project in the implementation of S_l scenario is understood as the integral index describing the level of achievement of objectives taking into account their significance:

$$u_n^l = \sum_{k=1}^{K} w_k a_{nk}^l . \quad (1)$$

At the same time, the concept of a specific utility of P_n project in the implementation of S_l scenario was introduced, which was calculated by the formula:

$$\tilde{u}_n^l = \frac{u_n^l}{B_n}. \quad (2)$$

In multiperiod models, the utility of the project depended on how growth of levels of achievement of the objectives by the periods occurred.

Each G_k objective in the framework of P_n project in the implementation of S_l scenario was assigned to $\left(a_{nk}^{l1}, a_{nk}^{l2}, \ldots, a_{nk}^{lT}, B_n'\right)$set, where B_n' is the value of P_n project costs, adjusted to the initial moment of time.

For each such set, $\tilde{u}_{nk}^l$ was defined – the specific utility of P_n project with respect to the G_k objective in the implementation of S_l scenario. Then the overall specific utility of P_n project in the implementation of S_l scenario was calculated:

$$\tilde{u}_n^l = \sum_{k=1}^{K} w_k \tilde{u}_{nk}^l. \quad 3)$$

Recall that the definition of the value $\tilde{u}_{nk}^l$ at the $\left(a_{nk}^{l1}, a_{nk}^{l2}, \ldots, a_{nk}^{lT}, B_n'\right)$set requires the construction of *T*+1-dimensional surface, which is an approximation (with the required accuracy) of the chart of the function $\tilde{u}_k = \tilde{u}_k\left(x_1, x_2, \ldots, x_T, z\right)$, regarded as a function of utility: $\tilde{u}_k \in [0,1]$, $x_t \in [0,1], t = 1, \ldots, T$, the interval of the variable *z* is defined by constraints on resources. The universal method of constructing such surfaces for the utility functions of an arbitrary number of variables (criteria) at any links between the criteria is given in (Lugovoy *et al.* 2012b). Overall, we need to build K surfaces (for each objective) and find $K \cdot N \cdot L$ values of $\tilde{u}_{nk}^l$ (for each of the K objectives for all the *N* projects for all the *L* scenarios) as the values of the utility functions at appropriate points.

Levels of achievement of the objectives in each period and, therefore, specific and general utilities $\tilde{u}_n^l$ are considered as random variables depending on a number of external and internal factors, which are functions of time. The dispersions of the general specific utilities $D\tilde{u}_n^l$ are used as a measure of risk.

Binary variable y_n is defined:

- y_n = 0, if the *n* project is not included in the development program of the organization;
- y_n = 1, if the *n* project is included in the development program of the organization.

The following scheme to analyze and construct the optimal portfolio was suggested:

- For each of the N projects under consideration, we define the costs in each of the *T* time periods under consideration and calculate the adjusted cost of the project.
- Determine the weight coefficients of K upper-level strategic objectives.
- For each objective, we build a surface that approximates the chart of a specific utility function, considered as a function of *T*+1 variables (criteria), where the first *T* criteria are a possible increase in the level of achievement of the objective in each of the *T* periods, while the last criterion is the adjusted cost of the project, which ensured growth of the level of achievement of the objective.
- We determine the set of $S_1, S_2, \ldots, S_L$ scenarios and estimate the probability of each of them $p_1, p_2, \ldots, p_L$, where $\sum_{l=1}^{L} p_l = 1$.
- For each scenario for each project, we define its specific utilities with respect to each specific purpose (with the help of the constructed surface) and calculate the general utility of the specific project by the formula (3).
- Find the expectation for the utility of the *n* project:

$$m_n = E(\tilde{u}_n^l) = \sum_{l=1}^{L} \tilde{u}_n^l p_l \,. \tag{4}$$

- and the elements of the covariance matrix of the specific utilities of the projects *i* and *j*:

$$v_{ij} = \sum_{l=1}^{L} (\tilde{u}_i^l - m_i)(\tilde{u}_j^l - m_j) p_l \,. \tag{5}$$

- Set limitations on available resources.

- Accept the utility of the portfolio as the value $m_{port} = \sum_{i=1}^{N} y_i m_i$, the portfolio risk – as the value

$$\sigma_{port}^2 = \sum_{i,j=1}^{N} y_i y_j v_{ij} \,.$$

Project portfolio was proposed to form using the following models.

Model one

The development program of the organization is formed by the criterion of the maximum expected utility under the specific restrictions on the amount of risk of the program (σ_0^2), and the volume of resources required to implement the program (B_0):

$$\begin{cases} \sum_{i=1}^{N} y_i m_i \to \max, \\ \sum_{i,j=1}^{N} y_i y_j v_{ij} \le \sigma_0^2, . \\ \sum_{i=1}^{N} y_i B_i' \le B_0 . \end{cases} \tag{6}$$

Model two

The development program of the organization is formed by the criterion of the minimum program risk at the restrictions on the amount of resources required for the implementation of the program (B_0) and the value of the expected specific utility (m_0):

$$\begin{cases} \sum_{i,j=1}^{N} y_i y_j v_{ij} \to \min, \\ \sum_{i=1}^{N} y_i m_i \ge m_0, \\ \sum_{i=1}^{N} y_i B_i' \le B_0 . \end{cases} \tag{7}$$

Now assume the possibility of revising the composition of the previously selected project portfolio at each step, depending on the already achieved results and changes in internal and external conditions.

The need to revise the composition of the project portfolio is due to the fact that weights of objectives and scenarios under consideration (their number and probability) may change under the new circumstances. At that, the specific utilities of the projects with respect to the each objective may also be affected. Accordingly, the general specific utilities of specific projects will change. The result may be a situation in which it is advisable to

stop some of the projects. The released resources will allow including previously not selected projects in the portfolio.

Thus, it is proposed to analyze and construct the optimal portfolio using the above scheme at each step (in the beginning of each of the *T* time periods). Note that the planning horizon can be varied. You can reduce the number of time periods by one at each step. Then the sequences of the increments of levels of achievement of the objectives will be shorter by one at each step. Accordingly, the dimensions of utility functions will be less by one at each step, which are necessary to build to determine the specific utilities of the projects depending on the objectives. On the other hand, the number of time periods can remain the same ("rolling" planning).

In addition, let's introduce additional resource limitations for each time period in the models. This will allow to more fully taking into account the differences in the cost of resources and the difficulty of access to them in different periods. So, $B_0 = \sum_{t=1}^{T} B_0^t$, where B_0^t is the limitation on the amount of resources needed to implement the program in the t period.

Then the models of formation of the optimal portfolio will change as follows.

Model three:

$$\begin{cases} \sum_{i=1}^{N} y_i m_i \to \max, \\ \sum_{i,j=1}^{N} y_i y_j v_{ij} \le \sigma_0^2, \\ \sum_{i=1}^{N} y_i B_i^1 \le B_0^1, \ldots, \sum_{i=1}^{N} y_i B_i^T \le B_0^T. \end{cases} \quad (8)$$

Model four:

$$\begin{cases} \sum_{i,j=1}^{N} y_i y_j v_{ij} \to \min, \\ \sum_{i=1}^{N} y_i m_i \ge m_0, \\ \sum_{i=1}^{N} y_i B_i^1 \le B_0^1, \ldots, \sum_{i=1}^{N} y_i B_i^T \le B_0^T. \end{cases} \quad (9)$$

These models are still the problems of Boolean quadratic programming, for solution of which the numerical optimization software packages can be applied.

3. Results

We will demonstrate the use of the proposed models on the example of the practice of the Vladivostok State University of Economics and Service (VSUES).We will consider the three strategic objectives, their corresponding figures with the current and target values, and the corresponding ranges of adjusted costs, beyond which the utility is either zero (at a cost above the right boundary, regardless of the level of achievement of the objective), or one (at a cost below the left boundary while achieving the level one of achievement of the objective) (Table 1).

Table 1 – Strategic goals, indicators and adjusted costs

Strategic objective	Weight of the objective	Parameter of the objective	Current value	Target value	Range of adjusted costs (mln rub.)
Increase in the publication activity of academic staff	0.3	Number of publications per one adjusted rate of the full-time academic staff in journals with RSCI impact factor not less than 0.2	0.5	1.6	[9; 44]
Increase in the degree level of full-time academic staff	0.2	Proportion of full-time university academic staff holding a degree of candidate or doctor of sciences, to the total number of full-time academic staff adjusted to full rate	0.66	0.78	[17; 140]
Increase in the volume of funds attracted by the university academic staff	0.5	Volume of the funds attracted by the university academic staff on R&D per one adjusted rate of the full-time academic staff (thous. rub.)	70	210	[13; 40]

For simplicity and clarity, each target corresponds to exactly one parameter in the example. Thus, at the achievement (or exceeding) by the parameter of the target value, the level of achievement is equal to one (if in this case the adjusted costs do not exceed the left boundary of the range); if the value of the parameter remains at the current level (or worsens), the level of achievement is zero (regardless of the costs incurred). If the objective is described by several parameters, the tools described in the works (Lugovoy *et al.* 2012, Keeney & Raiffa 1993) can be used to determine the relationship between the values of the parameters and the level of achievement. Note also that sometimes the parameter surpassing the target value lowers the level of achievement of the objective. In this case, you can use the methods described in the works (Morozov 2013; Garina 2012, Keeney 1974).

Table 2 – Costs and results of the projects

Costs by periods *(mln rub.)*	Adjusted costs at a 10% discount rate *(mln rub.)*	SCENARIO	PERIOD	OBJECTIVE 1	OBJECTIVE 2	OBJECTIVE 3
PROJECT 1						
8	13.95	Pessimistic	1	0.100	0.017	0
			2	0.100	0.033	0
		Realistic	1	0.117	0.033	0.010
8			2	0.150	0.050	0.010
		Optimistic	1	0.133	0.050	0.017
			2	0.183	0.050	0.017
PROJECT 4						
10	15.86	Pessimistic	1	0.050	0.033	0.083
			2	0.050	0.083	0.083
		Realistic	1	0.060	0.050	0.100
8			2	0.083	0.117	0.117
		Optimistic	1	0.067	0.067	0.117
			2	0.100	0.133	0.133

For each objective, we build a surface, which is an approximation of the chart of the function of specific utility, regarded as a function of three variables (criteria), where the first two criteria are a possible increase in the level of achievement in each of the two periods, and the third criterion is adjusted costs.Let's consider the nine strategic measures (projects), implementation of which over two periods (two years each) will contribute to achievement of the selected objectives:

- Establishment and operation of the reward system for academic staff having publications in top journals.
- Establishment and operation of support systems for young scientists, including those under the "Talent Pool" program.
- Establishment and operation of the motivation system for academic advisers and graduate students.

- Establishment and operation of the system to attract top scientists to the university staff.
- Establishment of a flexible system of requirements for enrollment to the acidic staff on a competitive basis, motivating to increase the productivity of scientific activity.
- Establishment and operation of the involvement of students in R&D since first years with the restructuring of the educational process.
- Establishment and operation of the system to raise the academic mobility of academic staff.
- Establishment and operation of the system to attract academic staff to student internships in enterprises in the framework of practice-integrated learning.
- Establishment and operation of improving the image of the university academic staff in the environment.

We will also consider three scenarios of possible changes in internal and external environment (let's call them pessimistic, realistic and optimistic) with probabilities 0.3; 0.6; 0.1, respectively.We will define the required costs for the periods for each project (and thus calculate the adjusted costs) as well as the sequence of increment levels to achieve the objectives by the periods for each scenario.

Table 2 shows an example of the data corresponding to the first and fourth projects.For each goal, using an appropriate constructed surface, we will define 27 values of the specific utility: for each of the nine projects for three scenarios (total of 81 values for all three objectives). Then we will calculate the general specific utilities of the projects in the implementation of each scenario and expectancy of utilities of the projects (Table 3).

Table 3 – General specific utilities of the projects

Project no.	General specific utility of the project			Expectancy of utility of the project
	SCENARIO 1 ($p_1 = 0{,}3$)	SCENARIO 2 ($p_2 = 0{,}6$)	SCENARIO 3 ($p_3 = 0{,}1$)	
1	0.056	0.086	0.105	0.079
2	0.036	0.052	0.069	0.049
3	0.063	0.089	0.117	0.084
4	0.125	0.146	0.165	0.142
5	0.091	0.127	0.152	0.118
6	0.025	0.046	0.066	0.042
7	0.049	0.081	0.114	0.075
8	0.108	0.142	0.167	0.134
9	0.060	0.095	0.118	0.087

Next we construct a covariance matrix of specific utilities of the projects and simulate the formation of the program of the university development, setting resource limitations.Table 4 shows some results of the use of the first model, when the university development program is formed by the criterion of the maximum expected specific utility with limitations on themamount of risk of the program and resources.

Table 4 – Simulation of the university development program (maximization of the expected utility, model one)

Limitations on the general adjusted costs *(mln rub.)*	Limitations on the risk of the project portfolio	No. of projects included in the portfolio	No. of projects not included in the portfolio	Expected utility of the project portfolio	Total adjusted costs of the project portfolio *(mln rub.)*
61.0	0.010	1, 3, 4, 5, 6, 8	2, 7, 9	0.60	52.0
	0.012	1, 3, 4, 5, 8, 9	2, 6, 7	0.64	50.2
	0.015	1, 3, 4, 5, 7, 8, 9	2, 6	0.72	58.6
	0.020	1, 3, 4, 5, 7, 8, 9	2, 6	0.72	58.6
65.8	0.010	1, 2, 3, 4, 5, 8, 9	1, 6, 7	0.61	60.7
	0.012	1, 3, 4, 5, 8, 9	2, 6, 7	0.64	50.2
	0.015	1, 3, 4, 5, 7, 8, 9	2, 6	0.72	58.6
	0.020	1, 3, 4, 5, 6, 7, 8, 9	2	0.76	65.5
91.9	0.010	1, 2, 3, 4, 5, 8	6, 7, 9	0.61	69.5
	0.012	1, 2, 3, 4, 5, 6, 8	7, 9	0.65	76.4
	0.015	1, 2, 3, 4, 5, 8, 9	6, 7	0.69	74.6
	0.020	1, 2, 3, 4, 5, 7, 8, 9	6	0.77	83.0
	0.021	All	-	0.81	89.9

Table 5 shows the results of the use of the second model, when the university development program is formed by the criterion of the minimum risk of the program with limitations on resources and the expected value of the specific utility.

Table 5 – Simulation of the university development program (minimization of risk, model two)

Limitations on the general adjusted costs *(mln rub.)*	Limitations on the expected utility of the portfolio	No. of projects included in the portfolio	No. of projects not included in the portfolio	Risk of the project portfolio	Total adjusted costs of the project portfolio *(mln rub.)*
61.0	0.4	2, 3, 4, 8	1, 5, 6, 7, 9	0.003	55.1
	0.5	2, 3, 4, 5, 8	1, 6, 7, 9	0.006	55.5
	0.6	2, 3, 4, 5, 8, 9	1, 6, 7	0.009	60.7
	0.7	1, 3, 4, 5, 7, 8, 9	2, 6	0.015	58.6
	0.75	Such utility can't be achieved			
65.8	0.4	2, 3, 4, 8	1, 5, 6, 7, 9	0.003	55.1
	0.5	2, 3, 4, 5, 8	1, 6, 7, 9	0.006	55.5
	0.6	2, 3, 4, 5, 8, 9	1, 6, 7	0.009	60.7
	0.7	1, 3, 4, 5, 7, 8, 9	2, 6	0.015	58.6
	0.75	1, 3, 4, 5, 6, 7, 8, 9	2	0.018	65.5
	0.8	Such utility can't be achieved			
91.9	0.4	2, 3, 4, 8	1, 5, 6, 7, 9	0.003	55.1
	0.5	2, 3, 4, 5, 8	1, 6, 7, 9	0.006	55.5
	0.6	1, 2, 3, 4, 5, 8, 9	6, 7	0.008	69.5
	0.7	1, 3, 4, 5, 7, 8, 9	2, 6	0.015	58.6
	0.8	All	-	0.020	89.9

Table 6 – Simulation of the university development program (maximization of the expected utility, model three)

Limitations on the general adjusted costs *(mln rub.)*	Limitations on the costs by periods *(mln rub.)*		Limitations on the risk of the project portfolio	No. of projects included in the portfolio	Expected utility of the project portfolio	Total adjusted costs of the project portfolio *(mln rub.)*
	1 period	2 period				
61.02	42.95	18.07	0.010	3, 4, 5, 6, 8, 9	0.607	43.2
			0.012	3, 4, 5, 7, 8, 9	0.641	44.6
			0.015	3, 4, 5, 7, 8, 9	0.641	44.6
			0.020	3, 4, 5, 7, 8, 9	0.641	44.6
	26.31	34.71	0.010	1, 4, 5, 6, 8, 9	0.602	42.9
			0.012	1, 4, 5, 7, 8, 9	0.636	44.3
			0.015	1, 4, 5, 7, 8, 9	0.636	44.3
			0.020	1, 4, 5, 7, 8, 9	0.636	44.3
65.80	35.80	29.98	0.010	1, 2, 4, 5, 8, 9	0.610	60.3
			0.012	1, 3, 4, 5, 8, 9	0.645	50.2
			0.015	1, 3, 4, 5, 7, 8, 9	0.720	58.6
			0.020	1, 3, 4, 5, 7, 8, 9	0.720	58.6
	42.95	22.84	0.010	1, 3, 4, 6, 8	0.599	50.2
			0.012	3, 4, 5, 7, 8, 9	0.641	44.6
			0.015	3, 4, 5, 6, 7, 8, 9	0.682	51.6
			0.020	3, 4, 5, 6, 7, 8, 9	0.682	51.6

Table 6 shows some results of the use of the third model, when the university development program is formed by the criterion of the maximum expected specific utility with limitations on the amount of risk of he program and the volume of resources required to implement the program in each period. Various options of splitting the total budget by periods were considered, with all costs having been reduced to the initial instant of time at the same discount rate (10%).

Let's now consider the procedure for the revision of the university development program after the first two-year period. As before, we will consider two periods of two years each (rolling planning).

As a result of the university development in the first period and on the basis of the changed internal and external conditions, the weights of objectives are revised (let them now be 0.2, 0.15 and 0.65, respectively), as well as the probabilities of scenarios (0.35, 0.55, 0.1). Note that, generally speaking, the number of scenarios under consideration may also change. In this example, for the purpose of simplicity, we will not change the number of scenarios.

We define new specific utilities of the projects in relation to each objective (for which we build new relevant surfaces), calculate the general specific utilities of the projects for each scenario and expectancies of the project utilities (Table 7).

Table 7 – General specific utilities of the projects after the end of the first period

Project no.	General specific utility of the project			Expectancy of utility of the project
	Scenario 1 ($p_1 = 0{,}35$)	Scenario 2 ($p_2 = 0{,}55$)	Scenario 3 ($p_3 = 0{,}1$)	
1	0.029	0.059	0.079	0.051
2	0.027	0.041	0.060	0.038
3	0.050	0.077	0.111	0.071
4	0.144	0.173	0.193	0.165
5	0.097	0.136	0.168	0.125
6	0.021	0.045	0.071	0.039
7	0.046	0.079	0.118	0.071
8	0.160	0.199	0.224	0.188
9	0.101	0.145	0.172	0.133

We build a new covariance matrix of specific utilities of the projects and simulate the formation of a new university development program, for example, using the first model. Some results are presented in Table 8.

Table 8 – Simulation of the university development program after the end of the first period (maximization of the expected utility, model one)

Limitations on the general adjusted costs *(mln rub.)*	Limitations on the risk of the project portfolio	No. of projects included in the portfolio	No. of projects not included in the portfolio	Expected utility of the project portfolio	Total adjusted costs of the project portfolio *(mln rub.)*
61.0	0.010	2, 4, 5, 8, 9	1, 3, 6, 7	0.65	46.4
	0.012	3, 4, 5, 8, 9	1, 2, 6, 7	0.68	36.2
	0.015	1, 3, 4, 5, 8, 9	2, 6, 7	0.73	50.2
	0.020	1, 3, 4, 5, 7, 8, 9	2, 6	0.80	58.6
65.8	0.010	2, 4, 5, 8, 9	1, 3, 6, 7	0.65	46.4
	0.012	3, 4, 5, 8, 9	1, 2, 6, 7	0.68	36.2
	0.015	2, 3, 4, 5, 8, 9	1, 6, 7	0.72	60.7
	0.020	1, 3, 4, 5, 7, 8, 9	2, 6	0.80	58.6
91.9	0.010	2, 4, 5, 8, 9	1, 3, 6, 7	0.65	46.4
	0.012	3, 4, 5, 8, 9	1, 2, 6, 7	0.68	36.2
	0.015	2, 3, 4, 5, 8, 9	1, 6, 7	0.72	60.7
	0.020	2, 3, 4, 5, 7, 8, 9	1, 6	0.79	69.0
	0.022	1, 2, 3, 4, 5, 6, 8, 9	7	0.81	81.6
	0.025	1, 2, 3, 4, 5, 7, 8, 9	6	0.84	83.0
	0.030	All	-	0.88	89.9

4. Discussion

As can be seen from Table 4, limitations on risk may lead to the fact that the portfolio does not include projects whose budgets allow doing this (at the set limitations on the general adjusted costs). For example, at the limitations on the general adjusted costs 65.8 mln rub. and limitations on risk 0.012, the total adjusted costs of the selected projects are 15.6 mln rub. less than the set limitation. At the same time, the adjusted costs of the sixth and seventh projects not included in the portfolio are 7.64 mln rub. and 9.16 mln rub., respectively. However, the

inclusion of these projects in the portfolio would have increased the risk higher than the set limitation. In turn, changes in limitations on the risk (at the same limitation on the general costs) may result in the exclusion of certain projects from the portfolio and the inclusion of new projects.

The results presented in Table 6 show that the imposition of limitations on the costs by periods (model three) in most cases leads to the selection of other project portfolios, utility of which is not greater than the utility of the optimal project portfolio formed when solving the task with a limitation on the general costs for all periods (model one). Thus if we consider the various options for limitations by the periods (options of splitting the total budget), it is easy to see that the utility of each formed portfolio (at all the considered limitations on risk) within one of the options exceeds the utility of the relevant portfolio formed at the same limitation on risk in another option. For example, let's consider two options of limitations by periods under the general adjusted budget of 61.02 mln rub. The first option is 42.95 and 18.07 mln rub. The second version is 26.31 and 34.71 mln rub. For each of the four considered limitations on risk (0.010; 0.012; 0.015 and 0.020), the utility of the portfolio in the first scenario exceeds the utility of the corresponding portfolio in the first option.

Comparison of the results presented in Tables 8 and 4 shows that under the same limitations on the general costs and risk, changes in the internal and external conditions may alter the feasibility of inclusion of certain projects in the portfolio. For example, initially, when the limitations on the general adjusted costs were 65.8 mln rub. and risk – 0.020, the portfolio included all projects except the second, while after the first period (at the same limitations), the sixth project should be excluded from development program. The expected utility of the portfolio will only increase.

Conclusion

The proposed modified multiperiod optimization models allow the rolling planning of the portfolio, taking into account the risks in the framework of the strategic development of the organization. Corporate social responsibility of the organization is shown at setting goals, taking into account the interests of all stakeholders. The main difference between the proposed models is the ability to revise the composition of the previously selected project portfolio at each step, depending on the already achieved results and changes in internal and external conditions. Another important difference is the introduction of additional resource constraints for each time period.

The following areas for further research in this area can be allocated. Firstly, it is intended to develop a model to optimize the distribution of the total budget of the organization development program by periods. Secondly, the procedure of redeployment of resources between projects can be offered, in which some projects are not excluded from the portfolio at the changes in internal and external conditions (and, consequently, at the reduction in their utilities), but their funding is reduced. Freeing up resources could increase funding for other projects of the portfolio, or new projects can be incorporated in the development program.

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