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FOREWORD to
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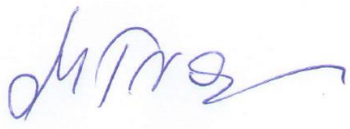
Dear readers,

Today it‘s my pleasure to introduce to your attention a new December number of ENTEPRENEURSHIP AND SUSTAINABILITY ISSUES (Web of Science, Emerging Sources Citation Index, Core Collection, SCOPUS since 2017). This number of the journal reflects contemporary concerns of scientists and wider society. Looking at the content of the journal we can see a vivid view of changing topics and directions of ongoing discussion what are known unknowns and unknown unknowns, which affect our daily lives, how we can tackle the new arising problems in order to make our lives better, more sustainable, and safer, of course

With kind regards



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Expert of European Commission (for Horizon 2016-2018)

National head of the European project ClusDevMED, ‘’Cluster Development Med’’ Horizon 2020, Marie Skłodowska-Curie Research and Innovation Staff Exchange (RISE), Grant agreement N°: 645730. 2015 – 2019

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STATE AID AND INVESTMENT: CASE OF SLOVAKIA*

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Abstract. State investment incentives are detrimental to the quality of the business environment and create unequal starting conditions for entrepreneurs to implement investment plans. In some cases, however, it is necessary to regulate the allocation of inward investment to regions within one country and thus decrease the disparities. Investment incentives are instruments that in general might violate market principles and thus are regulated within the EU internal market. Despite being aware of this fact most economists and politicians advocate these kinds of measures as necessary and relatively cheap in order to push the economy forward or win international big private equity investments. Investment aid is regional aid to stimulate investment in disadvantaged regions and to create new jobs in the Slovak Republic. Beneficiaries of this assistance may be natural and legal persons authorized to carry on business in the territory of the Slovak Republic and whose investment activities and projects meet the conditions of Act no. 561/2007 Z.z. on Investment Assistance and on Amendments to Certain Acts. This paper will focus on how investment incentive attracts foreign investment in the Slovak Republic and based on the data from 2002 to 2017 we will analyze their effectiveness on the created jobs. Despite the possible support from the Slovak government not all foreign investors areapplying for investment incentives, either are in contact with the government during their investment phase.

Keywords: investments incentives; stare aid; foreign direct investmnets; economic growth

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1. Introduction

Foreign investment is a recognized element in the economy of the state, serving on the one hand to reduce unemployment and, on the other hand, playing an important role in the inflow of the vast amount of capital it spends in the interests of state welfare, often presented primarily for the benefit of the public and for the citizens. Foreign Direct Investment (FDI) is a direct investment in a business from another country. They are usually in a form either of a share acquisition of an investor in another company abroad or a creation of a new totally owned company abroad, unlike portfolio investments in financial markets. FDI must usually be at least 10% of the company's share (purchase of shares or other business share). The investor gains significant decision-making power in the company where he invests. FDI are long-term assets such as land, buildings, machinery and equipment acquired in the country by foreign legal or natural persons and, on the other hand, by domestic physical or legal entities abroad. If there is a rapid influx of FDI in the country, it means that the business environment represents a healthier rate of return on investment and labor productivity is higher than in other countries.

FDI are a global phenomenon whose share in international business is steadily rising and generates large capital injections. FDI has been and continues to be an important factor in the development of transition countries. They help create new jobs, which can lead to an influx of new technologies, and in total they provide the necessary capital to restore a successful transition to the market economy. However, a one-sided focus on the inflow of FDI also brings some negatives. First, the high share of foreign investors in the domestic market is exposed to structural problems that may occur when investors leave. At present, the major player in foreign direct investment is transnational corporations, whose business in many countries allows them to move profits from one market to another, often due to more favorable tax conditions.

The issue of investment attractiveness determinants is currently a topic often dealt with in many publications of both Slovak and foreign authors. The significance of factors affecting investment attractiveness is dealt with for instance by A. Bevan (2000, 2004), S. Estrin (2000, 2004), J. Pietrucha et al. (2018) and K. Meyer (2004), who divide these factors into two basic groups (political and economic factors) and differentiate between factors affecting host and domestic economies. S. Brakman and H. Garretsen (2008) seek the main reasons leading companies to foreign investments as well as ways how a foreign market can be entered. Other authors (e.g. Dudáš 2004, 2010; Fabuš 2010, 2011, 2012, 2014; Korauš et al. 2018; Tvaronavičienė, 2018) deal with individual factors and their impact on economic development, respectively economic growth, and motivation of investors, economic and political conditions created in a host country. Theoretical background of investment attractiveness and the theories of creation, respectively motivation of FDI creation and movement were based on leading foreign authors. The best known is J. H. Dunning (1979, 2001) and his eclectic theory based on three categories of factors shaping the decision-making of investors. Dunning introduced a well-known OLI paradigm and motives which are essential in decision-making on investment, like advantages resulting from ownership and ownership rights, advantages resulting from information on human resources and new information and specific advantages resulting from a locality (Dunning, 1979, 2001). S. A. Hymer (1976) is concerned with why companies transfer intermediate products (knowledge, technologies, etc.) among countries. He also opines that FDI can be clarified by foreign control. As far as Slovak authors are concerned, we can mention J. Táncošová (2012, 2013, 2014), S. Ferenčíková (2005) and K. Belanová (2014), who analyse determinants and location, and their significance in relation to an access to FDI, and T. Dudáš (2010), who deals with the significance of workforce and S. Švecová (2012), who deals with the role of education in the structure of employees and advancement so that they fulfil market requirements on workforce.

This paper deals with investment incentive attraction of foreign investment in the Slovak Republic and based on the data from 2002 to 2017 we will analyze their effectiveness on the created jobs. We use standard scientific

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methods such as analysis, synthesis, comparison, etc. The paper is structured into integral parts dealing with development of FDI in Slovak republic and investment incentives based on current data, their mutual comparison and their relationship with the concluded conclusion.

2. Investments in Slovakia

One of the major benefits of FDI is the source of capital in areas where there is a lack of domestic investment and therefore a lowering standard of living or increasing regional disparities. FDI capital is of a long-term nature, which is crucial to the proper development of the country. Transnational investors have a large reach and are therefore able to source resources on more favorable terms than domestic companies. The investment environment is mostly but not exclusively influenced by legal standards, economic rules and political relations in the country (Nazarczuk, Krajewska, 2018). The environment can be constantly changing and that is why new natural investment opportunities are being constantly created for potential investors as well as for existing businesses (Cheba, Szopik-Depczyńska, 2017; Korcsmáros, Šimova 2018).

Slovakia is today one of the most attractive countries for business and investment in Europe based e.g. on the number of expansions of already existing investments in recent years. It is a young country and is strategically located in the heart of Europe. Slovakia has been a member of NATO and EU since 2004. It is now a truly liberal democracy with a functioning market economy and legislation that is fully harmonized with the EU. The Slovak economy grew further in 2016, mainly thanks to strong net exports and acceleration in household consumption. Economic activity is projected to continue to grow steadily over the forecast horizon and provide further support for the labor market through permanent job creation. According to EUROSTAT, inflation in 2017 after three years of decline in consumer prices will show positive growth. Increased food and service prices will become the main driver of overall return on prices, which will allow CPI inflation to increase to 0.9% in 2017. The government deficit is projected to decline gradually.

Development of FDI inflows in Slovakia from 1993 until 2000 had low value, few investors were coming to our territory. During this period, Slovakia has not used its potential to attract foreign investors. Entry of foreign capital into the economy didn’t match the demand for foreign direct investors. Slovakia lagged mainly due to political and economic weaknesses which are a threat to investors while investing. In the years 2000-2008 the situation changed rapidly in the inflow of FDI into Slovakia, see Figure 1. The program of the new government was focused mainly on increasing FDI inflows, implement measures to meet this objective. In 2008 crises began on international financial markets due to problems of mortgages in the US, which escalated into a global financial crisis, which was reflected in the amount of global flows of FDI.

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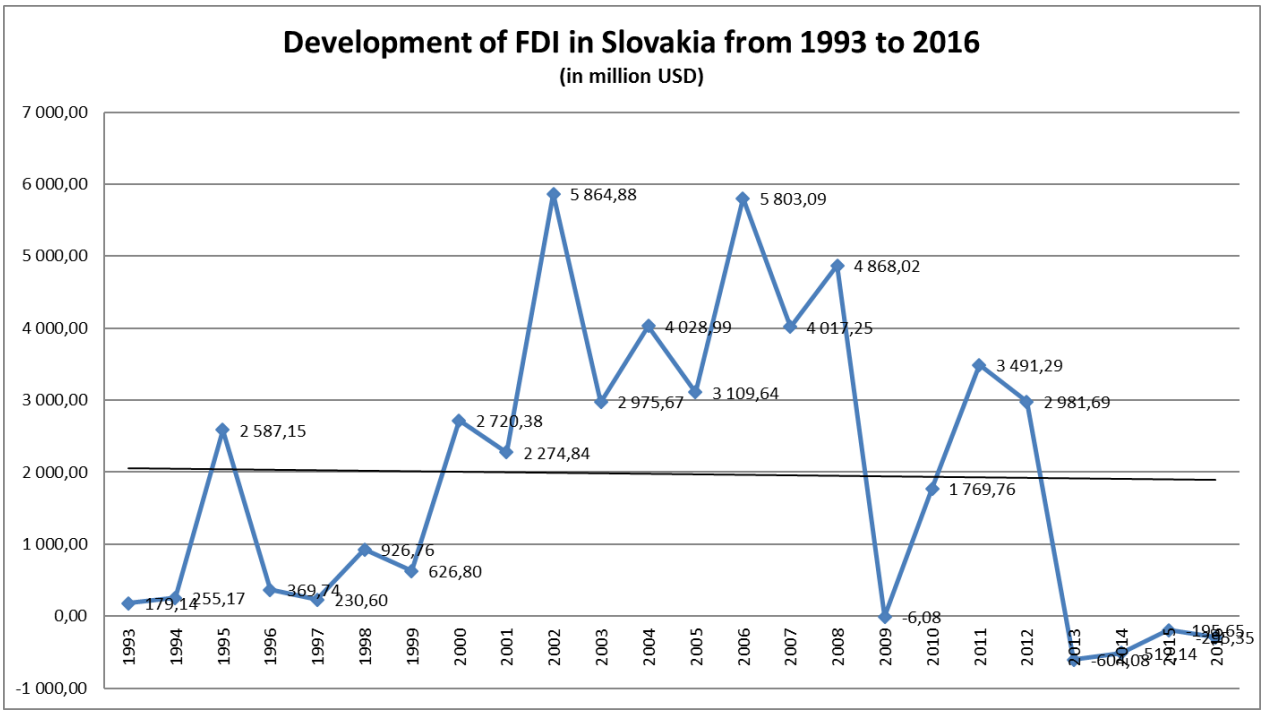

Fig.1. Development of FDI in Slovakia from 1993 to 2016
Source: Own processing according to UNCTAD data

The global economic and financial crisis had a severe effect on FDI flows around the world. Having peaked in 2007, EU-27 FDI flows dropped sharply in 2008. Slovakia suffered same development which became significant in 2009. Fortunately, this decline was recorded only in 2009 and since 2010 inflow of FDI slowly continued until 2013. Between the years 2013 and 2014 Slovakia suffered FDI inflow drop again with even more significant FDI outflow in this period. In 2015 Slovakia recorded slow increase of FDI inflows, with prospects for further growth in near future (new investors announced their investment plans in Slovakia), like Jaguar Land Rover in 2016-2017. This drop was caused by intracompany financial flows (which are considered also FDI), where the companies started to return intracompany loans. Also, there was for almost a year, the State aid scheme was not in place, which influenced the flows.

In Slovakia, the differences between FDI status and FDI inflows in the regions are significantly different, especially between East and West (Gozora, 2014). Western regions have received approximately ¾ of the total FDI that they have directed to our country, which means that the regions of Central and Eastern Slovakia are lagging. FDI inflows and FDI are largely dominated by the Bratislava Region, which accounted for 64.85% of total FDI over the period 2009-2015, which is comparable to the period 1993-2007 when it was up to 67.6%.

These figures clearly show that Slovakia, even after years, is divided into "rich west and poor east", which is being slowly counterbalanced with latest investments of 2017 and 2018 coming to the region of Košice and other in the East of the country. Secondly, with a significant decrease of Trnava region with a total of 12.30% (based mostly on intracompanies financial flows), followed by Trenčiansky with 10.47%, Nitra region with 8.48% improved compared to the period 1993-2007 when he gained just over 3,1%. The region of Zilina has gained 9.38% and Prešovský 8%, which is a jump of almost 7% in the period 1993-2007. The big fall is significant in Košice, where even FDI drops to -10.87%, as is the case for Banska Bystrica region, which recorded -2.61 FDI

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decline, which compared to 1993-2007 shows a difference when Kosice gained 8.8% and was on the second in the FDI inflow and Bansko Bystrický with 1.9% placed in the penultimate place.

As we mentioned in the end of the list of regions are the Košice and Banska Bystrica region, where at least FDI was invested, caused significant differences in employment, causing a high fluctuation which leads to low wages and the transfer of the population to the richer regions or abroad. In cuch cases the question of investment incentives, despite being an undue interference with the economy, are justified.

From the beginning of the economic crisis until the end of 2016 there was no new big foreign investor in Slovakia that would employ at least 500 employees. Only in 2017 the construction of Jaguar Land Rover in Nitra began, but production has not started yet. Or Amazon, who also announced investments in recent time. The state could help investors in particular simplifying tax rules on the labor market, eliminating corruption and bureaucracy.

3. State Aid – Investment incentives in Slovakia

Investment incentives are undoubtedly a serious argument for the benefit of the Slovak Republic. As an EU member country, however, the Slovak Republic must ensure compliance with EU rules. One of the fundamental principles of EU law is to promote competition in the EU internal market. Therefore, it is forbidden by the EU Member States to provide any incentives that could distort competition and affect trade between Member States. The state aid concept is very broad and covers a wide range of direct and indirect public incentives, but as a theoretical or legislative topic is not of our interest within this article. Investment incentives that seek to attract foreign investors are therefore a priori considered to distort competition. The Slovak Republic has marked regional differences and investment incentives are one of the tools to motivate investors to place their new operations on a priority basis in less developed regions, in areas with higher unemployment rates. The positive impact of the new investment should be reflected in the creation of new jobs, opportunities for graduate employment, and the creation of new entrepreneurial opportunities for local companies. Binding to a particular region is one of the fundamental features of investment incentives and their provision should be supported not only by foreign but also domestic entrepreneurs.

Investment aid may be provided in the form of:

- grants for long-term tangible assets and intangible fixed assets;
- income tax relief;
- contribution to created new jobs;
- the transfer of immovable property or the letting of immovable property at a value lower than the value of the immovable property or the value of the rental of immovable property determined by expert opinion.

Investment projects that can be supported in Slovakia are divided into four categories, namely industry, tourism, technology centers and strategic services centers. Costs for procurement of land, buildings, new technological and machinery equipment, intangible fixed assets - licenses, patents, or wage costs of newly created jobs over a 2-year period are considered eligible costs. Terms for technology centers and strategic services centers are the same for all districts, the minimum investment amount must be € 500 thousand, respectively € 400 thousand. In the case of industrial projects, the minimum investment depends on the unemployment rate in the district, at least 40 jobs must be created and, in the case of established enterprises, the production of min. by 15%. The maximum amount of investment aid is the maximum share of the eligible costs that may be approved by the investor in the form of investment aid. It is based on GDP per capita in the region. All regions except Bratislava are eligible; in Western Slovakia the state aid may be equal to maximum of 25% of the investment, for Eastern and Central Slovakia it is 35%.

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There is no legal right to any investment aid. The applicant must submit an application for investment aid to the competent authorities (ie the Ministry of Economy and other relevant aid providers) who will verify compliance with the general and special conditions under the Investment Assistance Act. The competent authority shall examine the completeness of the investment plan and the general conditions for the provision of investment aid and, if the investment plan contains all the required data, shall ensure that the expert opinion of the investment plan is drawn up. Subsequently, the offer for investment aid is issued to the successful applicant. After receiving the investment offer, the investor must submit an investment application for assistance to the Slovak Government for approval. The application for investment aid is submitted to the Slovak Government for approval. If the project's capital expenditures and the required investment aid exceed certain thresholds, the European Commission's approval is also required.

Investment incentives provided within the framework of adopted EU regulation are recognised as not-violating from the perspective of competition despite theoretically being not in line with basic market principles, but at the same time they are indispensable for attracting FDI, which serves to push the economy ahead, especially for small economies such as Slovakia. In total, 197 investment incentives were awarded by the Ministry of the Economy (MoE) in the form of job creation allowances, retraining allowance, tax relief and in the form of transfer of assets at a price below the market price of a total of € 1,818.4 million, to bring about 48,903,000 new jobs. In the MoE statistics, aid for Jaguar - Land Rover in the Nitra Region is not yet included, totaling € 130 million. We can see that investment incentives as a tool are relatively expensive and with unclear results in some situations, but in many cases the maximum of the incentives provided is not exhausted or used, and sometimes the investment will not even take place. Despite the possible support from the Slovak government not all foreign investors are applying for investment incentives, nor are at any contact with the government during their investment phase.

Investment incentives should mainly serve to support weaker regions, but as can be seen in Table 1, the aid was historically directed to more developed regions mostly based on the localisation decisions by the investors themselves, only recently the least developed regions are attracting more of their attention. Most of the incentives went to the Trenčín Region, amounting to€ 397 million, then the Žilina Region earned a total of € 364.7 million and should bring a total of 6.785 jobs and in the ratio of € 53.750 per capita means most of all regions. Thanks to the automotive industry, most incentives were allocated to the Zilina Region and Trnava, where the newest jobs were planned, amounting to € 1,612,000, and, which in the amount of € 19.083 per capita was the cheapest. The difference between the East and the West is again significant when the aid to the Banska Bystrica region was € 140.6 million and the least amount of state aid went to the Prešov Region, and it totally only € 78.7 million and should bring only 2.576 jobs.

Table 1. Regional distribution of investment incentives in 2002-2017

Region/County	Number of incentives	Volume (million €)	Jobs created	Incentive per created work place
Bratislava	8	355,9	7.158	49.720
Trnava	31	221,6	11.612	19.083
Trenčin	15	397	7.429	53.441
Nitra	30	259,9	9.033	28.772
Banská Bystica	30	140,6	6.886	20.418
Žilina	24	364,7	6.785	53.750
Prešov	16	78,7	2.576	30.551
Košice	43	262,6	10.915	24.058

Source: Own processing according to MH SR data

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These differences were influenced by the Investment Assistance Act 561/2007, which was amended 5 times by 2016 and revised 10 times altogether. Law No 231/1999 on state aid, which was also amended many times, was replaced by Act 358/2015. Last change in these laws were done this year via amendment by Act 57/2018 that introduced several changes into the process of granting state aid in Slovak republic. Nevertheless, these adjustments did not produce the desired effect in supporting weaker regions when the Prešov Region again gained only 2 incentives in 2017 in the amount of € 19.9 million in the ratio of € 42.315 per capita, which was relatively the most expensive state aid. Improvements are not significant in the case of Banska Bystrica region when it has gained a total of € 9.04 million and this aid should have only 315 new jobs. There is a special Act 336/2015 on the support of the least developed districts which helped to develop investment opportunities for foreign investors. In 2018 there were some investment incentives which supported project of investors in least developed ares of Slovakia.

In 2017, State aid was split between two supported sections, according to SK NACE categorization. Most of the investment aid was heading to support industrial production. In this area creation 2.982 of jobs (98%) was supported and the same percentage overall state aid of € 82.465.096. Other mostly supported areas were professional, scientific and technical activities, under which only 2% of new jobs were supported (74) and of the same level was the total state aid of € 1.480.424. Up to 67% of supported businesses have requested aid for enlargement already existing production. Production exports higher than 90% are expected in almost a year 70% of supported investments. 27% of supported investments are owned by Slovakia. In case of the EU countries is 53% and the remaining 20%, it represents owners from Asia.

Conclusions

Investment incentives in Slovakia started to be provided after 2000, as previously there was no special legislation that would regulate investment incentives. In institutional terms, state aid respectively. investment incentives cover the State Aid Office. After accession to the EU that power has passed after the abolition of the office to the Ministry of Economy of Slovak republic and other ministries that are providers of aid. Regarding the institutional framework for support of foreign direct investment, the three main institutions are the Ministry of Economy, the Slovak Agency for Development of Investments and Trade (SARIO) and the Regional Development Agencies. MoE SR seeks to increase the inflow of investments into prospective sectors, notably in sectors with higher value added and cost-oriented industries, as well as the direction of investment in less developed regions with high unemployment rates. The aim of MoE SR is to give priority to indirect forms of support that do not have an immediate impact on public finances and create the prerequisite for long-term investment of the region.

Despite the views on investment incentives and their impact on the business environment, in Slovakia they still are a necessary tool for stimulating of job creation and regulating the inflow of foreign investors in Slovak regions. The Slovak government must necessarily regulate their deployment in order to reduce regional disparities between regions. The positive impact of the new investment should be reflected in the creation of new jobs, opportunities for graduate employment, and the creation of new entrepreneurial opportunities for local companies.

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SMART MANAGEMENT OF TECHNOLOGIES: PREDICTIVE MAINTENANCE OF INDUSTRIAL EQUIPMENT USING WIRELESS SENSOR NETWORKS*

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Abstract. One of the most important problems of creating new and also modernizing and operating the existing industrial equipment is to provide it with technical diagnostic tools. In modern systems, most diagnostic problems are solved by vibration monitoring methods, and they form the basis of this process. For several years already, when creating new responsible equipment, many manufacturers have completed it with monitoring and diagnostic systems, often integrating them functionally with automatic control systems. This paper discusses the methods of servicing industrial equipment, focusing on predictive maintenance, also known as actual maintenance (maintenance according to the actual technical condition).The rationale for the use of wireless systems for data collection and processing is presented. The principles of constructing wireless sensor networks and the data transmission protocols used to collect statistical information on the state of the elements of industrial equipment, depending on the field of application, are analyzed. The purpose of the study is to substantiate the feasibility of using wireless sensor networks as technical diagnostic tools from both economic and technical points of view. The result is the proposed concept of the predictive maintenance system. The paper substantiates the model of optimization of predic-tive repair using wireless sensor networks. This approach is based on minimizing the costs of maintenance of equipment. The presented concept of a system of predictive maintenance on the basis of sensor networks allows real-time analysis of the state of equipment. The approach allows implementing smart management of technologies in companies for ensuring stability of functioning.

Keywords: management of technologies; monitoring of technological processes; industrial equipment; predictive repair; smart management concept.

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1. Introduction

Modern conditions imply a new development model based on human capital, innovation and high technologies. Flexibility and speed of innovation are the key success factors. These trends are typical of both social life and industrial production processes. In this context, smart environments perform a special role: in fact, they serve as a frame which will be added some infrastructure that can guarantee new product quality. Smart production involves using machines capable of exchanging information with other production systems and operating with a high degree of autonomy; using the industrial Internet of Things; and utilizing Big Data cloud service and technology. However, the most important link in this chain is integration platforms of an enterprise which are aimed at receiving data from equipment, analyzing and aggregating them. One of the sides of this issue is the system of industrial equipment that requires its condition to be constantly monitored. At present, several methods of servicing equipment have been formed, among which three basic ones can be distinguished: emergency, routine and predictive. The first kind is the maintenance of equipment after its failure Brüel & Kjær (1991). This approach is justified in the maintenance of simple, cheap equipment, when reservation is available, and replacement will be cheaper than repair work to restore equipment.

The second type of maintenance is planned preventive maintenance of equipment in accordance with the regulations (Brüel & Kjær, 1991). In this case, the maintenance is carried out in accordance with the manufacturer's recommendations at regular intervals. The equipment maintenance work is performed with a certain period, which is determined by statistical analysis and, in accordance with the regulatory documents, the period typically equals the time during which at least 98% of the equipment operates without failure (Brüel & Kjær, 1991).

When servicing according to the regulations, it would seem that the opportunity to use the guarantee of the manufacturer is not lost, at least. However, it should be taken into account that almost 50% of all technical maintenance works according to the regulations are carried out without their factual need. In addition, for many types of equipment, maintenance and repair according to the regulations do not reduce the frequency of their failure. Moreover, the reliability of the equipment operation after maintenance, if the latter involves disassembling the mechanism or replacing parts, is often reduced, sometimes temporarily, until the moment of their running-in, and sometimes this decrease in reliability is caused by the manifestation of installation defects which were missing before the maintenance.

The third type of maintenance, which is discussed in detail in the present paper, is predictive maintenance, also known as maintenance according to the actual technical state (Rawi, 2010; Stone, 2007; Vlasov *et al*, 2017; Mobley, 2002). With this type of service, the state of the equipment is monitored continuously or periodically. Depending on the results obtained, a forecast is made of the technical condition of the equipment and maintenance programs are formed. The predictive maintenance systems can predict the state of the system based on the current state of equipment and determine the necessary maintenance activities. Thus, the probability of an unscheduled system failure is minimized.

That is why in the present research the main attention is paid to the analysis of the model for evaluating the effectiveness of predictive services using wireless sensor networks. Presently, the problem of constructing distributed systems for data collection and monitoring of technological processes and individual equipment is more urgent than ever. This leads to the need to develop methods for constructing intelligent monitoring of technical industrial systems.

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2. Literature review

In connection with monitoring industrial systems in order to prevent malfunctions, the authors will analyze a model of a predictive maintenance system based on a wireless sensor network (Vlasov *et al*, 2017; Sharapov & Polischuk, 2012; Kozlova, 2009; Bogdanov & Basov, 2012; Shakhnov *et al*, 2013). Sensors are used as the elements of systems recording various data. Sensors are means of measurement designed to generate signals of measurement information in a form that is convenient for transmission, further transformation, processing and/or storage, but which cannot be directly perceived by the observer (Kozlova, 2009). Depending on the signal transmission medium, the sensors can be wired and wireless. The use of wired systems is not always effective due to a high cost of installation and commissioning, as well as technical maintenance. In addition, in some situations the installation of wired sensors is altogether impossible for technological or organizational reasons. Among the advantages of wireless sensors there are minimal restrictions on their placement, the possibility of introducing and modifying the network of such sensors on the operated object without interfering with the operation process, reliability and fault tolerance of the entire system in the event of disruption of individual connections between nodes (Bogdanov & Basov, 2012).

The predictive maintenance systems based on the wireless sensor network, in contrast to other types of technical maintenance, save the data obtained in the monitoring process, which allows usingadvanced methods of monitoring the technical state and analyzing the data in real time, as well as making forecasts for the technical condition of the equipment.

For a long time, systems with wired communication channels provided a reliable transmission medium and a high speed with a long service life. Despite many advantages, wired solutions also have a number of limitations, which gradually make them less attractive compared to wireless technologies. Among these limitations,one can identify the following:

- spatial arrangement of sensors;
- the costs of maintaining communication channels;
- the deployment time of wired networks.

These three major shortcomings of wired transmission explain the fact that wireless networks, radio networks are very rapidly gaining momentum. This is explained by the convenience of their use, low cost and acceptable transmission capacity.

When building a wireless sensor network, one needs to choose a data transfer protocol,since, depending on the field of application of the wireless sensor network, one or another protocol or standard can be used to interact with wireless sensors of the reading equipment (Vlasov, Ivanov & Kosolapov, 2011). Table 1 shows a comparison of the RF interface types for wireless tags/sensors.

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Table 1. Comparison of RF interface types for wireless tags / sensors

Indicators	Bluetooth	Wi-Fi	ZigBee	RFID UHF
Frequency range (Russian Federation)	2.4 GHz	2.4 GHz 5 GHz	2.4 GHz 868 MHz	868 GHz
Maximal communication range, m	1/10/100 (depends onthe class ofequipment)	100	200	50
Data transfer rate	721 Kbit/s	450/900/1.3 Gbit/s	256 Kbit/s	128-620 Kbit/s
Network topology	Point-to-point Star	Point-to-point Star	Point-to-point Star Tree Mesh	Reader-set of labels/sensors
Duration of autonomous work from battery power at 30-second sensor polling period	Half-year	60 days	1.5 years	2-3 years
Simultaneous reading of many labels	Up to 20	Up to 20	Up to 10	Up to 300
Software protocols of interactionwith the control system	Protocol stack Bluetooth	Protocol stack TCP/IP	Protocol stack ZigBee	Protocol LLRP (Low Level Reader Protocol)

Source: compiled by the authors

A wireless sensor network consists of a set of spatially-distributed intelligent sensors designed to monitor physical parameters such as vibration, temperature, strain, pressure, etc. Each sensor node in the network performs the function of reading, processing and wireless transmission of data. The use of microelectromechanical system technology (MEMS) provides an opportunity for low-cost production of low-power multifunctional sensors of small size and low weight. The use of wireless sensors with autonomous power supply necessitates a detailed consideration of the principles of their construction, functional filling and used circuit solutions in accordance with the generalized structural scheme in Figure 1.

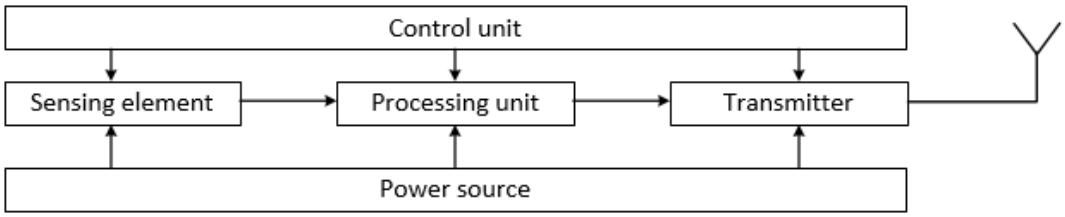

Fig. 1. Generalized block diagram of the wireless sensor
Source: compiled by the authors

The registration of the monitored characteristics is carried out by the sensing element (SE) of the sensor. At the same time, to measure one and the same quantity, the sensors can be applied that use various physical processes of its transformation into electrical signals and various principles of action (Andreev, Vlasov & Shakhnov, 2016; Freyden, 2005; Gotra & Tchaikovsky, 1995; Yudin *et al*, 2017; Burduk & Chlebus, 2009). The processing unit is designed to amplify an electrical signal and convert it to a form convenient for transmission. The functional filling of the processing units depends on the type of output signal. It should be noted that the criteria for achieving a minimum current consumption are contrary to the criteria for achieving maximum performance; therefore, micro-power op amps have very modest speed parameters (Freyden, 2005; Gotra & Tchaikovsky, 1995).

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According to the data presented in Table 1, it is proposed to use wireless sensor networks based on radio frequency identification (RFID) (Vlasov, Grigoriev & Zhalnin, 2017b), since the off-line operation time and the number of simultaneously read labels are the main parameters when choosing a radio interface in the systems of predictive equipment maintenance.

3. Methods

3.1. The concept of a predictive maintenance system based on sensor networks with an intelligent controller

Intelligent controllers are increasingly used in distributed industrial systems of different purposes. Recently, to obtain data on the status of equipment, wireless sensor networks, which consist of various sensors including infrared sensors, acoustic sensors, vibration, shock and acceleration sensors, have been increasingly used (Vlasov, Grigoriev & Zhalnin, 2017b; Freyden, 2005; Gotra & Tchaikovsky, 1995; Yudin et al, 2017; Burduk & Chlebus, 2009). Figure 2 presents a generalized conceptual scheme for obtaining data and analyzing the state of equipment in real time. In the process of work, continuous monitoring of the status of the modules takes place, as well as comparison of the obtained data from the sensors with readings during normal operation of the equipment, to determine possible malfunctions.

Figure 2 shows a generalized example of a monitoring object (1), on the equipment of which wireless sensor tags are installed. Abandoning wired sensors allows placing sensors in hard-to-reach places, thereby increasing the number of sensors themselves and the accuracy of the parameters obtained during the monitoring process. Sensor data are read and transmitted over the wireless network to external servers, where data are converted, stored and processed (2).

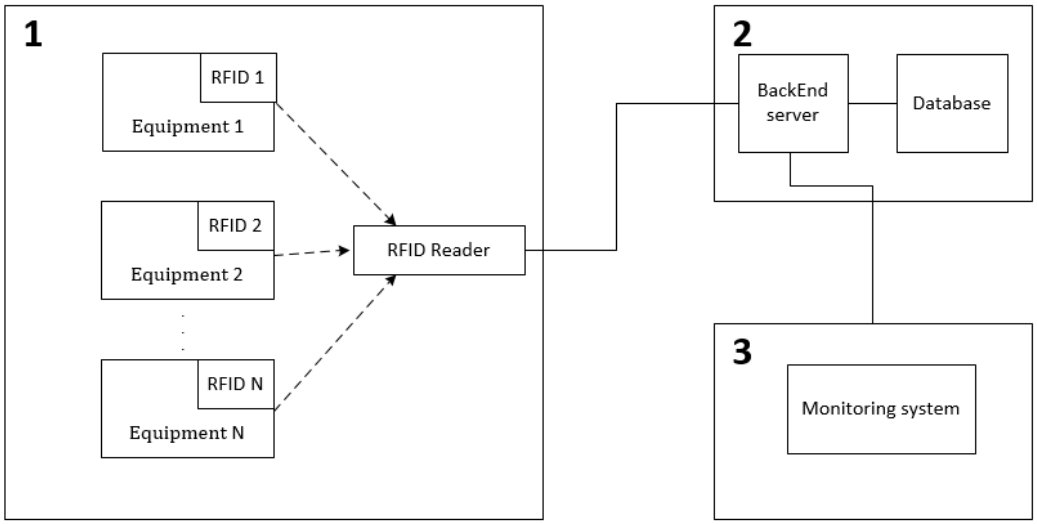

Fig. 2. Analysis of the state of equipment in the real time mode
Source: compiled by the authors.

All data received from sensors is stored in a database located in the cloud. The data is required to present statistics. There is also a defect database, which includes information related to the defects of various devices, the correspondence of arising defects and the operating time on which such defects usually occur. Data obtained as a

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result of monitoring is processed and then sorted in the order of frequency of occurrence. This approach allows forming a program of predictive maintenance of equipment, as well as predicting the failure of any of its parts.

Saved data can be obtained at any time in the form of graphs or individual events and displayed on the screen of a computer, tablet or mobile phone (3).

Broad implementation of solutions for the implementation of the concept of "Internet of things" imposes a number of requirements on the approaches to the realization of the functions of predictive maintenance. To achieve this goal, intelligent controllers and multi-agent technologies are needed (Vlasov *et al*, 2017). To each object in the real world, a software agentis put into correspondence: an object with some degree of intelligence. Recently, systems have been developed based on KNX and HDL wired buses or Zwave and ZigBee wireless standards. Such solutions often have unused options and, at the same time, do not have priority important functions. The software and hardware complex should interact with the following subsystems: power supply, universal chassis, localization module. In general, the intelligent controller must provide:

- monitoring of engineering systems (collection of information with the construction of graphs and temporary reports on current data);
- processing of the obtained information (calculation of maintenance, predictive repair and replacement of elements);
- timely notification and assistance in decision-making;
- remote control of engineering systems in the presence of such functionality;
- self-diagnostics of the main nodes, monitoring results should be transferred to a single cloud storage.

Within the framework of the work, the concept of a universal intelligent communication platform for integrated embedded solutions is proposed, which allows connecting the decision module and heterogeneous sensor elements, localization and positioning systems into a single whole. In the "Internet of Things" paradigm, a logical level is added to the hardware subsystems, which allows transferring the computational tasks directly to the execution units themselves, and transmittingonly the processed data to the data collection and storage station. This task can be solved with the help of universal controllers. Such controllers have sufficient computing power to perform tasks not only of processing data received from field devices, but also tasks that require the implementation of complex calculation algorithms. Universal controllers can function as a buffer memory device: all measured and calculated values are put into the controller memory and stored for the required period. Thus, even if communication with the data collection station is lost, they will be buffered, and then transferred to the server when communication is resumed.

When solving practical problems, special attention is paid to ensuring that intelligent controllers are scalable and expandable to localize solutions for specific parameters. One can identify the following tasks, which should be addressed at the hardware level (controller level):

- transfer of signals from the field level devices (sensors) to engineering units and transfer of information to a data collection station;
- execution of algorithms for calculating physical quantities to take into account the obtained data;
- control of technical systems, taking into account the built-in algorithms, as well as according to the instruction of the head station;
- formation and transmission of warning and alarm signals.

The tasks of the data collection station (processing module) can be described in more detail as follows: structuring and formalization of measurement information, accumulation of the dynamics of changes; processing and analysis of incoming data; analysis of the obtained results of processing to identify non-typical behavior and search based

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on the results of the analysis of a list of possible causes and factors that may lead to the development of contingencies. The intelligent controllers implemented in this concept provide the basic functionality of predictive repair and can be integrated into the complexes implemented within the concept of the "Internet of Things"(IoT).

3.2. A model for estimating the effectiveness of predictive repair

Based on the analysis of the solutions presented in the fundamental works on predictive repair (Vlasov *et al*, 2017a; Burduk & Chlebus, 2009; Vlasov, Grigoriev & Zhalnin, 2017b; Curcuru *et al*, 2017; Rausand & Hoyland, 2004; Lu & Meeker, 1993; Crowder & Lawless, 2007; Baptista *et a*l, 2018), to assess the effectiveness of predictive repair, it is proposed to use the model based on minimizing the costs of maintenance, diagnostics and taking into account the risks of failure of individual components:

$$c(S_p) = \frac{C_{pr} + L_f \cdot F(S_p)}{\bar{t}(S_p)} + c_d \quad , \qquad (1)$$

where C_{pr} is the cost of predictive maintenance; S_p is the value of the signal received from the sensors in the process of monitoring the state of the equipment (is a random quantity); $F(S_p)$ is the distribution function of the probability of failure in relation to the signal from the sensor; L_f are losses due to the risks of failure; c_d are unit costs for monitoring the condition of equipment to obtain a diagnostic signal; $\bar{t}(S_p)$ is the average operating time of the equipment before failure, which is determined by the formula (2):

$$\bar{t}(S_p) = \frac{1}{n}\left[\sum_{i=1}^{m(S_p)} t_i(S_p) + \sum_{j=1}^{n-m(S_p)} t_j(S_p)\right] \quad , \qquad (2)$$

where $t_i(S_p)$ is the time of operation of the *i*-th object with the normal value S_p of the signal; $t_j(S_p)$ is the operating time of the *j*-th object, which failed before the diagnostic signal from the sensor reached the state S_p; $m(S_p)$ is the number of objects that reach the state S_p without failures; *n* is the total number of sensors for monitoring.

To obtain the average time until the equipment fails, it is necessary to conduct tests that include diagnostic measurements. When analyzing the obtained data, it is necessary to calculate the average time from the moment the signal about the unstable operation of the equipment is received until it completely fails. In this case, applying the equation (2), it is possible to calculate the average operating time of the equipment from the moment of receiving the signal about unstable operation until it completely fails.

When calculating the average operating time, it is proposed to apply a simplified model in which the deterioration of the technical state (change of the diagnostic signal) runs along a straight line from the initial state S_{pz} to the limit value of the technical state (to failure) S_{pfi} of the *i*-th object. The calculation of $t_i(S_p)$ is carried out according to the formula:

$$t_i(S_p) = t_i(S_{pfi})\frac{S_{pi} - S_z}{S_{pfi} - S_z} \qquad (3)$$

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Figure 3 shows a graphical method for determining the input data for calculating the average operating time of the equipment, depending on the diagnostic signals from the sensors in the case of predictive maintenance.

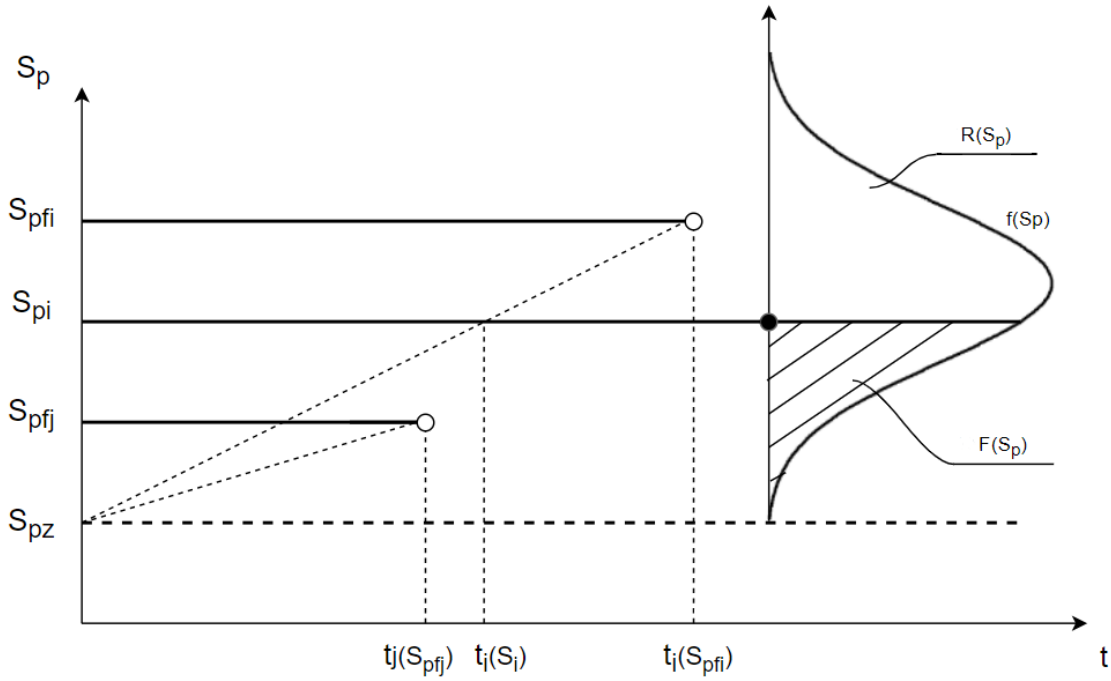

Fig. 3. Graphical method for determining the input data for calculating
the average operating time of the equipment, depending on the diagnostic signals from the sensors
Source: compiled by the authors.

As the unit costs for monitoring the state of the equipment for obtaining a diagnostic signal, one can consider the costs of deploying the wireless sensor network and the service; this can be described according to the formula (4):

$$c_d = l \cdot (C_t + C_s) + k \cdot C_r \quad . \tag{4}$$

Thus, the model for optimizing predictive repair using wireless sensor networks, based on minimizing the costs of equipment maintenance, can be described according to the formula (5):

$$c(S_p) = \frac{C_{pr} + L_f \cdot F(S_p)}{\bar{t}(S_p)} + c_d = \frac{C_{pr} + L_f \cdot F(S_p)}{\frac{1}{n}\left[\sum_{i=1}^{m(S_p)} t_i(S_p) + \sum_{j=1}^{n-m(S_p)} t_j(S_p)\right]} + c_d =$$

$$= \frac{C_{pr} + L_f \cdot F(S_p)}{\frac{1}{n}\left[\sum_{i=1}^{m(S_p)} t_i(S_p) + \sum_{j=1}^{n-m(S_p)} t_j(S_p)\right]} + l \cdot (C_t + C_s) + k \cdot C_r \quad , \tag{5}$$

where C_{pr} is the cost of predictive maintenance; S_p is the value of the signal received from the sensors in the process of monitoring the state of the equipment (is a random quantity); $F(S_p)$ is the distribution function of the

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probability of failure in relation to the signal from the sensor; L_f are losses due to the risks of failure; c_d are unit costs for monitoring the condition of equipment to obtain a diagnostic signal; $\bar{t}(S_p)$ is the average time of operation of the equipment before failure, which is determined by the formula (2); l is the number of sensor tags with sensors; C_t is the cost of one sensor tag; C_s is the cost of one sensor; k is the number of readers; C_r is the cost of purchasing and installing a single reader.

4. Results and Discussion

The proposed module of intelligent monitoring of technical systems was tested in the framework of monitoring the state of electric motors. If the motor is in operation for a long time, various defects may appear in it. If they are not remedied in time, the electric motor will fail. In any electric motor there are rolling bearings or friction bearings. The estimated life of rolling bearings on average does not exceed 8,000-10,000 h, which is slightly more than one year of continuous operation. In practice, rolling bearings often serve more than this period. Analyzing the signals from the vibration sensors installed on the supporting bearing of electric machines, defects in their condition were detected. When choosing defects that are described in this section, the authors proceeded from the following definition: if a defect can be diagnosed by installing vibration sensors on the supporting bearings, then its description is included in this section. Figure 4 shows a histogram of the appearance of defects, depending on the running time of the electric motor.

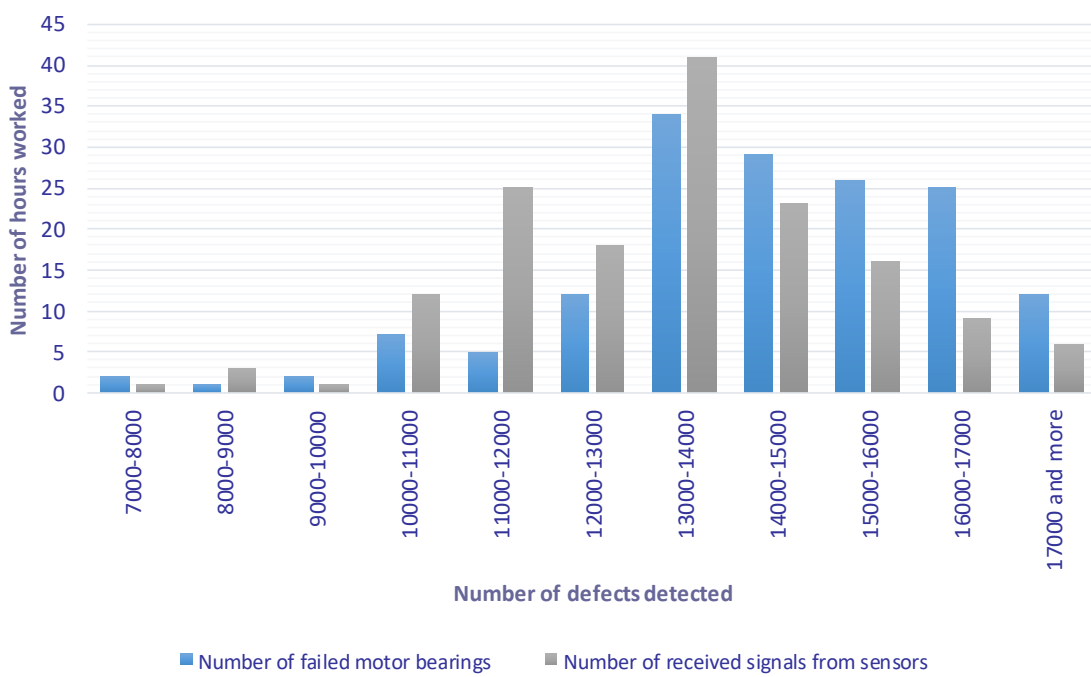

Fig 4. The number of defects that occur depending on the running time of the electric motor
Source: compiled by the authors.

During monitoring, the readings were taken from AC motors. Out of 155 cases of defects, only 3 cases occurred before the operator received a signal about a possible failure of the equipment. As can be seen from the graph

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depicted in Figure 5, real-time monitoring allows preventing up to 97% of the cases of failure of this type of equipment.

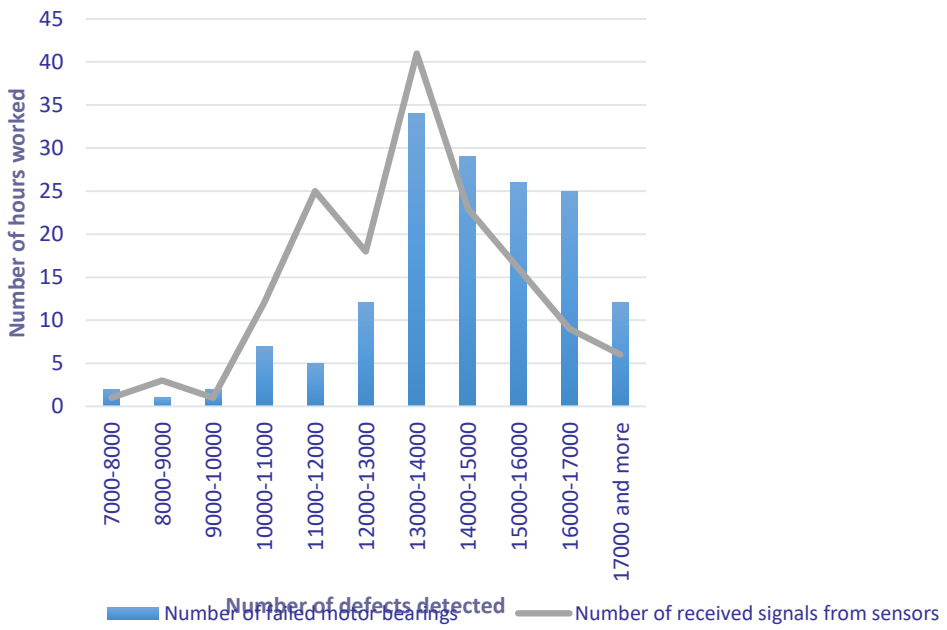

Fig. 5. The number of defects that occur depending on the running time of the electric motor
Source: compiled by the authors.

Thus, analyzing the obtained data, it is possible to plot the graph as shown in Figure 6 and graphically calculate the average time of operation of the equipment, depending on the diagnostic signals from the sensors in the case of predictive service.

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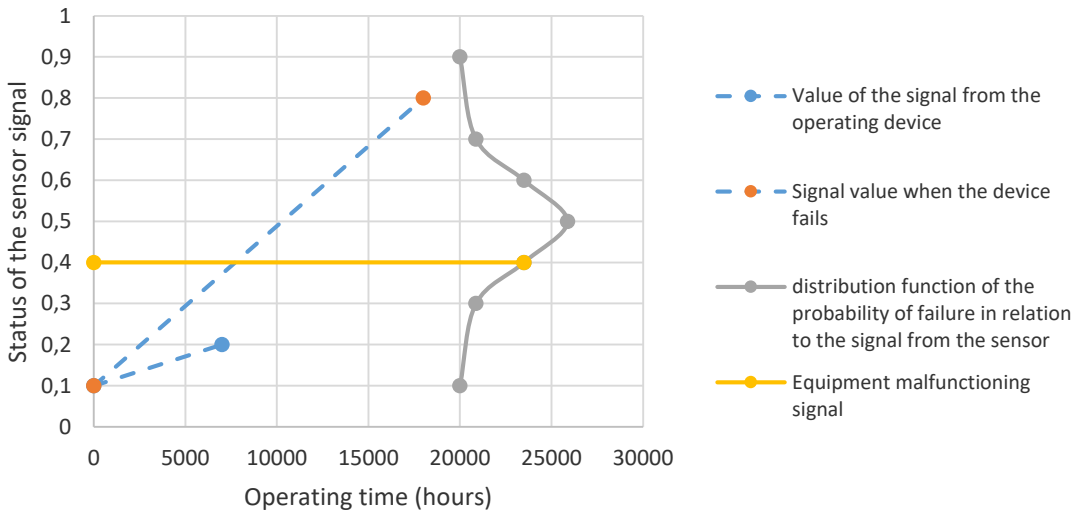

Fig. 6. Graphical method for determining the input data for calculating the average operating time of the equipment, depending on the diagnostic signals from the sensors
Source: compiled by the authors.

The presented concept of a system of predictive maintenance on the basis of sensor networks allows real-time analysis of the state of equipment. According to the data received from sensors, a program of maintenance of equipment is formed. In the future, this approach is supposed to be developed taking into account the microminiaturization of the elements of the intellectual controller, the creation of a specialized element base that allows diagnostics of individual subsystems in real time with intelligent processing functions (Whitaker *et al*, 2018; Amruthnath & Gupta, 2018).

5. Conclusion

Enhancing the efficiency of industry and infrastructure through the use of smart electronic systems – the so-called smart environments – is one of the most well-known avenues for technological development. The distinctive features of smart environments (Cook & Das, 2005) are remote control, communication between devices, sophisticated device functionality, developed network standards, obtaining information through smart sensory networks and its distribution, predictive and decision-making abilities. Currently, manufacturing companies gaining experiences in production in networks and smart logistics and develop new organisational structures and business models which better benefit from the new technologies and which adapt faster to the rapidly changing network environments (Prause & Atari, 2017).

Predictive maintenance of equipment is aimed at predicting the place and time of probable breakdown, as well as avoiding downtime and reducing maintenance costs. The use of wireless communication channels in the monitoring system makes it possible to deploy the sensor network in the shortest possible time, regardless of the spatial arrangement of the sensors. A model for optimizing predictive maintenance of equipment using wireless sensor networks based on minimizing the costs of maintenance, diagnostics and deployment of the equipment monitoring system is proposed. The presented concept of a system of predictive maintenance on the basis of sensor networks allows real-time analysis of the state of equipment.

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TEAMWORK MANAGEMENT IN CREATIVE INDUSTRIES: FACTORS INFLUENCING PRODUCTIVITY

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Abstract. The 'experience' economy, characterizes by the growing needs for cultural identity and social empowerment, and aided by technologies of knowledge generation, information processing and communication of symbols, further reinforce this. The creative industries involve the concretization of an image, through whatever medium for some form of economic return. However, the nature of experience goods makes demand pattern unpredictable and production process difficult to control. The uncertainty of demand for the creative product, pose managerial and organizational challenges. The structure and staffing of creative projects are often temporary, as are capital investment. Success is dependent on the composition of projects teams with individuals and groups working in a highly interactive and adaptive fashioning of the product: Despite this fact, a great deal of research conducted in the area of group dynamics suggests that groups are often much less creative and productive than they are usually assumed. The important question of how to manage creative teams to achieve a high productivity with limited resources and time arises in innovation management both from the theoretical and practical points of view. There is still no clarity which factors affecting productivity of teamwork are more important than others. The study was aimed at the identification most important factors for the productivity of teamwork. The survey of 113 student creative teams in 8 counties (Lithuania, Poland, Canada, China, France, Italy, Russia, and Denmark) was performed. Based of the findings the hierarchy of the significance of the factors influencing the productivity of teamwork is established and described in the article.

Keywords: collective creativity; teamwork; efficiency in creativity; creative industries

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JEL Classifications: D21, O31, O10, O32

1. Introduction

The 'experience' economy, characterizes by the growing needs for cultural identity and social empowerment, and aided by technologies of knowledge generation, information processing and communication of symbols, further reinforce this (Stepaniuk 2018; Strielkowski 2018). The term 'creative industries' reflect the progression of

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symbolic creativity being organized around, and for, the market: the industrialization of culture and its commodification for the mass audience (Hesmondhalgh 2007; Mitkus, Maditinos, 2017).

The creative industries involve the concretization of an image, through whatever medium for some form of economic return. However, the nature of experience goods makes demand pattern unpredictable and production process difficult to control. The uncertainty of demand for the creative product, pose managerial and organizational challenges. The structure and staffing of creative projects are often temporary, as are capital investment (DeFillippi, Arthur 1998). Success is dependent on the composition of projects teams with individuals and groups working in a highly interactive and adaptive fashioning of the product: the necessary skills for a film project are specialized into narrow creative, technical, and managerial realms that they are held by individual experts: creatives (writers, designers, choreographers, actors, directors), technicians (editors, cinematographers, lighting technicians) and managers (producers, line producers, controllers, accountants, financiers, and marketers), working concurrently and successively on a film (Wasko, 2003; Eliashberg et al, 2006). A film project is typically set up and controlled by a production company where the producers, marketers, and sometimes the financiers, are long-term employed.

Creative industries and creative-based organisations need to cope with challenges whether and how to control of the creative process; how should be mediated relationship between producer and consumer. Organizational practice exemplified by the creative industries emphasizes coping with problems, managing in states of uncertainty and unknowability, and thus challenges traditional thinking on managing people, production and marketing to the consumer. The challenge for managers and policymakers is to choose the most efficient organization in order to profit from the creativity - in the case of creative industries, the key problem is how firms, labour markets, and industries are built around the raw material constituted by "creatives", i.e., individuals with cultural (as well as technical) skills.

The creative act is an act of managing self, managing others and managing objects. It is the activity of organizing, co-ordinating and directing. Success in both areas often involve collaborative practice, especially as the basis for innovation. Although emanating from different sources, there are pressures to innovate in both management and art. The artist is obliged to innovate from that which went before in order to claim an individual voice. Within business, innovation of product or process is equally a form of 'market' imperative. Both may be seen as a form of practice. While this is largely recognized for the artist, the manager does not often see him as so engaged. A process of reflection 'what it is that they do' and 'how they do what they do' is not traditionally part of a recognized discourse of management activity. The introspective nature of the artistic process as the individual 'struggles' in order to express a creative intent might on first glance place it well outside the norms of management activity.

A greater awareness of management as practice opens up discussion as to the importance of skill and craft in the practice. Breaking from the traditional view of management as a role, or the the disciplinary of industry, management as practice and the need for reflexivity and self-critique in achieving good performance have been emphasized (Gabriel 2002; Bogdanović et al. 2018; Borisov et al. 2018, Mura et al. 2017; Vlacsekova, Mura, 2017).

It is important to focus on the nature of the relationship between creativity and management and does not privilege an 'artistic' or 'managerial' perspective. The disciplinary divide between creative programmes and management and the tension that arises between creative or creative endeavour and commercial constrains management in being able to realize creative endeavours, there is a lot that management can learn from the creative arts in terms of the way they manage their activities and the lessons that this might have for business (Lampel et al.2000; De Fillippi 1998; Sutton 2001; Tvaronavičienė, Razminienė 2017; Peterlin et al. 2018).

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It is thus important to frame an approach that does not favour one discipline over the other, but develops a common vocabulary privileging neither management nor creative endeavour.

2. Factors influencing productivity of teamwork: theoretical aspects

The considerable theoretical advancements have been made in linking contextual factors with intra-individual factors is Amabile's (1988, 1997) 'Componential Model of Organizational Innovation'. This identifies three intra-individual factors important for creativity: domain-relevant knowledge, creativity-relevant skills, and motivation. The Componential Model also describes characteristics of the work environment in an organization that impact on individual creativity via the above three intra-individual components: (1) organizational motivation to innovate; (2) resources and (3) management practices. According to Amabile's componential theory of creativity, creative work can be delineated into idea generation and problem solving. At each of these stages, teams are frequently used to tap into employee demographic diversity, cognitive styles and personality (Tagger 2002), divergent network ties (Perry-Smith, Shalley 2003), as well as functional heterogeneity.

Creative ideas need to be new and unique relative to others, and to what is currently available within the team or organization. Creative ideas have to be of value or useful to the team or organization. This focus on the mix of novelty and usefulness ensures that the definition of creativity is never static, but rather bounded within a social, cultural, or historical precedent (Perry-Smith, Shalley 2003). In the creative industries, where originality or the generation of something new is usually considered the currency of the realm (Florida 2002), there is continued pressure to look for ways to combine what already exists into something different or unique (Hargadon, Bechky 2006), to experiment with new, different, and existing ideas, as well to completely break from the known and venture into unknown territories.

Team creativity has been described as a collective phenomenon where members behaviorally, cognitively, and emotionally attempt new things, take novel approaches to their work; or generates products, processes, or procedures that are both novel and useful (Gilson, Shalley 2004). Team creativity can originate with the idea or suggestion of a single individual that is then developed, worked on, and elaborated upon by the team. In many teams there is a lead creator whose ideas are the seed for the projects that the team will subsequently develop.

Creativity can also emerge from the collective - an idea emanates from the unit and the unit as a team or as a collective works to refine and develop its ideas. Ideas also can be developed by subgroups, and then moved to the large groups who will further develop the idea and take the process forward. The work at Pixar can be considered as an exemplar in that small groups of individuals are encouraged to generate and refine ideas as well as give feedback and communicate with others inside and outside of the team. (Catmull, 2008). Creative individuals and artists are often labelled as eccentric, sensitive, self-confident, introvert, and intuitive (MacKinnon 1975) – characteristics that are not count as good team members. Enterprises in the creative industries need to continually balance their need to tap into the creative potential of both individuals and the teams as a unit and therefor it becomes critically important that the environment be one where opinions and divergent thinking are encouraged (i.e., Pixar) and self-confidence and at times aggression is regarded as passion rather than the deviance. (Gilson 2015).

There is no doubt that some teams can excel in the production of creative ideas or products. Despite this fact, a great deal of research conducted in the area of group dynamics suggests that groups are often much less creative and productive than they are usually assumed (Rietzschel E. F et al. 2010), (De Dreu et al. 2008), (Camacho, Paulus 1995).

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In many cases a manager responsible for innovation development has limited resources to take care of all the factors influencing productivity of teamwork. The important question of how to manage creative teams to achieve a high productivity with limited resources and time arises in innovation management both from the theoretical and practical points of view. There is still no clarity which factors affecting productivity of teamwork are more important than others.

The study on group creativity as a multifaceted, multistage phenomenon (Rietzschel E. F et al., 2010) revealed that creativity is a multistage a process. The performance in one stage of the creative process does not automatically carry over into the next stages. Different stages of the creative process may be affected by completely different variables.

Many studies have been carried out in order to identify the factors that influence creativity in team (Rietzschel et al. 2010), (Amabile 2011), (De Dreu et al. 2008), (Stroebe, Diehl 1994), (Camacho, Paulus 1995). The fact that people produce fewer ideas when they work in a group as compared to when they work individually is partly due to some social factors, such as social loafing (Stroebe, Diehl 1994) and social inhibition (Camacho, Paulus 1995). The research on motivation of teams of knowledge workers (Amabile 2011) revealed two groups of factors "the catalyst" and "the nourishment" relevant to the progress of team performance. The study on the influence of hedonic tone (i.e., positive vs. negative moods) on creative performance (De Dreu et al. 2008) revealed that both positive and negative activating moods lead to higher creative performance than deactivating moods. There are studies which are focused on how to increase the innovation efficiency not at team level, but at meso or macro levels (Bae, Chang 2012).

3. Empirical research methodology on the factors influencing productivity of teamwork

Usually creative teams differ in terms of their composition, the task being carried out, and the resources available, etc. Very often neither the task assigned to the team, nor the composition of the team nor the time allotted to carrying out the tasks can be changed, or can be changed only insignificantly. It has been noticed that some teams can achieve better results even when they have the same resources, carrying out the same or similar task and having the same amount of time allotted to them as other teams. The urgent question of how to manage creative teams to achieve a high performance of the team arises in creative team management both from the theoretical and practical points of view.

The present investigation is aimed at establishing the factors that determine the high performance of creative teams. Having elucidated the major factors of organising teamwork that determine a high performing team, it is possible to focus attention on those factors and thus increase the efficiency of collective work. A questionnaire survey of team members, which they filled in upon completion of the task involving the relevant teamwork, was applied to an empirical investigation. The questionnaire was devised according to the factors that have an effect on a team established by Teresa Amabile (Amabile 2011). Teresa Amabile (Amabile 2011) divides the factors that influence teams into catalysing factors, which have an effect on the performance-progress of the team and supporting factors, which have an effect on inner work life. According to Amabile, the catalysing factors have an effect on the inner work life of a creator too. The group of catalysing factors is made up of the following: clear meaningful goals, autonomy/freedom, sufficiency of resources, help at work, learning from problems and achievements, an open flow of ideas, and sufficiency of time. The group of supporting factors consists of the following: respect and recognition, encouragement, emotional support, a feeling of belonging and friendship/a sense of community.

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In carrying out the survey of the teams, each member of the team was asked to evaluate the following factors: whether the task of the team was clear/interesting; whether personal tasks were clear/interesting; team/personal autonomy; team/personal time; team/personal knowledge; the leader's help; the team's openness to ideas; learning from experience; respect within the team; team unity; job satisfaction in teamwork; leadership assessment; evaluation of the results achieved. The 7-point Likert scale was used for the evaluation. The higher the value of the point was, the stronger the factor under assessment manifested itself in the opinion of the team member. A total of 487 team members from 113 teams in 8 countries were interviewed: in Denmark (22 members from 6 teams), in Italy (21 members from 9 teams), in Canada (131 members from 20 teams), in China (39 members from 7 teams), in Lithuania (161 members from 38 teams), in Poland (70 members from 19 teams) in France (23 members from 8 teams) and in Russia (20 members from 6 teams).

These countries were chosen seeking to ensure a cultural and geographical variety of creative teams (relatively large and small countries, countries of Western and Oriental culture, etc.). Student creative teams were studied, that is, these teams had to find/generate some creative solution. The team member being interviewed had to evaluate the factors that had an effect on the team and its performance. According to the evaluation of performance, three groups were distinguished: of high performance (6-7 points), of average performance (5 points) and of low performance (1-4 points). Further the evaluations of only high and low performance teams calculating the averages of the evaluation of the factors of high and low performance teams in different countries were considered and compared. Though the tasks assigned to the teams and the duration of performing them were different, the teams of the same country had the same task and the same time allotted to perform it, and the same resources, therefore calculating the averages of these countries and comparing them was meaningful.

4. Evaluation of the performance factors of creative teams

The average of the evaluation of the performance factors of creative teams of all the countries under study (Denmark, Italy, Canada, China, Poland, Lithuania, France, and Russia) shows that high performance teams valued (see Fig. 1) respect most in the team (6.30 points), team autonomy (6.16 points), the team's openness to ideas (6.13 points), and team unity (6.09 points). The criteria of whether the task was interesting and teamwork satisfaction were evaluated at 5.98 points (Figure 1).

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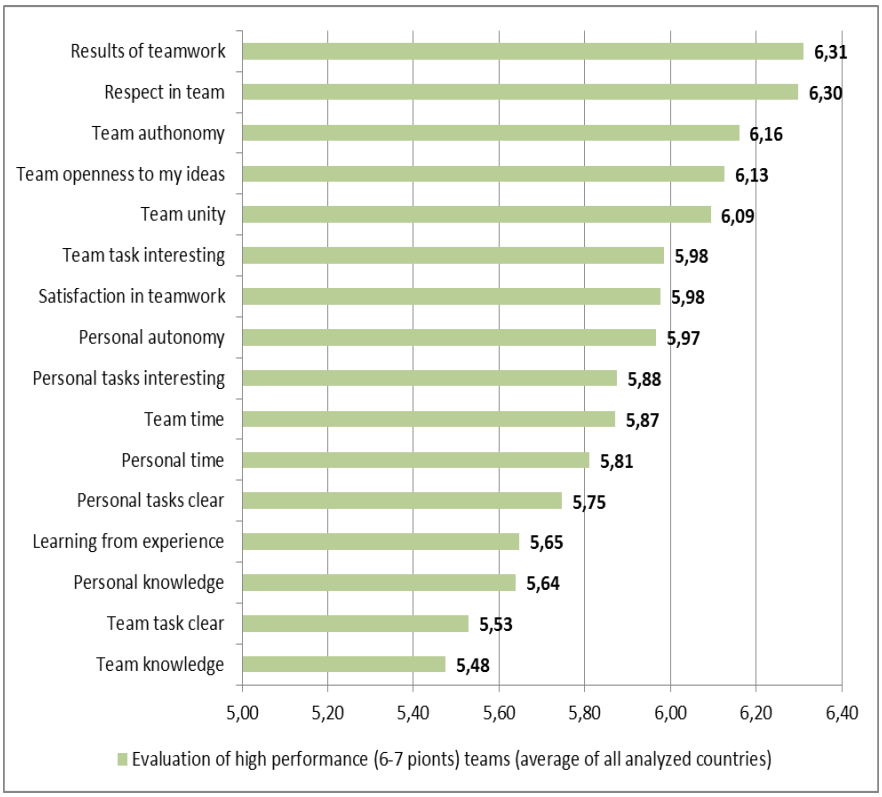

Fig. 1. Overall evaluation of the factors of high performance (6-7 points) teams

The average of all the evaluation of performance of creative teams of all the countries under study (Denmark, Italy, Canada, China, Poland, Lithuania, France, and Russia). It shows that low performance teams (see Fig. 2) gave the lowest valuation to whether the team task was interesting (3.91 point), the team's knowledge (4.03 points), learning from experience (4.04 points) and personal knowledge (4.19 points) (Figure 2).

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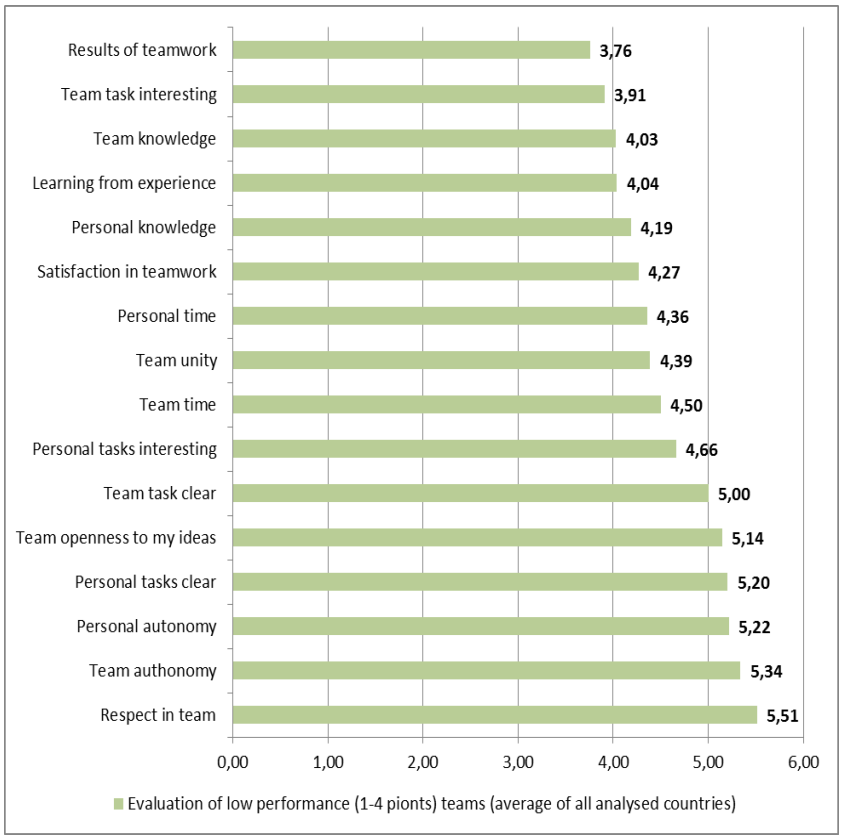

Fig. 2. Overall evaluation of low performance (1-4 points) teams

Low performance teams conditionally gave the highest valuation to respect in the team (5.51 points), team autonomy (5.34 points) and personal autonomy (5.22 points).

When comparing the differences in the evaluation of the factors of high and low performance teams, we see that high performance teams valued all the factors of the effectiveness on average at a higher level. The greatest differences are in the evaluation of whether the team task was interesting (difference of 2.08 points), teamwork satisfaction (difference of 1.71 point), and team unity (difference of 1.70 point) (see Fig. 3).

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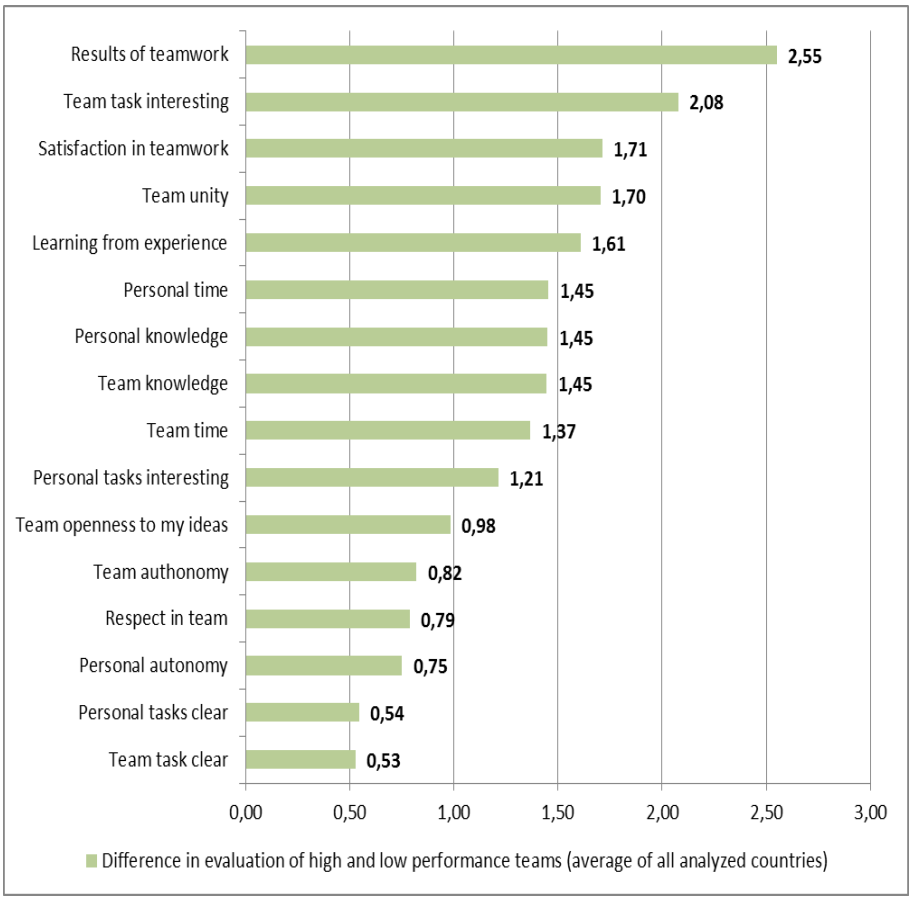

Fig. 3. Difference in evaluation high and low performance teams

The least differences between high and low performance teams are in the evaluation of whether the team task was clear (difference of 0.53 points), the evaluation of whether the personal task was clear (difference of 0.54 points), the evaluation of personal autonomy (difference of 0.75 points) and the evaluation of respect in the team (difference of 0.79 points).

5. The hierarchy of factors influencing the teamwork productivity

As it was already mentioned, according to Teresa Amabile (Amabile, 2011), knowledge team motivation factors can be divided into catalysing factors, which influence the performance-progress of the team and supporting-nourishing factors, which have an impact on inner work life. Catalysing factors also influence the inner work life of the creator. The group of catalysing factors consists of the following: clear meaningful goals, autonomy/freedom, sufficient resources, help at work, learning from problems and achievements, an open flow of ideas, and sufficient amount of time. The group of nourishing factors consists of the following: help and recognition, incentive, emotional support, belonging and friendship.

Investigations carried out into 487 team members (113 teams) from 8 countries (Lithuania, Poland, Canada, China, France, Italy, Russia, and Denmark) showed that the team's members' satisfaction is directly related to the

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results achieved by the team). The conducted investigations confirm the so-called Progress Principle by Teresa Amabile, which states that progress achieved by the team has a positive impact on the creator's inner work life, and the creator's positive inner work life has a positive effect on the result/progress of the team. The conducted investigations supplement Teresa Amabile's Progress Principle in revealing the impact of both catalysing and supporting factors on the results of the team. The hierarchy of the significance of the factors is established on the basis of the impact of the factors on the team's result/progress. Two groups of factors i.e. basic micro factors and additional micro factors are identified: The basic micro factors are (see Fig. 4):

- an interesting team task;
- the team's openness to ideas;
- learning from experience;
- team autonomy;
- respect in the team;
- team unity.

The additional micro factors are:

- team task clear;
- team knowledge;
- team time available for the task;
- personal autonomy;
- personal knowledge;
- personal time available for the task;
- personal task clear.

In order to achieve a higher result/performance of a creative team the greatest attention must be devoted to the basic micro factors. A task should be interesting for the team. The team members should be open to the ideas and respect each other. For the high productive team a sufficient level of autonomy have to be granted. It includes financial, decision making, teamwork management and other autonomy. Management of the team also has to stimulate sense of team unity. It is also very important to establish Leaning from the experience/continuous improvement system in order to constantly analyze the performance and satisfaction of the team. Key performance and key satisfaction indicators have to be established as well as regular monitoring procedures. The above mentioned basic micro factors and additional micro factors could be used for development of key satisfaction indicators.

Our findings also revealed that result/performance of the team has direct impact on satisfaction of the team. High result/performance of the team stimulates better satisfaction of the team which could lead to the establishment of positive loop i.e. high result/performance – better satisfaction, better satisfaction – high result/performance. The opposite to the positive loop it could be a negative loop when poor result/performance could lead to dissatisfaction and then dissatisfaction lead to even worst result/per high result/performance of the team.

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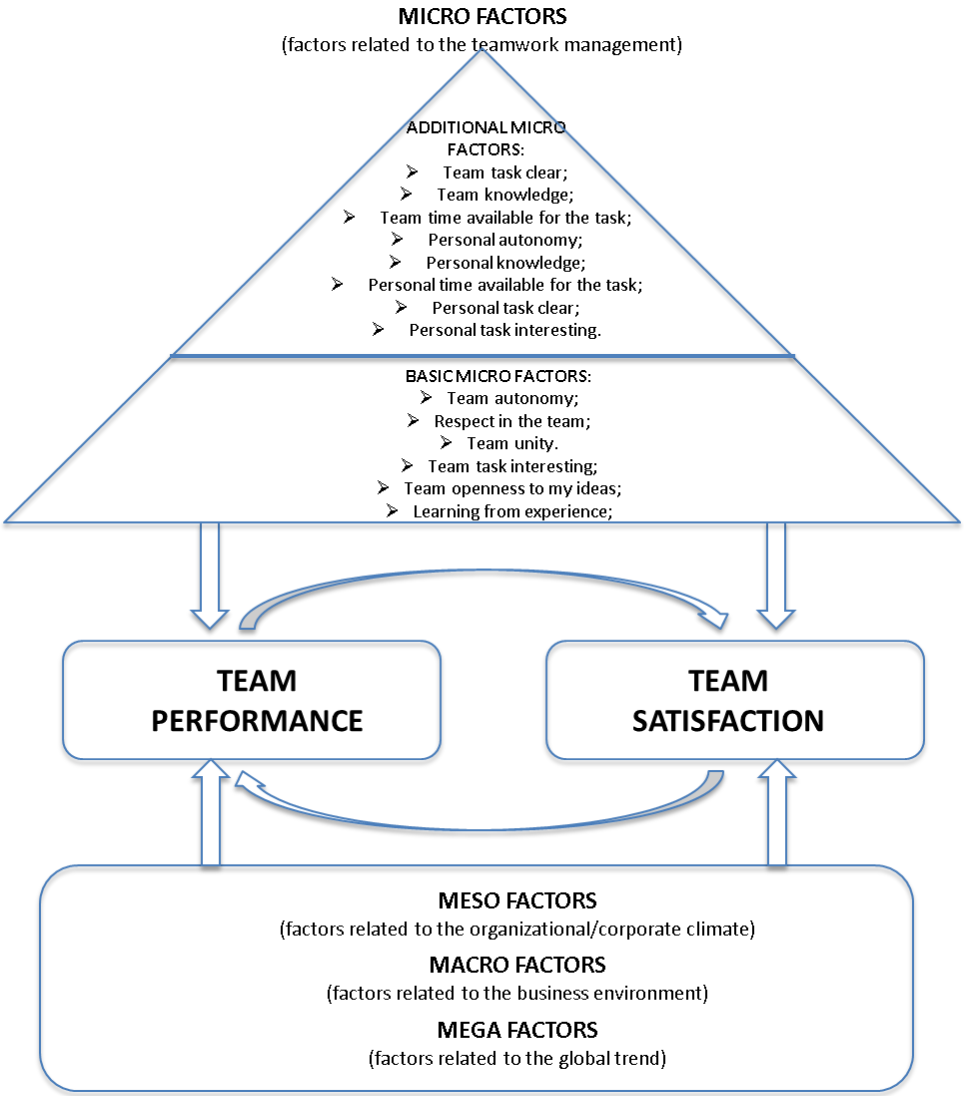

Fig.4. The hierarchy of factors influencing the teamwork productivity

Attention is to be paid to the fact that micro factors are not only factors which has impact to the performance/result of a team. Our research revealed that a team could achieve very different final result/performance with the same or very similar micro factors (task, time available, composition of the team and etc.). A poor performance of the team could be influenced by increase competition, negative political, economic, social or technological changes. This shows that not only micro but also other factors (mega, macro and meso) factors could have a big impact on the results/performace of the teams.

It means that in order to achieve high performance of the team meso, macro and mega factors should be taken into consideration.

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Conclusions

The research findings confirmed the so-called "Progress Principle" by Teresa Amabile (Amabile, 2011) in revealing the impact of both catalysing and nourishment factors on the results of the teams. The hierarchy of the significance of the factors influencing the productivity of teamwork is established.

The hierarchy factors influencing the productivity of teamwork consist of two groups of factors:
Basic micro factors. This group includes 6 factors (interesting team task, the team's openness to ideas, learning from experience, respect in the team, team unity and team autonomy). These factors are crucial for productivity and satisfaction of a team;

Additional micro factors. This group of factors includes such factors as time allocate to the team, team knowledge, team task, personal time of the team members, personal knowledge of the team members, personal autonomy, and clear and interesting personal tasks. These factors are important for productivity and satisfaction of a team.

The finding of the study shows that in order to achieve higher productivity of a creative team the greatest attention must be given to the factors of higher hierarchical level. Such focus would help to achieve not only higher productivity of teamwork, but would also increase the efficiency of innovation development process. The findings are relevant not only for creative industries, but also for innovation development in other sectors as the higher productivity of a creative team would affect the efficiency of innovation development in all sectors.

Despite the fact that all the analysed teams were given conditionally the same task, the same goal, same time and resources, some of the teams managed to achieve better results than others. This shows that not only micro factors had an influence of the productivity of the teams, but also external environmental (mega, macro and meso) factors had also an impact on the results of the teams. Mega, macro and meso factors can have a crucial impact on productivity of teamwork in creative industries, despite existence of all necessary positive micro factors. The influence of mega, macro and meso factors have to be additionally investigated.

Limitation of the study. The paper presents conclusions from students teams involved in development of creative projects, but not from the teams working in creative industries, assuming that factors of productivity in students teams involved in creative projects are similar to the teams working in creative projects in creative industries. To identify factors influencing productivity of teams working in creative industries are difficult due uniqueness of each projects (task, allocated resources, timing and etc.). These factors usually are out of direct control of the creative teams and are determined by meso, macro and mega factors (customers, CEOs, competitors, market and etc.) Research of students teams involved in development of creative projects allowed us to partially eliminate these factors and concentrate on the factors that are in direct control of creative teams. It implies that the presented research was conducted on closed to reality environment, but in order to verify the results, further research should be done in real environment i.e. by analysing teams in creative industries.

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INTENTIONS TO ADOPT ECOPRENEURSHIP: MODERATING ROLE OF COLLECTIVISM AND ALTRUISM

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Abstract. There is need to understand the importance of sustainability of economies by the students especially undergoing business education and look for avenues that provide support to sustainability, in which ecopreneurship is one. The current study examines the intentions to adopt ecopreneurship while extending theory of planned behavior model by including the dual moderating role of collectivism and altruism while taking developing country context as field of analysis. Data were collected from students of two universities located in a rural district and student participants of entrepreneurship training workshop. Results show that ecopreneurship is mainly driven by subjective norms and self-efficacy while attitude towards ecopreneurship become significant in presence of collectivism and altruism not otherwise. Similarly, the dual moderating role of collectivism and altruism has been identified by the significance of three-way interactions for attitude, subjective norms and self-efficacy with collectivism and altruism respectively.

Keywords: Sustainability; Ecopreneurship; Collectivism; Altruism; Theory of Planned Behavior

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JEL Classifications: Q56, L26, D64

1. Introduction

Since 1980's the word "Sustainable development" has been referred as buzz word (Tilley and Young, 2009). The most popular definition of sustainable development was given by World Commission on Environment and

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Development (WECD) (1987: 8) according to which sustainable development is "development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs". This definition makes us answerable to the future generations about environment depredation. Business units are one of the major entities that have direct impact on the sustainable development. Due to the rise in awareness level, the general public is not only demanding eco-friendly products but also sustainable practices by their producers. The lack of participation of entrepreneurial new ventures in sustainable management can not only cause the specific country left behind on sustainable development but can further worsen the natural environmental conditions. The sustainable entrepreneurship, also called ecological entrepreneurship or eco-preneurship, can be taken as a possible way to address the problem of environmental degradation (Muñoz and Cohen, 2018; Law, Hills, and Hau, 2017; Keijzers, 2002). This type of entrepreneurial activity links business to the sustainability management. Taiwan, by putting focus on sustainable management has successfully generated both economic as well as social benefits for the whole community (Valdez-Juárez, García-Pérez-de-Lema, and Maldonado-Guzmán, 2018; Pfajfar and Mitręga, 2016; Chen and Jaw, 2009). The recycling system in Taiwan is the best example of how communities can get benefits from practicing sustainable management practices (Outsios and Kittler, 2017; Sardianou, Kostakis, Mitoula, Gkaragkani, Lalioti, and Theodoropoulou, 2016; Koe and Majid, 2014).

Considerable evidence exists among developed and developing countries about saving the environment and initiating the entrepreneurial activities targeted at saving the depleting environment (Canever, Barral and Ribeiro, 2017; Ozaralli and Rivenburgh, 2016; Gubik and Farkas, 2016). Entrepreneurship is a source of promoting employment and bringing prosperity to the economy (Iglesias-Sánchez, Jambrino-Maldonado, Velasco, and Kokash, 2016; Testa and Frascheri, 2015; Holmgren and From, 2005). Especially in the developing countries context the entrepreneurship is seen as a way to trigger economic development and to handle serious economic and social challenges, in this regard besides enhancing economic activity the protection of environment is a serious concern. The question like how to promote the eco-businesses is an evergreen challenge. This calls for highlighting the factors that influence the adoption of eco-entrepreneurship for sustainable future decisions. The economic growth with ecological friendly entrepreneurship has received attention in recent times (Mbebeb, 2012) and a positive attitude towards adoption of such entrepreneurship is found. Further, the significance of the concept, within the context of green economy, can be understood by the concept of ecological entrepreneurship that has emerged as means to decrease market failures and enhance social welfare through the exploration of environmentally responsible opportunities (Muñoz and Dimov, 2015; Miller, 2015; Meek, Pacheco, and York, 2010). According to Marsden and Smith (2005; p.440), "through a process which we call *ecological entrepreneurship*, key actors facilitate sustainable development in the countryside by a combination of fragmentation, specialisation and quality building strategies".

The researchers have recognized that there are chances that the intentions to initiate ecological entrepreneurial activities may be moderated by social, cultural, and ecological norms; it is at times influenced by economic interests that are characterized by patterns of aggressive and unsustainable consumption (Koe and Majid, 2014). The United Nations Organization (2011) has recognized eco-friendly entrepreneurship as an intervention strategy, a catalyst for fostering the process of economic development, and at the core of this action is the eco-entrepreneur. Thus, given the necessary drive, the entrepreneurs who have the intentions to start their businesses must consider investment in the ecological entrepreneurial opportunities at the first instance. Ecological entrepreneurship is one of the major drivers of green economy (Mbebeb, 2012). Schaltegger (2002) while coining the term ecopreneur identifies their unique role by stating that "whereas all entrepreneurs deal with bridging activities between suppliers and customers to create and change markets, ecopreneurs differ from conventional entrepreneurs in that they also build bridges between environmental progress and market success." (2002, p. 46). The environmental risks are translated into green business opportunities by ecological entrepreneurs. Similarly, they also respond to the negative consequences of businesses on the natural environment by introducing environmentally friendly

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products and processes (Gast, Gundolf, and Cesinger, 2017; Schaper, 2016; Pastakia, 2002). In the same run, Hill et al. (2010: p. 37) acknowledged the growing business viewpoint that "*as pressure increases on the world's natural resources, concerns over environmental degradation have shifted from the fringes of altruistic concern to tangible global economic losses.*"While highlighting the importance of sustainable wealth creation Marsden and Smith (2004: p. 441) strongly recommended that in order to respond appropriately to emerging needs, "*sustainable wealth creation and local economic development within the wider context of sustainable development require new entrepreneurial initiatives that focus on investing in the local environment. . . . employing people and their resources*" (2004: p. 441).

Green growth, therefore, requires a transformation that is influenced by one's strong motivation to create new products. By doing this the socially responsible investment can be ensured as a strategy. Adopting this strategy generates competitive advantages for both investors and beneficiaries (Tandoh-Offin 2010; Young, 2010). The people having potential for engaging in ecological entrepreneurial practices would be recognized for their expertise in practicing sustainable approaches to survival, which are derived from their perceptions, attitudes, and ecological identity. Further it is noted that the ecological entrepreneurship is directly related to the climate changes occurring, as these are inducing alterations to the global atmosphere. These alterations are directly or indirectly results of human activities (Momodu, Akinbami, and Obisanya, 2011).

In this relation, enhancing awareness among masses and developing skills are necessary to persuade initiators to get on board the green economy platform. The primary task is to influence perceptions and attitudes and to motivate good investment behaviors. This idea comes from the recognition that social constructs (collectivism and altruism) that play a vital role in facilitating start-up intentions with regard to pro-environmental ventures. Cultural factors are determinants in developing intentions regarding adoption of ecological entrepreneurship (Koe and Majid, 2014). This is the reason, the current study considered collectivism and altruism as the moderators in defining adoption of eco-preneurship as means of sustainability. By presenting a model of cultures' association with entrepreneurship, Hayton George, Zahra (2002) provided a broad overview of the potential pattern of relationships between national culture, contextual factors, and entrepreneurial outcomes. Culture is depicted as a moderator in the relationship between contextual factors (institutional and economic) and entrepreneurial outcomes. This suggests that culture acts as a catalyst rather than a causal agent of entrepreneurial outcomes, thus this calls for examining the role of cultural characteristics like such as collectivism and altruism. Ecology and sustainability entrepreneurship research has emerged from the huge body of business, environment and corporate responsibility literature while trying to find the answers to the questions like how the change in the business practices effect the business, social and environmental practices. The sustainable entrepreneurship research area has overlapped the organizational studies and the sustainable development literature, giving rise to another insight, sustainability enterprise as another field of study. Collectivism as derived from the theory of social learning and altruism based on social/national identity seems to be important factors that can have impact on the intentions of individuals to adopt ecofriendly/ sustainable practices.

2. Ecopreneurship Intentions and Theory of Planned Behavior

Krueger et al. (2000), starting a new business cannot be accidental rather it requires long term planning and positive intentions toward the new business so it is more of a planned behavior. Theory of planned behavior (TPB), extension of theory of reasoned action (TRA) (Ajzen, 1991; Ajzen and Fishbein, 1970) has been widely used by many researchers not only in social psychology (Armitage and Conner, 2001; Collins and Carey, 2007; Fielding et al., 2008) but also in for predicting behavioral intentions generally and environmental conscious behavioral intentions particularly. For the study of pro environmental behavior, many researchers have used TPB theoretical foundations (e.g., Bamberg and Schmidt, 2001; Bamberg et al., 2003; Chen and Tung, 2010; Kim and Han, 2010 and Han and Kim, 2010). Some of these studies combined or extended the TPB proposed model.

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Despite the general usefulness of the TPB, several studies made efforts to improve the explanatory power of this theory by adding additional constructs within the TPB model (Botetzagias, Dima, and Malesios, 2015; Kaiser and Scheuthle, 2003).

Intentions are considered to be an important factor in explaining actual behaviors. Strong intention to perform a certain behavior is most likely to result in its performance (Ajzen, 1991). TPB, successfully explains that how the positive behavioral intentions result in the actual behavior. The model of theory of planned behavior has been repeatedly used by many researchers in explaining the green behavioral intentions (Kalafatis, Pollard, East and Tsogas, 1999; Han, Hsu, and Sheu, 2010; Ryu and Han, 2010). The definition and measurement of behavioral intentions varies across existing literature however, the researchers are broadly agreed that it is readiness or likelihood to conduct a specific behavior (e.g. Ajzen, 1991, 2009; Han and Ryu, 2007; Oliver, 1997). The theoretical advantages of TPB-based work in entrepreneurship area cannot be denied. Linan, Nabi and Krueger (2013) very rightly have identified the four major focused areas of TBP by entrepreneurship researchers, the first one where the researchers have focused on studying the impact of core elements of TPB on entrepreneurial intention, the second stream has tried to study the impact of human and social capital on TPB elements and entrepreneurial intention, the third stream focused on the study of the effect of knowledge and awareness on TPB model and last but not the least, cross cultural comparisons on TPB model with reference to entrepreneurial intentions.

TPB model has been repeatedly used by many entrepreneurship researchers for identification of entrepreneurship intentions however, its power to explain the intention towards sustainable entrepreneurship has not been fully explored (Koe and Majid, 2014). Attitudes are considered to be an important driver of new venture intentions and many researchers (e.g. Moriano et al., 2012; do Paço et al., 2011 etc) in this area have found significant positive impact of attitudes on entrepreneurial intentions. Similarly, attitudes are also found to be predictor of pro environmental behavioral intentions in individuals (Stern, 2006; Bamberg and Möser, 2007). Sustainable practice adoption is also affected by positive or negative attitude of individuals (Chen et al., 2011). Subjective norms (pressures from influential others) have also been identified as predictor of sustainable behavioral intentions (Vermeir and Verbeke, 2008). Similarly, Meek (2010) and Yaacb (2010) found that environmental actions of entrepreneurs are resultant of social pressures. The behaviorists and psychologists are agreed upon the various concepts having impact on the processing capabilities for task accomplishments or solving problems and found a linkage between self-efficacy and motivation to behaviorail change (Drnovšek, Wincent and Melissa, 2010; Tzchentke, Kirk, and Lynch, 2008; Luszczynska, Gutierrez-Dona and Schwarzer, 2005; Pearlmutter, 1998; Tilley, 1999). Researchers have linked self-efficacy with various constructs like achievements, emotional disorders, mental and physical health, selecting careers etc. (McCormick, Tanguma and López-Forment, 2002). It is to highlight that the concept of self-efficacy is also relevant to the conservation of resources and adoption of pro-environmental behavior, where the research is found scarce (Dumitru, Budică, and Budică, 2017; Janmaimool, 2017; Drnovšek, Wincent and Melissa, 2010; Homburg and Stolberg, 2006). Individuals cannot contribute positively towards protecting the environment unless they have confidence for better environmental management. Hence based on above literature support following hypotheses are proposed:

H_1: Attitude toward ecopreneurship has a positive effect on ecopreneurship intentions.
H_2: Subjective norms has a positive effect on ecopreneurship intentions.
H_3: Self-efficacy has a positive effect on ecopreneurship intentions.

2.1 Ecopreneurship Intentions and Collectivism

People with individualistic orientations are independent, self-reliant, exercise freedom of choice and feel high level of competition from people around them (Triandis, 1995; Kim and Choi, 2005), whereas with collectivist orientation people are more interdependent, try to maintain in-group harmony, give importance to social

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hierarchies, have cooperative behavior and feel less competition (Hosfstede, 1980; Triandis, 1995). This value orientation has been investigated at both aggregate levels for the identification of differences across cultures and at individual levels for the identification of difference in the value orientation of individuals within a culture (Leonidou, Skarmeas, and Saridakis, 2018; Tascioglu, Eastman, and Iyer, 2017; Kim and Choi, 2005). This value orientation has been found to influence a range to social behaviors of individuals. Individual level of individualistic or collectivistic orientation has an impact on the motivation of individuals to perform certain behavior (Kim and Choi, 2005). Collectivistic tendencies of individuals have a positive impact on their pro environmental attitudes whereas people with individualist orientation view pro environmental behavior as less important and hence are less likely to engage in environmental friendly activities (McCarty and Shrum, 2001). Laroche et al. (2001) suggest that collectivist people tend to be friendlier toward the environment. Ling-Yee (1997) found similar results for ecological commitment and Kim and Choi (2005) for green purchase behavior. But little is known about the potential influences of collectivism or individualism on attitudes and intentions for ecological entrepreneurship. Values have been theoretically reasoned and empirically proven to have an important role in predicting specific attitudes and behaviors (De Groot and Steg, 2008; Stern and Dietz, 1994). Intentions of individuals are directly affected by their value orientations. Individuals try to stick with the value congruent information and disregard the information that is incongruent with their value orientation (Stern et al., 1995; Verplanken and Holland, 2002). A person with individualistic orientation would be more concern about him and pay less importance to the environment. Hence the following hypotheses are proposed

H_{4a}: Collectivism will moderate the relationship of attitude and ecopreneurship intentions.
H_{4b}: Collectivism will moderate the relationship of subjective norms and ecopreneurship intentions.
H_{4c}: Collectivism will moderate the relationship of self-efficacy and ecopreneurship intentions.

2.2 Ecopreneurship intentions and Altruism

Moral norm-activation theory by Schwartz (1977) suggests that behavior become more probable when one is aware of its consequences. According to this theory, altruistic behaviors occur due to personal moral norms of individuals that are triggered as a result of an awareness about the negative consequences (condition pose threats to others) of certain behavior and the believe that their actions can reduce these negative consequences. As the environmental conscious behavior involves a tradeoff between individual and collective benefit many authors (e.g. Black, 1978; Black et al., 1985; Guagnano, Stern and Dietz, 1995; Schultz and Zelezny, 1999; Guagnano, 2001) have conceptualized it within the framework of Schwartz (1977) model of altruism and have provided substantial support of this theory while applying it to range to environmental issues. Guagnano (2001) after empirical analysis identified that in contrast to self-interest, market and market like behaviors are motivated by altruism. While studying the willingness to pay extra for recycled products, Guagnano (2001) validates the applicability of Schwartz (1977) model of moral norm activation. A person with high altruism would pay attention to the negative consequences of environmental problems and its impacts on humans and biosphere and would have pro environmental attitudes. Hence, it is proposed that the altruism has an impact on attitudes, behavior and intentions of individuals.

H_{5a}: Altruism will moderate the relationship of attitude and eco-preneurship intentions.
H_{5b}: Altruism will moderate the relationship of subjective norms and eco-preneurship intentions.
H_{5c}: Altruism will moderate the relationship of self-efficacy and eco-preneurship intentions.

2.3 Dual Moderating Role of Collectivism and Altruism

The values (collectivism) and norms (Altruism) play a very important role in developing pro-environmental behavior (Guagnano, 2001; Kim and Choi, 2005) in individuals. Moral norm-activation theory by Schwartz (1977) and Kim and Choi (2005) identification of value orientation impact on pro environmental behaviors in individuals provide indication for the additive moderating role of collectivism and altruism. Although,

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collectivism and altruism are two different type of values/norms. There is a possibility that an individual may possess either collectivism or altruism, or both. Hence, it is proposed that collectivism and altruism both may play additive moderating role (three-way interaction) in the relationships of TPB. Based on the above discussion following hypotheses are proposed:

> H_{6a}: Collectivism and altruism will play additive moderating role in the relationship of attitude and ecopreneurship intentions.
> H_{6b}: Collectivism and altruism will play additive moderating role in the relationship of subjective norms and ecopreneurship intentions.
> H_{6c}: Collectivism and altruism will play additive moderating role in the relationship of self-efficacy and ecopreneurship intentions.

Based on above discussion, extended theory of planned behavior model for identification of drivers of ecopreneursip intentions is proposed (Figure 1).

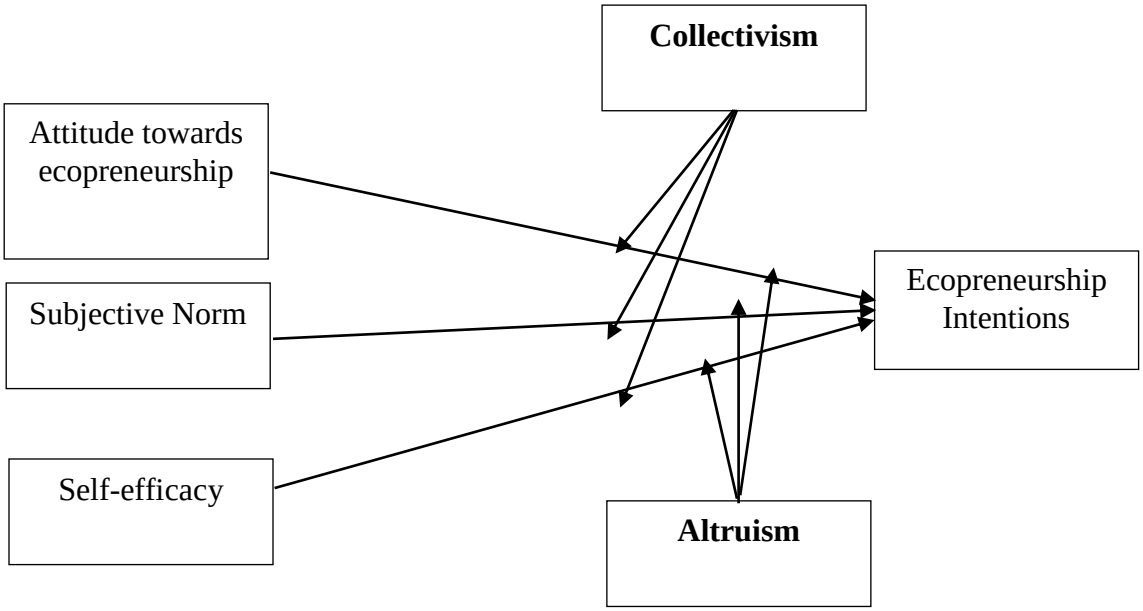

Figure 1. Drivers of ecopreneursip intentions

3. Methodology

3.1 Data collection

Data were collected from entrepreneurship and innovation students from one public and one private sector universities from a rural district of Pakistan and participants of a training workshop held in Fatima Jinnah Women University, Rawalpindi, Pakistan in July 2017 the title of workshop was "Creating and Strengthening the Awareness of Financial Linkages among the Young Women Entrepreneurs in the Rural Areas of Rawalpindi District" under Social Integration Outreach Program, of Higher Education Commission, Islamabad. The students were enrolled in the undergraduate program of business administration departments of the two universities and participants of training workshop were females who were interested in starting a new business in near future. Non-probability purposive sampling technique was used where the respondents were selected based on their enrollment in entrepreneurship and innovation course and the participants of the training workshop.

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Questionnaires (Saunders, Lewis, and Thornhill, 2012) were distributed either using online google docs or in hard form for the workshop participants. Serial mean was used for imputation of missing values and after imputation of missing values total usable sample size was 292 (Missing value imputations were used for confirmatory factor analysis). Majority of the respondents were males (189 males; 70 females), belonging to the age group of 24-27 years. The mean family income was $ 500- $ 1000.

3.2 Measures

Entrepreneurial Intention Questionnaire: Entrepreneurial Intention Questionnaire (EIQ) developed by Liñán, Battistelli, and Moriano, (2008) was adopted for the assessment of the ecological entrepreneurial dispositions of respondents. Attitude toward eco-preneurship was measured with the help of five items measured on 5-point likert scale where 1 was "strongly disagree" to 5 as "Strongly Agree". Sample item is "A career as an ecological entrepreneur is totally unattractive to me" a subjective norm for eco-preneurship was measured using three items and self-efficacy for eco-preneurship was measured with the help of six itemed scale. Similarly, Intentions toward eco-preneurship was measured with the help of four questions sample items are "I am ready to do anything to be an ecological entrepreneur" and "I will make every effort to start and run my own environmentally friendly business".

Collectivism: Collectivism was measured on a seven-point, three-item scale measured on (1) "not at all important" to (7) "extremely important" adopted from Yamaguchi (1990). The sample items are 1) "I maintain harmony in my group. 2) I respect the majority's wish and 3) I sacrifice self-interest for my group. None of the item was reverse coded."

Altruism: For the measurement of altruism, we used a 7-item scale developed by Guagnano (2001). Items were measured on 7-point Likert scale (1 = strongly disagree; 7 = strongly agree). The sample items are 1) "Over the next several decades, thousands of species on earth will be driven to extinction 2) The effects of environmental problems on public health are worse than we realize 3) Current claims that environmental problems are changing the earth's climate are exaggerated, and 4) Protecting the environment will threaten jobs for people like me". Item 3, 4 and 5 were reverse coded.

3.3 Data Analysis

Data were analyzed using SPSS, AMOS and PROCESS Procedure for SPSS Release 2.16.3 written by Andrew F. Hayes, Ph.D. the process was downloaded from www.afhayes.com.

3.3.1 Common Method Variance

Self-reported data raise issue of potential effect of common method variance (CMV) (Podsakoff et al., 2003). Prior to hypothesis testing, CMV was tested using Harman's one factor test. When all items were loaded in principal component factor analysis 5 factors with "eigen value" greater than 1 were formed and the first factor accounted for less than 30% variance. The result revealed that data is free from CMV.

3.3.2 Reliability

Reliability of the collected data set was checked with the help of Corbatch's Alpha and composite reliabilities coefficient (Nunnally, 1978). The value of Cronbatch alpha coefficient for all variable understudy ranged between 0.697 and 0.936 and composite reliability coefficient values lie between 0.688 to 0.886 showing the acceptable reliability of the data (Hair et al., 2014). Results are present in Table 1.

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Table 1. Confirmatory Factor Analysis of Items Present in Model

Construct/Variable	B	Alpha	CR	AVE	SK	KU
Attitude		.803	0.803	0.451	1.39	1.97
ATT1	.640					
ATT2	.640					
ATT3	.718					
ATT4	.673					
ATT5	.683					
Subjective Norms		.697	0.688	0.425	0.87	-0.19
SN1	.662					
SN2	.611					
SN3	.681					
Self-Efficacy		.884	0.849	0.563	1.11	0.40
SE1	.749					
SE2	.786					
SE3	.788					
SE4	.768					
SE5	.743					
SE6	.662					
Intentions		.926	0.928	0.763	-1.14	0.68
INT1	.805					
INT2	.875					
INT3	.925					
INT4	.885					
Collectivism		.881	0.815	0.596	-0.49	0.17
COL1	.670					
COL2	.853					
COL3	.783					
Altruism		.936	0.886	0.651	0.01	-0.65
ALT1	.657					
ALT2	.956					
ALT3	.761					
ALT4	.755					
ALT5	.902					
ALT6	.774					

Note: β: standardized coefficient; Alpha: Cronbath's Alpha; CR: Composite Reliability; AVE: Average Variance Extracted; SK: Skewness; KU: Kurtosis.

3.3.3 Normality

Normality of data was ensured with the help of skewness and kurtosis values (Winer, Brown and Michels, 1991). For all constructs, the values of skewness and kurtosis values lie between +1 and -1 Hence, indicating that data were normally distributed. Results are presented in Table 1.

3.3.4 Validity

Convergent and discriminant validity indices were used to ensure the validity of data set. For convergent validity, the regression coefficients for each observed variable (Item) should be greater than 0.6 (Joreskog and Sorbom, 2006), all items were loaded in to their respective latent construct with regression coefficient greater than 0.6, results are presented in Table 1. Similarly, discriminant validity was confirmed using Fornell and Larker (1981) criteria where the AVE for each variable should be greater than the shared variance for all constructs present in the proposed model (Fan et al., 2006). For all constructs, the AVE were greater than shared variance except for self-efficacy where shared variance was greater than AVE of two constructs. Results are present in Table 2.

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Table 2. Descriptive Statistics, Correlations and Shared Variance for Constructs

Items	Variable	No of items	Mean	S. D	1	2	3	4	5	6
1	Attitude	5	1.69	0.721	.45					
2	Subjective Norms	3	1.68	0.719	.67* (.44)	.43				
3	Self-Efficacy	6	1.60	0.377	.66* (.43)	.78* (.60)	.56			
4	Intentions	4	3.99	1.094	.20* (.04)	.30* (.90)	.32* (.10)	.76		
5	Collectivism	3	4.83	1.455	-.05 (0.002)	.20* (.04)	.15* (0.02)	.33* (0.12)	.60	
6	Altruism	6	3.95	1.522	.04 (0.002)	.08 (0.006)	.08 (0.006)	-.07 (0.005)	.13** (0.017)	.65

Note: Shared variance in parenthesis; AVE in diagonal; *P <0.01;

3.3.5 Confirmatory Factor Analysis

Three different CFA models (Kaplan, 2000) were constructed including two factor model having attitude, subjective norms, self-efficacy, collectivism and altruism as single construct and intentions as a separate construct, three factor model having attitude, subjective norms and self-efficacy as one construct and collectivism and altruism as second construct and intentions as the third construct and finally the six-factor model where all constructs were loaded as separate constructs. Results identify that the proposed six-factor model is the best fitted model compare to two or three factor models. Results are presented in Table 3.

Table 3. Summary of CFA Results

Model	χ^2 (df), df/ χ^2	CFI	RMR	GFI	RMSEA	Comparison with 6 factor models ($\Delta\chi^2$, df)
Model 1 (2 factors)	1526, (316),4.8	0.798	0.359	0.776	0.115	877, (14)
Model 2 (3 factors)	1085, (314),3.4	0.872	0.157	0.856	0.092	436, (12)
Model 3 (6 factors)	649, (302), 2.1	0.942	0.069	0.933	0.063	

Finally, CFA was performed by taking all constructs (latent and observed) including dependent, moderators and independent at a time. The results of the measurement model identified that all observed variables had t-values greater than 2.50, their factor loadings were greater than 0.5 and R2 was also greater than 0.5. However, three items were deleted from analysis due to cross loading (one item from altruism and two items from intentions) (Joreskog and Sorbom, 2006).

3.4 Regression Analysis

Multiple linear regression analysis was used to test the impact of attitude, subjective norms and self-efficacy on ecological entrepreneurship intentions. The results are presented in Figure 2. Subjective norms and self-efficacy have significant positive impact on ecological entrepreneurship intentions while attitude toward ecological entrepreneurship remain insignificant.

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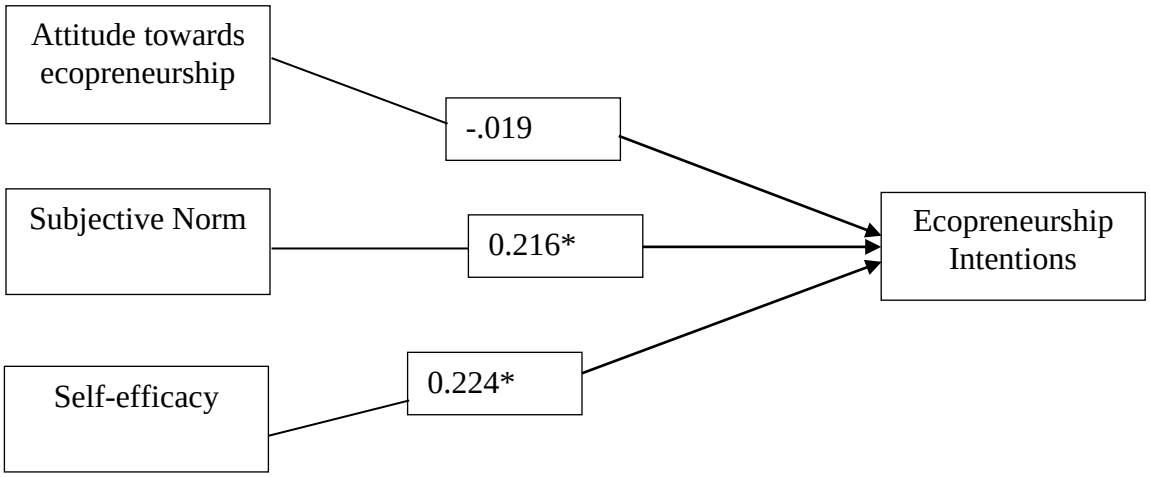

R2 = 0.16 F value = 14.27**
**P <0.01 *P <0.05

Figure 2. OLS Regression Results

3.5 Moderation Analysis

For testing of the moderating impact of collectivism and altruism on the proposed relationships PROCESS macro developed by Hayes (2013) for SPSS was used. We use PROCESS macro particularly due to the fact that PROCESS allows integrating multiple moderating variables in a single model. The study intended to estimate whether attitude, subjective norms, self-efficacy (X1, X2, X3) and ecopreneuship intentions (Y) is moderated by collectivism (MV1) and altruism (MV2) simultaneously. We used Model 2, which allows testing of the two moderators with bootstrap confidence intervals. The results of moderation analysis are presented in the following tables. (Hayes, 2013). To do so, the study run the process model by mean centering attitude, subjective norms, self-efficacy, collectivism (MV1) and altruism (MV2) using process model inbuilt option. The process output illustrated in first part the overall model fitness by estimating the direct impact of the variables of the study namely attitude, subjective norms, self-efficacy (X1, X2, X3) and the interactions terms i.e. int_1 of MV1 and int_2 of MV2 on the dependent variable, ecopreneuship intentions (Y). The output then illustrated the effect of interaction terms separately and collectively through the magnitude of R2-change. Results of PROCESS macro for SPSS are presented in Table 4 and Table 5.

Table 4. Moderation Analysis (PROCESS Model 2)
Bootstrap (5000 re-sample) Results

Predictors	Beta	Std. Error	t-value	LLCI	ULCI
Attitude	0.468*	0.10	4.80	.6591	.2760
Collectivism	0.279*	0.05	5.84	.1850	.3730
Altruism	0.040	0.04	1.06	-.0377	.1257
Attitude X Collectivism	0.167***	0.09	1.82	.0140	.3489
Attitude X Altruism	0.150**	0.08	1.98	.0006	.2985
R2	.20				
F-value	13.7*				

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Subjective Norms	0.485*	0.09	5.69	.6518	.3170
Collectivism	0.223*	0.05	4.70	.1314	.3209
Altruism	0.060	0.04	1.47	-.0203	.1408
Subjective Norms X Collectivism	0.132*	0.06	2.02	.0032	.2603
Subjective Norms X Altruism	0.091	0.06	1.53	-.0259	.2071
R2	.22				
F-value	16.1*				
Self-Efficacy	0.528*	0.08	6.44	.6890	.3664
Collectivism	0.240*	0.05	5.09	.1470	.3325
Altruism	0.059	0.04	1.45	-.0210	.1385
Self-Efficacy X Collectivism	0.085	0.07	1.23	-.0512	.2215
Self-Efficacy X Altruism	0.111***	0.06	1.89	.0044	.2262
R2	.24				
F-value	17.9*				

Note: *P <0.01, **P <0.05, ***P <0.10

Table 5. R-square increase due to interaction(s)

Interaction (s)	**ΔR^2**	**F-value**
Attitude X Collectivism	0.009	3.30***
Attitude X Altruism	0.011	3.91*
Attitude X Collectivism X Altruism	0.026	4.64*
Subjective Norms X Collectivism	0.011	4.07*
Subjective Norms X Altruism	0.006	2.34
Subjective Norms X Collectivism X Altruism	0.022	3.99**
Self-Efficacy X Collectivism	0.004	1.51
Self-Efficacy X Altruism	0.009	3.59***
Self-Efficacy X Collectivism X Altruism	0.019	3.47**

Note: *P <0.01, **P <0.05, ***P <0.10

The both interactions of collectivism and altruism with attitude are significant, identifying the moderating impact of collectivism and altruism on the relationship of attitude and ecopreneurship intentions. Similarly, the three-way interaction (Attitude X Collectivism X Altruism) is also significant with ΔR^2= 3%, identifying the combined role of collectivism and altruism on the relationship of attitude and ecopreneurship intentions. Hence, hypotheses H4a, H5a and H6a are supported. This is also evident from three-way interaction plot.

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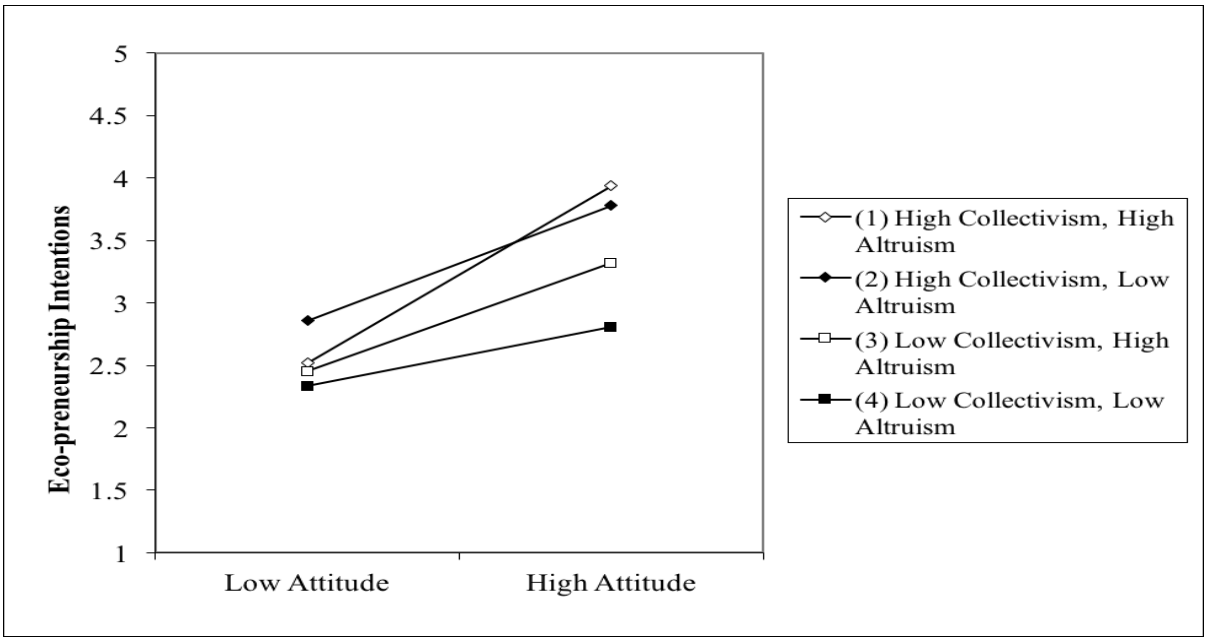

Figure 3. Three Way Interaction Plot for Attitude, Collectivism and Altruism

In case of subjective norms, the moderating role of collectivism is significant and altruism is insignificant. However, the three-way interaction (Subjective Norms X Collectivism X Altruism) is significant with ΔR^2= 2%. This identifies the importance of the existence of combined effect of collectivism and altruism on the relationship of subjective norms and ecopreneurship intentions. Hence, hypotheses H4b and H6b are supported. This is also evident from three-way interaction plot.

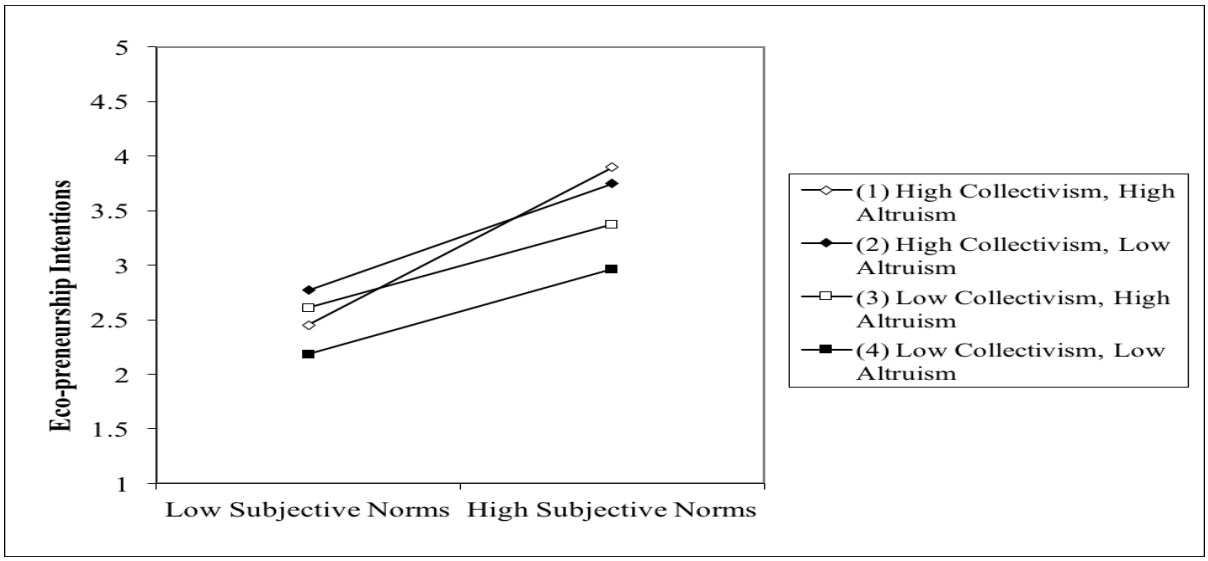

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Figure 4. Three Way Interaction Plot for Subjective Norms, Collectivism and Altruism

For self-efficacy, altruism interaction and three-way interaction (Self Efficacy X Collectivism X Altruism) are significant. Hence, hypotheses H5c and H6c are supported. See figure 5 for three-way interaction plot.

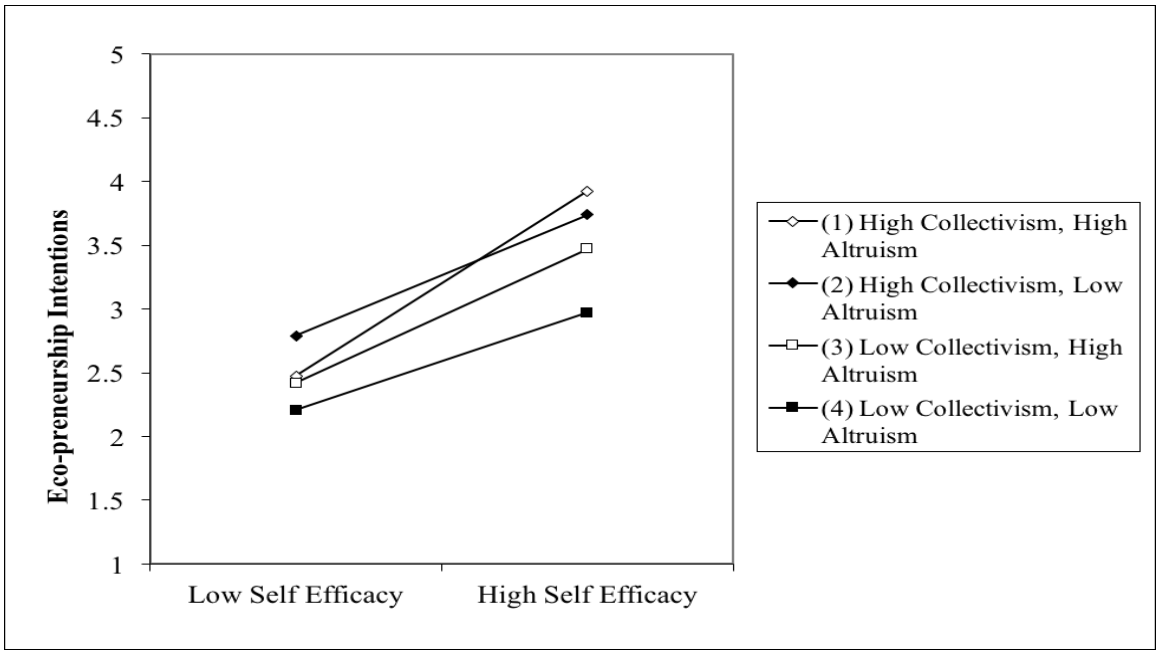

Figure 5. Three Way Interaction Plot for Self-efficacy, Collectivism and Altruism

4 Discussion

In this study, we have presented and tested an extended theory of planned behavior (Ajzen, 1991) model specifically for explaining the ecopreneurship intentions by incorporating the moderating role of altruism and collectivism. The most important finding of the current study is the insignificant relationship of attitudes with ecopreneurship intentions which become significant in presence of collectivism and altruism. This not only identifies the importance of both the moderators but also provides insight about the fact that the attitude toward ecopreneurship can become significant only if altruistic and collectivist behavior exists not otherwise. This finding substantiates Schwartz (1977) model of moral norm activation according to which people with high altruistic values would be able to show pro environmental behavior.

The second important finding revolves around subjective norms. Ecopreneurship intentions are significantly affected by subjective norms. It would be relevant for us at this stage to reflect on the context of the study. Societal culture does play a role in shaping behavior. The social and cultural environment of Pakistan is relationship oriented, with strong collectivist values (Hofstede, 1980). Since our sample was drawn from Pakistan the results might be explained with reference to the orientation of respondents. Collectivism is significant moderator while altruism remain insignificant moderators for subjective norms. However, the three-way interaction (Subjective Norms X Collectivism X Altruism) significantly produce 2% change. This identifies that presence of both moderators is required to enhance the relationship between subjective norms and ecopreneurship

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intentions. Attitudes and social norms were shown to have significant effects on the ecological entrepreneurship intentions in presence of moderators.

The third important finding is related to self-efficacy, having control over behavior. The relationship of self-efficacy and ecopreneurship intentions are also enhanced by altruism and its three-way interaction (Self Efficacy X Collectivism X Altruism). Self-efficacy is an important factor for encouraging the people to adopt ecopreneurship for the reason that there are chances of negative outcomes in the start of any business and the people with low self-efficacy may give up at earlier stages, thus hampering sustainable development of any business. The self-efficacy among students can be developed by providing relevant education and training, thus leading to positive outcomes (Wilson et al., 2007). While training the activity, practice and feedback prove to be important for developing performance standards, a sense of efficacy and expectations form performance (Bullough, Renko and Myatt, 2014). Further self-efficacy helps control negative thoughts by providing the confidence and fostering positive thoughts during achievement of the goals (Drnovsˇek, Wincent and Cardon, 2010).

Self-efficacy is an important component in minimizing the risk to the environment. Janmaimool (2017) viewed that when people have higher perceived severity, susceptibility as well as high perceived self-efficacy, they are likely to be involved in pro-environmental behaviors in order to minimize the risks. People learn/acquire skills for doing any activity (business) based on the self-efficacy (Bandura, 1997). Self-efficacy as a self-referent and cognitive mechanism can significantly influence the willingness of people to get involved in a certain activity and this further helps them to remove the barriers coming across the steps followed for achieving goals. People believing in the possession of skills and capability to handle environmental problems is important especially when the people feel pressures of increased demands towards them, when they are about to get involved with a new task area (adoption of ecoprenurship).

Last but not the least, Schwartz (1977) model of moral norm activation is also validated in new social, cultural, developing country context. The results support the idea that a person with high altruism would pay attention to the negative consequences of environmental problems and its impacts on humans and biosphere and would have pro environmental attitudes and positive ecopreneurship intentions. Similarly, when individuals think they are part of a larger group and have collectivistic tendencies their attitudes and intentions toward ecopreneurship become positive. This result is consistent with the findings of McCarty and Shrum (2001) and Laroche et al. (2001) who suggest that collectivist people tend to be friendlier toward the environment.

The study has few limitations related to the investigation regarding eco-entrepreneurial behavior. The students are considered for the study that may be a limiting factor in terms of their exposure to the ecoenterprenurial behavior and its impact on sustainability of the economies. The sample size considered for the study is another limiting factor, the bigger sample size with diversification in the sample selection may contribute to generating interesting results. Addition of the variables to the tested model on either side of the model that is independent variables, dependent variables or the variables having indirect effects that are mediators or moderators may add to the strength of the model. The different contextual contributions for testing model may add to the value of the findings derived in this study. The contextual contributions may be achieved by adding the responses from the teaching faculty imparting ecological entrepreneurship education, collection of the responses from the marketers marketing the ecological products, the producers who are producing eco-friendly products may influence the intentions of the entrepreneurs to get into this business etc. Further the methodology used for the study is quantitative with closed ended structured questionnaires, the change in methodology such as use of triangulation may add to the worth of the study.

Conclusion

There is need to understand the importance of sustainability of economies by the students especially undergoing business education and look for avenues that provide support to sustainability, in which ecoprenureship is one. The results of the study show that the intentions to adopt ecoprenurship are not only affected by attitudes, subjective norms and self-efficacy, as identified by theory of planned behavior (Ajzen and Fishbein, 1975) but are also affected by the presence of some specific values and norms in individuals like collectivism and altruism. Further the social capital in terms of people having positive attitudes towards adoption add to the positive outcomes. To conclude, this study makes an important contribution to the literature on drivers of ecopreneurship by extending the theory of planned behavior model (Ajzen and Fishbein, 1975) by incorporating moderating role of collectivism and altruism and testing it in a developing country context. The ecopreneurship is mainly driven by subjective norms and self-efficacy while attitude towards ecopreneurship become significant in presence of collectivism and altruism not otherwise. Similarly, the dual moderating role of collectivism and altruism has been identified by the significance of three-way interactions for attitude, subjective norms and self-efficacy with collectivism and altruism.

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PECULIARITIES OF HOUSING MARKET: DYNAMICS OF HOUSING AVAILABILITY IN UKRAINE

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Abstract. The article analyzes the dynamics of availability of housing for Ukrainian citizens in 1990-2017 years. The social and commercial availability of housing is investigated. The refined author's methodology for determining the commercial availability of housing was applied in the article. The actual values of social accessibility of housing in 1990-2017 years, and the commercial affordability of housing in 2011-2017, as well as trends in their dynamics are defined also. It is shown that the coefficient of social availability of housing has promptly fell from 1990 to 2010 years, and in 2011-2017 it has reached a critical low level. This proves that the government of Ukraine was actually discharged from the problem of social availability of housing and it has not developed modern effective tools for solving the housing problem of the poorest layer of citizens, who really need social housing. It is revealed that the mechanism of bank mortgage lending evolves in the direction opposite to the increase of affordability of housing. This indicates the need for radical changes in the state regulation of the mentioned mechanism. It is proposed to introduce new mortgage institutes in Ukraine, particularly, such as savings and credit, and to adapt the best examples of foreign experience for the sphere of state housing policy with the purpose of real increase of the level of availability of housing for Ukrainian citizens.

Keywords: availability of housing; social housing; housing problem; mortgage loan; state housing policy

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JEL Classifications: O18

Additional disciplines: law; political sciences.

1. Introduction

The aim of the article is to make a comprehensive assessment of the dynamics of housing availability for Ukrainian citizens in the period from 1990 to 2017 years, in order to identify the causes of negative tendencies and also development of practical recommendations for raising the level of either social or commercial availability of housing.

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The problem of housing availability for Ukrainian citizens has remained as an inheritance from the Soviet Union and during the years of independence, it has only deepened. Citizens of Ukraine are provided with housing in 2-3 times worse than citizens of developed countries (Kovtun, 2014; Filipishyna et al. 2018), and, besides, the absolute majority of houses were built in Ukraine during the Soviet Union time and nowadays they are often in a transient condition. As for other countries, let us mention that after the war Germany built housing for public funds in large volumes and solid prices and did not transfer housing for free, but gave its citizens a lease. Almost 50% of Germany's population still lives in rented apartments (Serdyuk & Serdyuk, 2012).

From year to year, the number of Ukrainian families and single citizens who receive housing, from those who are in the housing register list decreases, and that means the social availability of housing decreases. So, in 2014, about 3000 families and single citizens, who were in the housing register list, have received housing, and this is twice lower than in 2013.

As of the beginning of 2015 year, 657 thousand families and single people were in the household register in Ukraine. At the same time, starting from 2015, the State statistical observation on the form №4-housing fund (annual) "Apartment queue and provision of housing accommodation" was canceled (Housing Fund of Ukraine, 2015). Taking into account that the average size of households in Ukraine in 2015 was 2,59 people (Characteristics of households, 2015), we can receive the total number of citizens, who were officially registered as those, who are in need of housing, and the total number is almost 1.7 million. However, the mentioned figures can be applied only to official statistics. In reality, a much larger number of members of Ukrainian society have unsatisfied need for housing. This applies, particularly, to young people who are officially registered in small towns and villages, but in reality they work in large cities and they form a huge shadow rental market.

A large amount of scientific researches are devoted to the housing problem in Ukraine (Klymenko, 2012; Oliynyk, 2013). Experts are unanimous: the availability of housing in our country is extremely low in comparison with developed countries. It is also related to the system of State control. The economic security indicators should create a system that allows quickly influencing socio-economic policy in the country. This in turn requires embedding control measures in the strategic and tactical plans for the economic development of the country (Akhmetshin & Vasilev, 2016; Tvaronavičienė 2018).

Let us take an example from EU: in 2016, more than 4 out of every 10 persons (41.8 %) in the EU lived in flats, close to one quarter (23.9 %) in semi-detached houses and just over one third (33.6 %) in detached houses. The proportion of people living in flats was highest, among the EU Member States, in Spain, Latvia (both 66.1 %) and Estonia (62.0 %), while a similar proportion of people lived in flats in Switzerland (62.7 %). The highest proportions of people living in semi-detached houses were reported in the United Kingdom (60.1 %), the Netherlands (58.4 %) and Ireland (52.4 %); these were the only Member States where more than two fifths of the population lived in semi-detached houses. The share of people living in detached houses peaked in Croatia (71.0 %), Slovenia (65.5 %), Hungary (62.8 %) and Romania (61.9 %); the former Yugoslav Republic of Macedonia (72.9 %), Serbia (64.2 %) and Norway (59.9 %) also reported that a high proportion of their populations were living in detached houses (Eurostat. Statistics…, 2017).

Besides, it should be noted that the actual estimates of the availability of housing for various categories of Ukrainian citizens are rarely carried out. Most authors identify the availability of housing with its value (Shcherbinina, 2009). But housing is one of the most expensive goods and the purchase of housing with one-time full payment of its total value not only in Ukraine, but also in the world practice is more often an exception (Kuzmin et al. 2018), than a rule.
In most cases, citizens use mortgage lending and various state support programs when they decide to buy home.

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For example, in 2016, an 11.1 % share of the EU population lived in households that spent 40 % or more of their equivalised disposable income on housing. The proportion of the population whose housing costs exceeded 40 % of their equivalised disposable income was highest for tenants with market price rents (28.0 %) and lowest for persons in owner-occupied dwellings with a loan or mortgage (5.4 %) (Eurostat. Statistics…, 2017).

When you receive a mortgage for the purchase of housing, not only the ability of a citizen (households) to serve a mortgage loan is taken into account. Much attention is paid to such important element that determines the possibility of access to housing, as the availability of the necessary sum of money, sufficient to pay the initial instalment.

The down payment (advance) of the citizen to the purchase of housing is also significant (from 30% to 50% of the cost of housing) and acts as a limiting factor for the availability of housing.

2. Materials and Methods

There are different methodological approaches for defining the availability of housing.
The vast majority of researchers understand a possibility of acquisition of such housing by citizens as availability of housing. It is obvious that the availability of housing is directly proportional to the incomes of citizens and inversely proportional to the cost of housing.

According to such authors as: S.R. Khachatryan, E.Yu Fayerman, R.L. Fedorova and A.N. Kyrylova (2000), the basis of the formation of commercial and social demand for housing are different basic concepts of satisfaction of housing needs. Therefore, it is necessary to mark out separately social and commercial availability of housing.

3. Results and Discussion

"Social housing" is defined as housing, which is intended to meet the housing needs of people who do not have a home and who are unable, by their own efforts, to provide themselves with housing due to difficult living conditions and which is provided for permanent or temporary use on a paid or non-paid basis in cases and in the manner prescribed by law (Haliantych, 2008).

The generally accepted indicator of social accessibility of housing is the share of citizens who receive housing during the year in the total number of citizens, who need social housing.

Let's consider how social affordability of housing for Ukrainian citizens has changed during the 1990-2017 years.

We will determine the social accessibility of housing by the specific weight of families and single citizens who were in a residential queue and who have received housing during year in the total number of waiting lists (Table 1).

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Table 1. The dynamics of social accessibility of housing in Ukraine during 1990-2017 years

Year	Number of families and single people, who were in the residential queue at the end of the year, thousand	Number of families and single people who received during the year, thousand	Share of citizens who have received housing in the total number of those who are in the residential queue, %	Conditional duration of stay on registration before receiving housing, years
1990	2638	235	8,91	11,23
1995	2411	82	3,40	29,40
2000	1765	32	1,81	55,16
2005	1323	20	1,51	66,15
2010	1139	11	0,97	103,55
2011	1084	7	0,65	154,86
2012	1022	7	0,68	146,00
2013	808	6	0,74	134,67
2014	657	3	0,46	219,07
2015*	590	2	0,33	295,00
2016*	540	1,8	0,33	300,00
2017*	500	1,6	0,32	313,00

Source: calculated by the author according to (Housing Fund of Ukraine, 2015); * - according to the author (official statistical information is absent (Housing Fund of Ukraine, 2015)).

More clearly, the dynamics of social housing availability for Ukrainian citizens in 1990-2017 years is shown in Figure 1.

Analyzing the data presented in Table 1 and Figure1, we should note that the social affordability of housing in Ukraine was low during all years of independence. It is impossible to consider acceptable the average term of staying in residential queue of nearly 30 years (1995), and we not even mention 154 years (2011) and 313 years (2017). It should be emphasized that the coefficient of social accessibility of housing for citizens in Ukraine has rapidly fell from the period of 1990 to 2010, and in 2011-2017, it has reached a critical low level. This situation demonstrates that in recent year's government has essentially moved away from the problem of providing social housing availability and it has not developed any modern effective tools for solving the housing problem of citizens, who really are in need of social housing.

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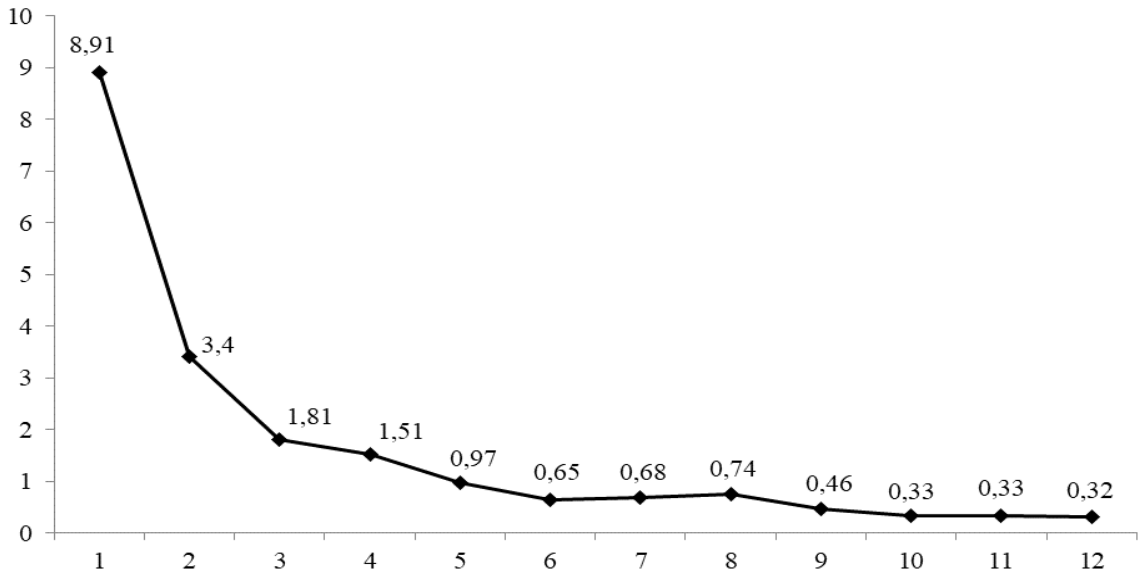

Figure 1. The coefficient of social accessibility of housing for Ukrainian citizens in 1990-2017 years.

Let's make analyze of the commercial availability of housing, since the vast majority of citizens improve living conditions by using market mechanisms.

Under the commercial availability of housing we understand, as a rule, the availability of mortgage loans, for which different researchers have developed a number of indicators (Rudy & Tropnikova, 2006).

An accessibility index is defined, as a rule, as a numerous characteristics of commercial availability of housing, which is defined as the ratio of solvent demand to the offer in the housing market.

In foreign and domestic economic theory various approaches to the withdrawal of its value are offered.

For example, the National Association of Realtors of the USA uses such indicator as the affordability index, which is calculated as follows (Rudy & Tropnikova, 2006) (1):

$$AI = \frac{MI \cdot 100\%}{I_m}, \quad (1)$$

where MI - the average household income, monetary units; I_m- income necessary for obtaining and servicing a long-term mortgage, sufficient for the purchase of the average housing cost, monetary units.

The aim of this indicator is to determine the availability of housing through the mortgage mechanism. The value of the indicator, when it is equal to 100%, indicates the availability of housing in case of purchasing it through the borrowing of a long-term mortgage loan, because the average household income corresponds to the income necessary for obtaining such a loan. However, this indicator covers only one of the blocks of the mortgage scheme - the claims of mortgage lenders to the borrower, but leaves out the attention of another indicator- the borrower's ability to raise funds on the down payment.

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After all, the formula (1) correctly defines the availability of housing only in the case of a zero down payment, whereas in the case of its large value, a citizen or family applying for a mortgage must first accumulate an amount equivalent to the down payment.

In the UN-HABITAT methodology, the housing availability index is determined by the number of years, which are necessary for the average family to raise money in order to purchase the average housing, in case that all household incomes will be directed to the mentioned aims (Rudy & Tropnikova, 2006) (2):

$$ID = \frac{C}{D}, \tag{2}$$

where ID - is the housing affordability index; D - average household income, monetary units/per year; C - average cost of housing, monetary units (the area of the apartment is not taken into account).

The affordability index, defined by (2), is the simplest indicator calculated on the basis of statistical information on housing prices and household income.

Some authors use the UN-HABITAT methodology to calculate housing availability, but despite it, it is assumed that the household consists of three people, and the area of the required flat is 54 m^2 (Federal Target Program "Housing").

Taking into account all the mentioned above, the affordability index is calculated as follows (3):

$$Id = \frac{Vm \cdot 54}{Cd \cdot 3 \cdot 12} \tag{3}$$

where Vm - the cost of 1 m^2 of housing, monetary units; Cd - average monthly income, monetary units; 54- the area of the conventional apartment, m^2; - 3 - number of household members, persons; 12- the number of months in the year.

We should agree with A.V. Serdyuk (2010) that the disadvantage of the formula (3) is the lack of consideration of household expenses. Such expenses should be taken into account, at least at the subsistence level. Then the refined formula (3) will have the following view (4):

$$Id = \frac{Vm \cdot 54}{(Cd - Vd) \cdot 3 \cdot 12}, \tag{4}$$

where Vd - the average monthly cost per family member.
In our opinion, the given methods need some improvement. We propose to evaluate the commercial affordability of housing by two parameters: the number of years required to accumulate an amount equivalent to the down payment, taking into account all costs, and the ratio of household incomes to the cost of servicing the loan (taking into account the requirements of banks).

The first indicator can be defined by the formula (5).

$$T = \frac{Vp}{(Cd - Vd) \cdot 3 \cdot 12}, \tag{5}$$

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where T - the period of accumulation of the down payment in years; Vp - an initial contribution to the purchase of housing under a mortgage scheme in monetary units. This indicator depends on such a parameter of the mortgage scheme as the share of the loan in the cost of housing (LTV).

The second indicator Id we can define by this formula (4).

Formulas (4) and (5) can be improved and simplified (Omelchuk, 2015). The first indicator we calculate by the formula (6):

$$T = \frac{Vp}{CD : 2 \cdot 12}, \tag{6}$$

Where CD - actual incomes on average per month per household (family) in Ukraine in hryvnias; 2- coefficient, which determines that the share of payments on the mortgage in the borrower's income is 50%. The second indicator is the index of housing availability under the mortgage scheme and it can be calculated by the following formula (7):

$$ID_m = \frac{CD : 2 \cdot 100\%}{I_m}, \tag{7}$$

where I_m - the income necessary to obtain and maintain a long-term mortgage loan.

Thus, the availability of housing under the mortgage scheme will be characterized by such point, whose coordinates will correspond to the index of affordability of the mortgage scheme (7) and the minimum period necessary to accumulate the amount of the initial contribution when purchasing housing under the mortgage scheme (6).

The calculation of the coordinates of commercial affordability of housing in 2011-2017 years under the mortgage scheme in Ukraine is given in Table 2.

Table 2. Indicators of commercial affordability of housing in Ukraine in 2011-2017

Indicators	Years						
	2011	2012	2013	2014	2015	2016	2017
Cost of 1 sq. m of housing in Obolonsky district of Kiev, $	1720	1558	1566	1497	1223	1172	860
Actual interest rates on mortgage loans in national currency, %	23	24	24	25	23	22	20
Term of the loan, years	15	15	10	10	10	10	10
The cost of the apartment, which is 54 square. m, $	92880	84132	84564	80838	66042	63288	46440
Share of mortgage in housing cost, %	70	70	60	60	60	60	60
Amount of mortgage, $	65016	58892	50738	48500	39625	37973	27864
Average annual rate, UAH / USD	7,97	7,99	7,99	15,77	24,00	27,19	27,27
Amount of mortgage loan, UAH.	518178	470547	405397	764845	951000	1023486	759851
Monthly payment, UAH	12811	12025	11486	22308	26184	27498	19022
The share of payments on a loan in the borrower's income, %	50	50	50	50	50	50	50
Required total income per month, UAH	25622	24050	22972	44616	52368	54996	38044
Actual income per month per household (family) in Ukraine, UAH.	3708	4032	4331	4471	6194	8531	10438
Initial deposit on a mortgage loan, UAH.	222076	201668	270269	509970	634008	688315	506568

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Share of household income (family), which may be directed to accumulation of down payment and maintenance of a mortgage loan, UAH / month	1854	2016	2166	2236	3097	4266	5219
The period of accumulation of the down payment, years	10	8,3	10,4	19	17	13,5	8
Housing affordability index according to the mortgage scheme, %	14,5	16,8	18,9	10	5,9	7,8	13,7

Source: it is calculated by the author according to the data (Characteristics of households, 2015).

We can construct a trajectory for the availability of housing for citizens of Ukraine under the mortgage scheme (Image 2) on the basis of the results presented in the Table. 2.

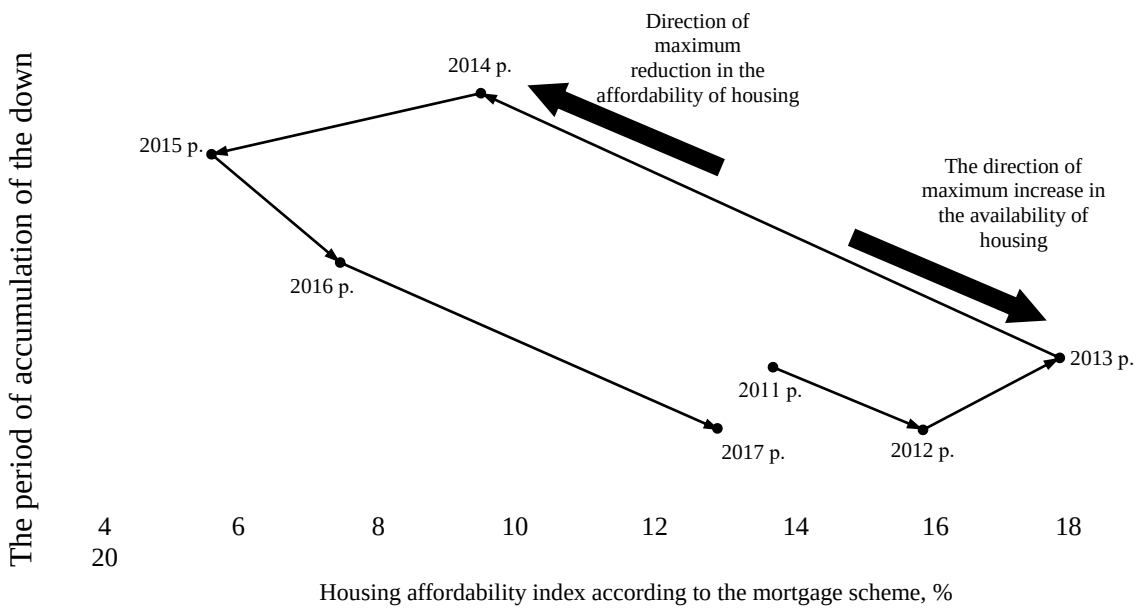

Figure 2. The trajectory of commercial affordability of housing in 2011-2017.

Source: constructed by the author in accordance with the Table 2.

As we see in Figure 2, the commercial affordability of housing in 2011-2017 has changed over a complicated trajectory.

In 2011-2012, it has gained a positive direction, but in 2012-2013, housing availability has significantly decreased, and in 2013-2014, the housing availability trajectory has been directed towards the maximum reduction in the availability of housing.

Since 2015, and especially in 2016-2017 years, the tendency has changed to a positive one. That means that the trajectory of commercial affordability of housing for Ukrainian citizens was aimed at increasing the availability of housing.

Such tendencies can be explained by the fact that after the sharp collapse of the hryvnia exchange rate against the US dollar in 2014, housing prices in hryvnia have increased in many times, while the purchasing power of citizens has dropped dramatically. Respectively, housing availability has become minimal.

After that, in 2015-2017 years, housing prices fell sharply in dollar terms against the backdrop of stabilization of the hryvnia exchange rate. At the same time, a significant increase of the minimum wage by the Government of Ukraine has led to an increase in household incomes and, as a result, housing affordability index began to grow.

It should be noted that despite some positive changes that took place in 2017, the level of commercial affordability of housing for Ukrainian citizens remains extremely low, because the accumulation of the down payment for a mortgage loan requires 8 years, and the index of commercial affordability of housing is only 13.7 %.

Conclusions

This research shows that in the period from 1990 to 2017 years there were negative changes in the field of housing availability for Ukrainian citizens.

The rate of social housing availability in Ukraine has rapidly decreased from 1990 to 2010, and in 2011-2017 years, it has reached a critical low level. This fact demonstrates that the government of Ukraine was actually discharged from the problem of social availability of housing and it has not developed modern effective tools for solving the housing problem of the poorest layer of citizens, who really need social housing.

The use of a refined author's methodology for determining the commercial affordability of housing has allowed revealing that the mechanism of bank mortgage lending is inaccessible for the most Ukrainian citizens and evolves in the direction opposite to increased affordability of housing. This indicates the necessity for radical changes in the state regulation of the mentioned mechanism (Omelchuk, 2015).

It is necessary to introduce new mortgage institutes in Ukraine, particularly, the savings and loan mechanisms, which we have proposed (Omelchuk, 2014), as well as we should implement the best examples of foreign experience in the sphere of state housing policy (Omelchuk, 2016) for the purpose of real increase of the level of affordability of housing for Ukrainian citizens.

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TOWARDS THE SILK ROAD ECONOMIC ZONE INITIATIVE: HISTORICAL PERSPECTIVE

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Abstract. In contemporary conditions, the Great Silk Road remains the subject of modern historical research naturally intertwined with research in the area of sustainable development. Its significance caused not only by providing sales, but also cultural, scientific and diplomatic relations. Way, which arose, as a trade infrastructure, soon became an important factor of technical, scientific and spiritual progress of the population of different countries. The Silk Road segment on the territory of modern Kazakhstan as a historical gate of the Great Silk Road also has its specific international significance. Today the idea is re-emerging of renewing the way in a new historical incarnation and revival of the Great Silk Road in order to preserve and enhance its tremendous influence on the political, economic and cultural systems of the countries through which it passes.

Keywords: Great Silk Road; sustainable development; historical heritage; communication; trade exchange

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JEL Classifications: B10, O1

Additional disciplines: history

1. Introduction

Well-developed communication infrastructure and means always has been precondition of economic cooperation of leading towards sustainable economic development of networking partners (Mingaleva et al. 2017; Monni et al. 2017; Prause, Atari 2017; Otter et al. 2017; Lavrinenko et al. 2016; Lavrinenko et al. 2017; Mikhaylov 2018). The legendary highway of the Middle Ages - The Great Silk Road is the subject of modern historical research, its 1,500-year history of the route is a world cultural and economic miracle. One of the branches of the famous trade route passed through the regions of Kazakhstan. The most important trading communications system, which is linked to the XV century East Asia to the Mediterranean, known as the Silk Road, the length was 7 th.км. At the

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beginning of II millennium BC the Chinese took control of the way from China to the west. The formation and development of the Great Silk Road begins from this moment. Despite the fact that the trade routes have changed, two main routes have been identified on the map of the Great Silk Road: the southern and northern routes. South covered the territory from China to the shores of the Black Sea, ran through the lands of the Pamirs and the Aral Sea. The main trade hubs of this route were Syria, Iran, Central Asia, the south of Kazakhstan through the Talas and Chui valleys to Issyk-Kul, and it came out to the lands of Turkestan (Baypakov, 1998, 2009).

2. Review of literature

The northern part began in the basin of the Yellow River, crossed Central Asia, and led merchants to Iran and Syria, to the provinces of India. One of the branches of the Great Silk Road (northern) passed through the Kazakh lands, to the south and east, covering central territories and rushing westward (Gumilev 1999). The trade route had directions on the territory of Kazakhstan - the road from west to east as the main thoroughfare, which, starting from the second millennium BC. E., allowed to transfer goods from Shash to Sairam and further to the Ferghana Valley. Southeast direction was traders, striving to get to the Ili valley, the road ran through the south of Kazakhstan, its eastern regions and went to the lake Balkhash (Baipakov 1998, 1989, 2009; Baipakov et al. 2001). Thus, in the II millennium BC the intensive growth of large shopping centers on the territory of Kazakhstan was due to the formation and development of the Great Silk Road. A lot of trade routes, convenient access to large waterways made this region particularly lively.

2. Materials and methods

The significance of the Great Silk Road was not only in providing trade and economic ties, thanks to its cultural, scientific and diplomatic ties were established. The path that originally arose as a commercial, very soon became the most important factor in the technical, scientific and spiritual progress of mankind (Rtveladze 1999). In the process of communication, there was a cultural rapprochement and the establishment of connections between representatives of different tribes. Sold and bought products of silver and gold, jewelry made of precious stones, clothing made of fur. They were not only skillfully made, but also processed in a proper way, they were decorated with an authentic pattern or embroidery, original compositions were created that demonstrated the taste and aesthetic values of a particular people. Surprisingly beautiful silver jugs made by Byzantine craftsmen, porcelain products made in China, were discovered during the exploration of Talgar and Ispidzhab hillforts (Mamadazimov 2014). Remains of temples and religious buildings of all kinds were found in these shopping centers. This indicates that sages, pilgrims, travelers, creatively gifted people, who produced not only objects of worship, but also articles of secular character, flocked to the centers of trade. Thanks to this, there was a cultural exchange. Travelers who went along the silk route left records, diaries, composed songs and poems, wrote music. This greatest highway has contributed to the formation and development of diplomacy. The peoples of the East and the West were forced to contact, establish trade and political relations. Not the least, it has become possible due to the Silk Road segment that passes through the territory of present-day Kazakhstan. It should be noted that the area has historically become the gateway to the Great Silk Road (Gostin 2018). The settlements, located along the caravan route, developed intensively. The formation and rapid development of handicrafts by the Turkic peoples took place. Various technologies were developed for the production of goods, trade turnover increased, trade relations developed. Nomads and semi-nomadic Turkic tribes are gradually moving to a settled way of life. Trade routes that passed through the territory of Kazakhstan contributed to the establishment and development of such trade hubs as Otrar, Sairam, Taraz, etc. Urban culture is being formed, many-sided ties are being established with the world, socio-economic, political and cultural bases for the development of peoples inhabiting the territory are being formed Kazakhstan. Until the XIV century, the Great Silk Road retained its importance in the development of socio-cultural, political and economic ties. But with the development of sea trade routes, it has lost its position (Kembayev 2018; Gostin 2018).

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Today, world leaders are returning to the idea of renewing this highway in a new historical incarnation. Through the efforts of many states of the world it was decided to revive the Great Silk Road to a new life. An increasing number of people show a keen interest in the history of this ancient trans-national trade route, to unique monuments of ancient architecture, untouched spiritual values, bequeathed by famed ancestors, to national crafts, cuisine, traditions and festivals of the peoples of the region. The Silk Road had a tremendous impact on the formation of the political, economic, cultural structure of the countries through which it was held.. Along all its routes, large and small trading cities and settlements arose, especially carved by the caravan routes was Central Asia (Chaisse 2018). Dozens of trade routes crossed this region. Here, the most important ethnic processes took place, active interaction of cultures, large-scale trading operations were carried out, diplomatic treaties and military alliances were concluded. The peoples of this region have an outstanding role in the distribution of letter letters and world religions, many cultural and technical achievements to the countries of Inner Asia and the Far East.

As is known, the name "Silk Road" is associated with the precious in those days for Western goods - silk, who introduced the two worlds -West and East of the first in the history of mankind transcontinental road. But it would be unfair to reduce the importance of the Great Silk Road in the history of world civilization exclusively to the trade in silk. Its role was much wider and more diverse, because it was caravans not only with various eastern and western goods, but also penetrated spiritual values, religious ideas. Despite the last statement, it was during the heyday of the Silk Road in the 1 -V111 centuries, and then the 1X-X111 centuries. The people of the East, as never before, began to realize the importance of cultural ties, close communication, began to develop common cultural values, and common traditions appeared in the culture of the peoples of the Eurasian space. Despite the last statement, it was in the heyday of the Silk Road that the peoples of the East, as never before, began to realize the importance of cultural ties, close communication, began to develop common cultural values, and common traditions appeared in the culture of the peoples of the Eurasian space. Silk Road carried mainly silk, which along with gold has become an international currency, they are gifts to kings and ambassadors paid a salary of mercenary troops and government debt. In turn, from Rome, Byzantium, India, Iran, the Arab Caliphate, and later from Europe and Russia, goods were produced from these countries (Azovsky 1999). On the Silk Road, the famous horses of Ferghana, Arabian and Nisian horses, camels and elephants were brought for sale and much more. Religious ideas also spread along the Silk Road. Various missionaries carried their faith in the overseas countries. Buddhism came from India through Central Asia and Eastern Turkestan, Christianity spread from Syria, Iran, and Arabia, and then Islam spread. The greatness of the Silk Road is not so much in that colossal commodity exchange between different states, as in the interpenetration and mutual enrichment of dissimilar civilizations and cultures. The Silk Road is a system of ancient trade caravan roads leading from China to the countries of the Middle East and Europe, one of the most significant achievements in the history of world civilization. The Silk Road had a tremendous impact on the formation of the political, economic, cultural structure of the countries through which it was held (Baipakov 1989, Tang et al. 2017).

3. Results

At the beginning of the third millennium, mankind faced the need to seek new ways of cooperation or restore forgotten, sand-stained centuries. Comprehensive, integrated research and restoration of the Great Silk Road, as "path of dialogue", it corresponds to a need. For many centuries the Great Silk Road served as a rapprochement between different peoples, the exchange of ideas and knowledge, the mutual enrichment of languages and cultures. Of course, in those distant times there were political conflicts, wars broke out, but the Silk Road was invariably revived. The ineradicable desire for enrichment, for reasonable profit and higher prosperity, has always prevailed over political and religious confrontation. Therefore it is necessary to use such a powerful example when creating a model for future relations and cooperation between the peoples.

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Globalization, which has become one of the leading trends of world development at the turn of the 20th and 21st centuries, has an increasingly deeper impact on the socio-economic, military-political and other spheres of human life, including the character of international life (Mikheev 2015; Královičová, Žatko 2016). Integration of the former Soviet republics among themselves and with the world economy, the search for their own place on the international scene, defending national interests for inclusion in regional and global policy takes place in the context of globalization, which has both positive and negative sides. The drive for globalization processes, rapidly integrating capital, technology, services and information, is world trade. By linking all new countries, regions and entire continents into unified networks, history influences the nature, intensity, duration of bilateral and multilateral relations, forcing the interaction of states that were not partners before. The Silk Road revitalization project corresponds to global development trends, creating new opportunities for the development of trade relations between Asia and Europe, uniting the efforts of many countries at different levels of economic development and differing in their political order.

In May 1993 in Brussels, the European Commission organized a meeting of representatives of the states of Central Asia and the Caucasus, as well as the European Union. The purpose of the meeting was to consider the possibility of integrating into the world economy new independent states - the countries of Central Asia and the Caucasus. In 1998, the UNESCO international organization announced the launch of a ten-year project entitled "Integral study of the Silk Road - the way of dialogue". The project provides for a broad and comprehensive study of the history of civilizations, the establishment of close cultural contacts between the East and the West, the improvement of relations between the numerous peoples inhabiting the Eurasian continent. The project of the revival of the ancient transnational highway - Great Silk Road, put forward by the world community in the early 90's. In the 20th century, it became a reflection of the desire of many states and authoritative organizations to expand the zones of stability and the space of trust, to stimulate economic and political cooperation among the young independent states among themselves and with the developed states of Europe and the Asia-Pacific region, and an attempt to realize the perspective idea of Euro-Asian transit (Jinping 2015a,b; Surie 2018). Historically, on the Great Silk Road along the Northern transport dry land route from Asia to Europe, the leading place is occupied by Kazakhstan and Russia, which are in an extremely favorable geopolitical position, being on a large transport and trade transit of goods from Asia to Europe. The intensification of cooperation within the framework of the SCO and the Eurasian Economic Union attaches particular importance to the revival of the land intercontinental transport project. So, within the framework of the Eurasian Economic Union, the concept of the transport union has already been adopted, which creates the institutional preconditions for cooperation on one of the most difficult sections of the new Silk Road, with sufficient reserves in the transport infrastructure in this region. One of the tasks of the SCO is also the intensification of trade and economic cooperation between the member countries. TRACECA - the international transport corridor Europe-Caucasus-Asia, allocated in the quality of an independent Euro-Asian transport corridor, it does not include the communications of the PRC and other East Asian states. The idea of the project (TRACECA, Transport Corridor Europe-Caucasus-Asia) was first announced at a conference in Brussels in May 1993 with the participation of 8 republics of the former USSR - Azerbaijan, Georgia, Armenia, Kazakhstan, Turkmenistan, Uzbekistan, Kyrgyzstan, and Tajikistan. The project was supported by the European Union, which finances through its Tacis program its main activities, as well as the United States of America, which officially recognized it as an alternative to Russian transport communications (in April 1999 in Washington in the framework of the 50th anniversary of NATO special meeting on the TRACECA project).

The corridor of "TRACECA" is interpreted as a modern modification of one of the directions of the Great Silk Road, the idea of its revival acquired special popularity in the Central Asian states after the collapse of the USSR. Official TRACECA route: ports of the Western Black Sea coast (Istanbul, Constanta, Varna, Odessa); ferrying across the Black Sea - Poti (Georgia), Tbilisi (Yerevan), Baku; crossing over the Caspian Sea - Turkmenbashi -

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Bayram, Samarkand, Tashkent, Shymkent, Bishkek, Almaty, Dostyk. The TRACECA connection with the European transport system is via Istanbul port, Constanta port, Varna port, Odessa port, Danube river. With the Asian transport networks, the TRACECA corridor is connected through the Kazakh-Chinese border station Dostyk. The main objectives of TRACECA are: the development of trade, transport and communication links between Europe, the Black Sea region, the Caucasus, the Caspian Sea region and Asia; facilitating access to world markets for Member States by road and rail; ensuring road safety, cargo security and environmental protection; Harmonization of transport policy and related legal structures; creation of a competitive environment for carriers from member states.

The European Union, as well as leading economic powers and trading states such as the United States, Japan, China and Russia, showed interest in TRACECA and created projects or organized interactions with it. There are different points of view regarding the prospects for the implementation of the TRACECA transport corridor between Europe and East Asia through China, Kazakhstan, Central Asia, the Caspian, the Caucasus and the Black Sea. Transport cooperation here is one of the main directions [Chaisse, Julien 2018]. The planned increase in ties between the member states will make the Great Silk Road of the 21st Century even more demanded, not only as a purely transit route to the countries of Europe, but also as a more convenient option for delivering goods to the SCO countries. Therefore, a revival of the Great Silk Road is a politically and economically necessary condition for the development of international trade, and for Kazakhstan and Russia this is an added plus, since the transit of goods is considered on the Northern transport route from Asia to Europe (Mihnev 2016, Remyga 2015). The project provides an opportunity for States to implement with maximum efficiency advantages of its geographical position, to build a modern infrastructure here to upgrade given the world economy needs an existing industrial potential, create new jobs and improve living standards.

Kazakhstan and China since ancient times are friendly neighbors, which are reliably united by the Great Silk Road. Since the establishment of diplomatic relations, cooperation between the two countries has been successfully developing in all spheres, especially in the cultural sphere. Days of culture of two countries, weeks of cinema, tours of creative teams and individual performers, scientific and technical and art exhibitions, porcelain and silk exhibitions are regularly held in Kazakhstan and China, which creates a fertile ground for interpenetration and mutual enrichment of cultures. A significant project in the field of conservation and protection of monuments of cultural and historical heritage was the cross-border serial nomination of the Silk Road monuments for inclusion in the UNESCO World Heritage List. Representatives of 10 states, international experts from UNESCO and ICOMOS took part in the sub-regional seminar held in Xi'an. It was a global task - to determine the specific routes of the Great Silk Road for inclusion in the first serial nomination. Historical sources say that Xi'an, which was the ancient capital of many Chinese dynasties, was the starting point of the Great Silk Road, the unique objects of the world cultural and historical heritage, including the most famous - the Terracotta army, have been preserved here. Only after visiting China, you clearly see and begin to realize that the Chinese civilization, which originated about five thousand years ago, is one of the oldest in the world. Modern China is a dynamically developing and at the same time mysterious country with a lot of interesting historical and cultural attractions. History and culture of Kazakhstan for many centuries developed in close contact and interaction with eastern and western civilizations. Thanks to the state program "Cultural Heritage", it became possible to replenish and expand Kazakhstan's source-research and information-historical base with copies of archival materials from foreign collections that have a huge historical and cultural significance (Sazonov 2015). Thus, scientists of the Institute of Oriental Studies named after RB Suleimenov, working in the First Historical Archive of China, discovered unique materials on the history of Kazakhstan, as well as information on the history of the relationship of the Ch'ing Empire with neighboring states in 1741-1828. This is more than 500 archival documents in Chinese, over 60 in Chagatai, more than 40 in Oirat, and more than 3,000 in Manchu. All these priceless documents have become unique sources for studying the history of Kazakhstan. Important documents on diplomatic relations were also found in the archives: Kazakh-Chinese, Kazakh-Russian, Kazakh-Kyrgyz, Kazakh-Kokand, Kazakh-Oirat,

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evidencing a multi-vector cooperation policy. On the Silk Road, along which caravans with silk, tea and gunpowder went to the west, and in the opposite direction - with horses, carpets, jade, corals and other goods from Central Asia, culture flourished. The art of the "Great Highway" was multi-genre: music, dances, various performances, of course, painting. We can imagine how Buddhism from India gradually penetrated into the countries along the Silk Road, as evidenced by the ruins of Buddhist temples discovered by archaeologists in Central Asia, including in Kazakhstan. A painting by Giuseppe Castiglioni "Kazakhs are presented gifts with horses" (1757) was found thanks to the efforts of scientists of the Institute of Oriental Studies at the famous National Museum of Oriental Art in Guimet, Paris, where relics of the peoples of the East. To date, this is the only picture that depicts the diplomatic ceremony of giving gifts in the form of three horses. The canvas depicts the fact that the Kazakh emperor Qianlong was given gifts to the Chinese emperor as a sign of union and friendship. (Sherman 2000). Studies conducted by scientists of the Institute of Oriental Studies confirmed that the events presented in this picture belong to the era of the reign of Ablai Khan in Kazakhstan and Emperor Qianlong in China. This proves that there were diplomatic and trade relations between the Kazakh and Qing rulers. It was during this period that fairs were opened on the principle of "silk in exchange for horses". A rich history of economic and cultural relations between Kazakhstan and the Celestial Empire has found its continuation in modern times. In Astana at the International Specialized Exhibition EXPO-2017, the Chinese side approved Kazakhstan as the main country of tourist trips for PRC citizens in 2017. This serves as a good example of good neighborly relations and support by the Chinese government of Kazakhstani international projects (Kaczmarski 2017, Xu et al. 2017; Tang et al. 2017).

The Silk Road is actively reviving today and regaining its place on the world map, now as the great highway of the new century and the new millennium. Among the joint projects on the revival of the ancient route can be called the Transcontinental Transport Corridor "Western Europe - Western China", which is of great importance for the development of the Kazakh economy. In 2014, the capital of Qatar made a historic decision on the joint application of Kazakhstan, China and Kyrgyzstan. The Great Silk Road was inscribed on the UNESCO World Heritage List. The popular route of the Chang'an-Tien-Shan corridor begins with the famous cities of Xian / Chang'an / and Luoyang, which were the ancient capitals of China, and ends in Central Asia - in Kazakhstan's Zhetysu region. The total length of the famous corridor exceeds five thousand kilometers. For many centuries, this segment of the Silk Road has successfully linked peoples and states. In the long term, it is planned to include other routes of the great ancient road to the UNESCO list. We can confidently say that the revival of the Silk Road, the great friendship and success is sure to continue highway and achieve new successes, strengthened the friendship of Kazakhstani and Chinese people (Alonso 2017, Habal 2017).

4. The discussion of the results

The Silk Road Economic Zone Initiative, part of the historic "One Belt - One Way" initiative, in recent years has become an integral part of China's foreign policy. The concept of the new Silk Road, proposed in 2013, launched in 2015, involves investing in roads and railways and ports, which should recreate the old Silk Road, substantially enriching neighboring regions. The proposed trade corridors should connect the territories of Xinjiang, Pakistan, Afghanistan and some other states with Europe, although an exact plan for a completely reconstructed path has not yet been published. The project is officially called the "Silk Road economic belt and maritime Silk Road of the XXI century" (or for the sake of brevity "One belt and one way"). One of the main ideas of this initiative is to connect the five post-Soviet countries: Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan and Tajikistan. Any country participating in a large-scale initiative to transform the infrastructure of the region will receive unprecedented investment from China and, most likely, real advantages. It is believed that the history of the Silk Road was peaceful and that it did not know wars, conquests and imperialism. China also speaks of this initiative as "happy", "peaceful" and also quite consistent with the principle of win-win (double winnings) (Auezov 1999). It is distinguished by Beijing's unprecedented foreign policy activity. It is quite logical in this connection to raise

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two questions: first, how the Economic belt of the Silk Road meets the interests of the PRC, and secondly, how in practice the initiative is implemented in the space of the Eurasian Economic Union (Ostrovskii 2017). The main practical interests of the PRC are as follows. Firstly, this is a continuation and expansion of the one started in the late 1990s. The policy of "Greater Western Development" - the accelerated development of the lagging economically conflict-prone western regions of the PRC through the successful expansion of their trade, transport and logistics, financial ties with the neighboring states of Eurasia. Secondly, it is the continuation and expansion of the "Exit Outward" economic policy actively implemented by the previous Chinese leadership, which provided for the withdrawal of "excess" capital from the state (Tang et al. 2017; Xu et al. 2017). As the economic model of the PRC is revised (instead of the former export orientation - expansion of domestic consumption and services), there is a trend towards a gradual withdrawal of surplus manufactures, including environmentally unreliable ones, abroad. Thirdly, the initial strong emphasis on the economic belt of the Silk Road was made on joint infrastructure projects and on the construction of infrastructure facilities outside the PRC. This is explained, among other things, by the fact that the construction sector has developed in scale in the previous decades and provided a huge number of jobs. In a situation where a number of key projects (for example, in the sphere of high-speed road traffic, energy infrastructure) have been successfully implemented, and the pace of real estate construction in the crisis situation of this sector has decreased, internal challenges associated with unemployment are increasing. In addition, according to statistics, China's labor market annually increases by 20 million people. In such circumstances, the importance of going beyond the PRC for construction companies is growing. The projects proposed in the framework of the economic belt of the Silk Road for related loans meet these requirements. Thus, the practical interests of the PRC in The economic belt of the Silk Road are due, first of all, to the tasks of internal development and the removal of internal tension (Petrovsky (Ed.) 2016; Spechler 2018).

At the international and global levels, Beijing's need to respond to the processes of creating new geo-economic and geopolitical constructs, which can be considered, including deterrence of the PRC (for example, the projects of the Trans-Pacific Cooperation, the Transatlantic Partnership, the Eurasian Economic Union), is added to them. In Belarus, the economic belt of the Silk Road initiative was actively supported. The main in the process of joint promotion of the economic belt of the Silk Road was the implementation of the joint industrial park "Great Stone" project in the Belarusian territory. As it is known, the construction of the park was envisaged from May 2012. Initially, the shares of the parties were determined: 60% for the PRC and 40% for the Republic of Belarus, the prospects for the development of electronic technologies, biomedicine, robotics, cooperation in the field of logistics and etc. Then there was a slowdown around the project. As the Chinese side of the economic belt of the Silk Road moved forward, the parties came to a variant of a more specific interface between the economic belt of the Silk Road and the construction of a techno-park in the Republic of Belarus. Given the greater share of the Chinese side in this project, it can be assumed that the adjustment of practical conjugation goals is also influenced by the interests of the Chinese side. The official rhetoric of the PRC at the bilateral level is sustained in the neoliberal tradition. In contrast, the expert discourse in the PRC regarding the Chinese-Belarusian interaction can be correlated with the tradition of the neo-realistic: first of all, it takes into account the interest of Beijing in promoting The economic belt of the Silk Road, assesses the economic situation in Belarus, trends in Belarusian-Russian relations and to a lesser degree in the relations of Belarus with the states of the European Union. The economic belt of the Silk Road is characterized by Chinese specialists as a new historical opportunity for Kazakhstan, Belarus and other countries.

Conclusions

The Great Silk Road influenced the development of world culture. The Kazakh steppe was a territory through which trade routes passed. During the trade, the economic and cultural relations of the nomadic and sedentary

population interacted, and the spiritual cultures of the various tribes merged. The importance of the Great Silk Road was not only in providing trade and economic ties. Thanks to it, cultural, scientific and diplomatic ties were established. The path that originally arose as a commercial, very soon became an important factor in the technical, scientific and historical progress of mankind. Thus, the history of the Great Silk Road is the history of a broad cultural interaction and mutual exchange between the peoples of the East and the West (Haiyan 2018). It proves that only close cooperation and mutual enrichment of cultures are the foundation of peace and progress for all of humanity. The Silk Road had a tremendous impact on the formation of the political, economic, cultural structure of the countries through which it passed.

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EFFICIENCY OF USING AGRICULTURAL LAND IN KAZAKHSTAN

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Abstract. The paper evaluates the use efficiency of agricultural land in the Republic of Kazakhstan using physical and relative measures, as well as a consolidated criterion defined as the volume of gross output of crops per 100 ha of agricultural land. The assessment of agricultural land use was conducted in the period between 2012 and 2016, after which the acquired results were benchmarked against the results of 1990. That year was set as a reference point since it gives an indication of the Republic's achievements in agriculture while it was still part of the USSR. The undertaken analysis has shown that between 2012 and 2016, most agricultural land use metrics tended to have a positive dynamic. Despite that, the country has never regained the agricultural performance level it had back in 1990. The agricultural land use score according to the consolidated criterion has also demonstrated an insufficient land use performance compared to Russia, Belarus and Ukraine. The approved ABI Growth Government Program for 2017-2021 outlines efforts aimed at the efficient utilization of the country's land resources, helping boost the output of domestic products.

Keywords: land, agricultural land, efficiency metrics for land resources use, cropland, crop yield, gross yield of plant and livestock products, efficiency, performance.

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Additional disciplines: agriculture

1. Introduction

All the land within the borders of a given country contributes towards the common state reserve. For example, the total land reserve of Kazakhstan is 272,490.2 million hectares (ha), ranking ninth in the world by the size of its territory. If divided by the size of population, it makes 17 ha per capita, of which 1.5 ha is arable land. Compare this with the resources of other countries, such as Russia with 11.6 and 0.89 ha respectively, USA with 3.8 and 0.75 ha, China 0.8 and 0.08 ha.

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The country's land reserve is extremely heterogeneous by its composition and so is subject to classification specified in the Land Code of Kazakhstan.

In accordance with Article 1 of the Land Code of Kazakhstan, the entire land reserve can be broken down to the following categories:

1) Agricultural land;
2) Urban land (cities, towns and villages);
3) Land for industrial, transportation, communication, space industry, defense, national security and other non-agricultural purposes;
4) Areas of special protection; lands of health-related, recreational, historical and cultural importance;
5) Forest reserves;
6) Water reserve lands;
7) Unzoned land (Mindrin et al., 2008).

In Kazakhstan, 95.8% of land is utilized and 4.2% of land is utilized by foreign countries.Of the entire land reserve, the largest percentage of land (39.7%) is classified as unzoned land, with agricultural land taking up 34.4%.

The percentage of urban land, land for industrial, transportation, communication, space industry, defense, national security and other non-agricultural purposes, areas of special protection; lands of health-related, recreational, historical and cultural importance is 19.8%.

The rest of the area consists of forest reserves (8.5%) with only 1.5% left for water reserves.

In line with the subject of this study, let us define land for agricultural needs. Land for agricultural needs is any land allocated for the needs of the agricultural industry. The category of land for agricultural needs includes farmland and any land occupied with nonfarm roads, communications, landlocked bodies of water, melioration networks, buildings and structures supporting agricultural activities and any other land (solonetz areas, sands, takirs and other miscellaneous types of land dispersed in between farmland) (Mindrin et al. 2008).

On the other hand, agricultural land is land that is systemically used to make agricultural products. Agricultural land includes farmland, set-aside land, and land under perennial plantings, hayfields and pastures.

Farmland is a plot of land which is systemically cultivated and used for growing agricultural crops, including perennial grasses, or is a fallow land.

Over 70% of dryland farms are concentrated in three regions: Akmola Region, Kostanay Region and North Kazakhstan; 60.7% of irrigated land is located in Almaty Region and South Kazakhstan. A set-aside land is a plot which used to be part of a farmland and then for over a year, starting from autumn, has not been cultivated or fallowed. The total area of set-aside land in Kazakhstan is 4,979,700 ha or 2.3% of all agricultural land.

Perennial plantings are plots of land used by farmers to plant perennial trees and shrubs that yield fruit, berries, and plants for technical and medicinal products and for landscape design. Areas with perennial plants in the Republic currently take up 152,300 ha, including 97,600 ha occupied by orchards and 14,600 ha by vineyards.

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Natural hayfields and pastures are plots of land which are systemically used for producing hay and for animal grazing. The area of hayfields in 2016 was 4.9 mn ha, of which 62,400 ha were meliorated and 731,800 ha were irrigated using the inundation method. Pastures take up 180,000 ha or 83.8% of agricultural land. Pastures can in turn be with or without water supply. Within their boundaries, pastures with water supply have various irrigation canals, wells, lakes, rivers, ponds and other water reservoirs that supply water to the grazing cattle (Mindrin et al. 2008).

Agricultural land can be irrigated and non-irrigated.

The irrigated agricultural land is land which can be used for agricultural needs, including those that require water supply, and which has a permanent or temporary irrigation network connected to the irrigation source, with its water reserves sufficient for sprinkler-watering the land and meeting at least 75% of water demand within the best possible time and in compliance with the specification requirements or other applicable irrigation norms, with a certain known system efficiency.

According to the latest approved ABI Growth Government Program for 2017–2021, the area of irrigated land in the Republic is expected to expand to 640,000 ha (Kozenko & Zvereva 2008).

The lands irrigated by inundation are those land plots which are equipped with water-retaining mounds or dams and other hydrotechnical appliances helping retain and redistribute meltwater and spring water, alongside with water transmitted from irrigation and water supply canals, all over those plots to feed water into the soil (Mindrin et al. 2008).

The dynamics of agricultural land area is downward. Specifically, in the period from 2012to 2016, the area of agricultural land shrank by 7,423,000 ha, that is 3.3%. The downsizing of agricultural land was due to the allocation of plots of land for various construction projects, industrial sites, and natural reserves. The inefficient land utilization also took its toll on some parts of hayfields and pastures which were eventually overgrown with shrubs.

Over the considered period, the area of farmlands has shrunk by 219,200 ha or 0.9%, hayfields by 263,100 ha or 5.1%, pastures by 7,626,800 ha or 4.1%. At the same time, we can see the increase in the area of set-aside land, from 4,316,700 ha to 4,979,700 ha, up by 15.4%. The land allocated for perennial plantings has grown in area from 127,100 to 152,300 ha or by 19.8%.

Of the entire land resources, the most valuable are agricultural land, farmland as part of agricultural land and cultivated land under crops as part of farmland.

Kazakhstan has a very high share of agricultural land in the total land area. Specifically, the percentage of agricultural land is over 80.0% of the entire land resource, with the decrease in this number over the studied period being 0.3% or 655,400 ha. However, the percentage of farmland in the total area of agricultural land is only 11.5%, down by 0.2% in 2016. Overall, the area of farmland has reduced by 221,300 ha over the studied period. That said, the share of cropped land in the total farmland area increased from 84.7% to 86.6%, i.e. the area of cropped land has grown by 282,900 ha. Judging by these figures, the country's land reserve has been used reasonably within the given time frame.

All land used for agricultural needs can be granted:

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1) As a private property to citizens of the Republic of Kazakhstan for farming, gardening and building suburban houses;

2) As a private property or for rent to individuals and legal entities of the Republic of Kazakhstan for farming or husbandry, productions of agricultural produce, forestry, research and development, experimental and learning projects, growing fruit and vegetables on allotments, gardening and animal breeding;

3) To foreign citizens, stateless persons, foreign legal entities and legal entities whose authorized capital is comprised by more than 50% of assets owned by foreign citizens, stateless persons or foreign legal entities, for tenancy with a rental period of up to ten years (Mindrin et al. 2008).

In the wake of market economy and emerging agricultural reforms in the Republic back in 1991, all countryside residents were granted title deeds for provisionary land plots. Overall, 2.3 mn such title deeds were granted. The grantees disposed of these land plots in the following manner: of the 652,000 land owners, 29% established farms, 28% leased their land, 22% invested their land in the authorized capital of companies, and 3.0% sold their plots and another 18% of unclaimed land plots were returned back to public ownership.

Of the total area of land used for agricultural needs, 37 mn ha (40.8%) are owned by over 3,300 different associations and joint-stock companies, 34.4% of land in this category are used by over 130,000 of farms, 16% are owned by 1,669 cooperatives and the share of land owned by other forms of agricultural organizations (institutions, public authorities) is 8.7%.

Overall throughout the country, more than 400,000 ha of land are already a private property, of which 55.8% or 224,000 ha are occupied by private farms, 22% or 87,600 ha are used for suburban and recreational housing and gardening.

Ten per cent or 40,500 ha are occupied with private residential houses, 9.5% or 38,000 ha of land belong to industrial, transportation and other companies and around 3.0% are owned by various service companies and organizations.

The diversity of soil in Kazakhstan is due to the latitude where the land zones are located, the climate that can vary from west to east and certain geological characteristics of different parts of land. The Republic's natural Chernozem soil is concentrated in fairly narrow strips of land in the northern and north-western parts of the country. Here, the temperature and precipitation allow gathering consistent yields of crops. The eastern and central parts are considered high-risk zones in terms of land cultivation due to frequent dry years. In the southern part of the Republic, land cultivation is only possible in irrigated areas since it is mostly covered with deserts and semideserts.

It bears mentioning that Kazakhstan's land resources, like those of every country in the world, are shrinking, as productive lands are increasingly allotted for the construction of residential houses and industrial mining, get overrun by cities and towns, get inundated in the process of building water storage reservoirs, etc.

Another curse for farmers is soil degradation. Throughout almost all regions of Kazakhstan, soil degradation takes place largely due to the following reasons:

- Inefficient use of land resources;

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- Excessive development of the mining industry;
- A wide network of military ranges that used to function back in the time of the USSR.

Because of the Republic's vast deserts (81.6 mn ha) and unstructured animal grazing, wind erosion takes its toll. The Republic also suffers from soil erosion by water (salination, bogging, desertification), which affects 4.3 mln ha of land.

Wind and water erosion are responsible for the degradation of soils and their living cover, turning land into a desert. Desertification is the process of expansion of deserts, their overtaking of agricultural land. Neglect of crop rotation and the lack of organic and mineral fertilizers negatively affect the crop-producing power of the soil, reducing the amount of humus in the surface layers. Kazakhstan currently has a high percentage of soils with low humus content.

The excessive activity of the mining industry leads to soil pollution with heavy metals, dumping of all sorts of industrial and domestic waste, formation of potholes, pits and gulleys. Former military ranges also made soil unsuitable for farming.

Sustainable agricultural intensification plays an important role in land use improvement, helping preserve and increases its productive power around the globe, including in Kazakhstan. The need for sustainable intensification is determined by the growing demand for agricultural products of the right varieties and proper quality. The following major three groups of efforts can be taken to improve land use:

1) Involving less productive or unused agricultural land into the cultivation process;
2) Improving the productive power of the already used agricultural land;
3) More efficient utilization of the existing crop yield.

Each group of the efforts listed above has a whole system of interrelated steps:

-Implementation of scientifically grounded farming systems, design and application of crop rotation systems;
-Anti-erosion efforts, melioration and re-cultivation of damaged land;
- Lime treatment of soil, irrigation/drainage of soil;
-Introduction of promising region-specific varieties and hybrids of crops;
- Cultivation of major hayfields and pastures, tackling weeds, pests and plant diseases, and other organizational, economic and social initiatives.

2. Literature review

The primary purpose of land is to satisfy the demand of our planet's population for food products of plant and animal origin. Despite the achieved success in the development of the world's agriculture, about 805 mln people around the world still suffer from regular malnutrition, and over 2.0 bn people experience the so-called "hidden hunger" (Wheater & Evans 2009; Volchik et al. 2018).

All of this happens as the population of our planet keeps growing, with about three billion more people expected to live in the world by 2050. That is why producing enough food to provide sufficient nutrition for every human should be our top priority. Delivery on this goal can happen only through the efficient use of the land resources we already have.

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The economic use efficiency of land in agriculture is defined as a certain mode of land cultivation that yields a certain amount of produce per unit of land. In today's reality, the efficiency and sustainability of land use depends not only on the growing output of produce per unit of land, but also on its increasing quality, cost-effectiveness and the ability to maintain or improve soil fertility and at the same time care for the environment (Ivanov 2009; Melas et al. 2017; Lizińska et al. 2017; Tireuov et al. 2018; Akhmetova, Suleimenova 2018; Bychkova et al. 2018; Ivanova, Latyshov, 2018; Suleimenova et al. 2018).

The question of effectiveness of the agricultural aspects was reviewed in many written papers – both legal acts and research works. Thus, Mindrin et.al. (2008) dissucssed the rational usage of the land offering numerous methods on increasing the profitability of the land plots and gaining more economic benefits.

Gurova O.N. (2012), in turn, considered the aspects of growing a specific culture (namely, sunflower) and getting profits from planting them.

The questions of soil, its recovery from degradation and preserving water were oinsideredin the works by Tefera and Sterk (2010) and Zvereva and Glushko (2013).

Legal aspects were covered in the works by Kozenko and Zvereva (2008), who discussed the questions of property rights in terms of the land plots, as well as Kazistaev Ye. (2016) discussed the consequences of effective subsidizing of the land plots.

Formal reports on using land can be found in the public reports published by Ministry of Agriculture.

3. Methods of assessment

The following empirical scientific cognition methods became the methodological basis of the study.

The method of statistical observation - "method of the main array" used in the research to study and identify the regularities of agricultural land use in the Republic of Kazakhstan for 2012-2016.

The statistical study array was formed by physical and relative measures and one consolidated criterion. The physical measures are farmland area, crop yield, gross output of plant and livestock products, gross product output per 100 ha of cropped land or 100 ha of agricultural land, livestock and poultry population, per-capita agricultural production, livestock and poultry fertility. The relative measures are percentage of agricultural land in the total land area, percentage of farmland in the total area of agricultural land, percentage of cropped land in the total farmland area.

To determine the empirical characteristics of the studied phenomenon by the method of the main array, the indicators of the basic growth rate coefficient (T_b) and the basic growth coefficient (K_b) were used (1), (2):

$$Tb = \frac{Y_i}{Y_0} \times 100\% \qquad (1)$$

$$Kb = \frac{Y_i}{Y_0} \qquad (2)$$

where Yi - data on agricultural land use for the reporting period;
Y_0 - data on agricultural land use for the base period, which is predetermined as a comparison base.

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Comparison method is used in the study to compare the efficiency of agricultural land use in Kazakhstan with respect to countries such as Russia, Belarus and the Ukraine with the help of the consolidated criterion (*CC*) (3):

$$CC = \frac{V_{grout}}{A_{al}}, \quad (3)$$

where V_{grout} - the gross output of agricultural products, USD bn;
A_{al} - agricultural area, mln ha.

As for the consolidated criterion, the authors plan to use the gross output of agricultural products per 100 ha of agricultural land (Gurova, 2012). This criterion will allow comparing the country's agricultural land use with that of other former Soviet republics. Using cost-related metrics is not possible in this case as the value of national currency has changed dramatically between 1990 and 2016 and costs cannot be compared.

To sort the data on livestock and gardening development in Kazakhstan, state subsidies volume, absolute and relative indicators of agricultural land use efficiency, the traditional method of tabular analysis is also used in the study. This method contributed to the fixation and comparison of the final dynamics and efficiency indicators.

4. Results

Let us review the distribution of different crop cultures across available farmland. The dynamics of farmland cultivation between 2012 and 2016 has undergone significant changes.

In the studied period, the Republic's total farmland area increased by 282,900 ha or by 1.3%. The expansion of farmland was due to the land inventory which continues starting since 2012. The inventory covered 96.0 mln ha of land used for agricultural needs. It helped reveal 19,200 unused land plots suitable for agricultural needs with a cumulative area of 7.4 mln ha, of which around 943,000 ha are used as farmland. This also revealed more than 91% of unused land plots within farms with a total area of 3.7 mln ha, of which 407,600 are used as farmland, including 30,600 ha of irrigated cropland.

In the reporting year, the area of farmland under certain crops has decreased, specifically under grain and pulses, wheat, potato and grapes, whereas the area used for growing other kinds of crops has grown. In fact, over the studied period, the area of cropland under all kinds of grain and pulses has shrunk 5.2%, wheat – 7.6%, potato – 1.8% and vineyards – 1.4%. The drastic decrease in the area of cropland used to grow grain over the past years is explained by the ongoing optimization of cropland allocation. The decline in the cropland used for growing potato had to happen because of its excessive supply in the country.

At the same time, the areas of other cropland are expanding: in 2016, barley was sown on 62,600 ha, sugar beet – on 800 ha, sunflower – on 12,900 ha, vegetables – on 17,200 ha, melons – on 12,100 ha, berries and fruit – on 1.20 ha. The largest share of cropland between 2012 and 2016 was still used for grain. While the percentage of area occupied with all kinds of grain in 2012 was 76.7%, in 2016 it was 71.7%. To optimize cropland allocation, annual efforts are taken to diversify crops. This leads to increased areas of land used for sowing oil-bearing crops, vegetables and forage. New advanced methods are used, such as moisture retention and water retention technology.

Crop yield is an indicator showing the average output of agricultural produces per area unit. It is calculated as the ratio of the gross output to the area harvested, and is measured in quintals per hectare (q/ha).Great importance is placed on this indicator. Yields are greatly affected by farming practices, agricultural equipment and crop

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cultivation technology, soil fertilization, the ability to perform all field works well and in short periods of time and other economic factors.

Let us have a look at the dynamics of crop yield in 2012-2016. In 2016, the yield of all crops was higher compared to that of 2012.

To give you the numbers, the yield of sugar beet in the studied period grew from 168.2 to 285.5 q/ha, potato – from 165.9 to 190.4 q/ha, vegetables – from 234 to 250 q/ha, melons – from 206.8 to 221.4 q/ha, grapes – from 58 to 60.8 q/ha and so on. All sorts of crops showed a 100%+ increase in yieldin 2016 as compared with 2012. Overall throughout the Republic, this indicator says of a satisfactory efficiency of agricultural land use in the studied time frame.

During the considered period, crop yield went up and down alternately. It dropped especially sharply in 2012 compared to the previous years. The dry climate that year made a big impact on crop yield. It should be pointed out that crop yield performance was lower in agricultural companies than in private and cooperative farms.

The next physical measure of agricultural land use efficiency is the amount of plant products made, i.e. the gross output of crops (Table 1):

Table 1. Gross output of certain crops (in all kinds of farming businesses)

('000 t)

Crop variety	Year					Growth, %
	2012	2013	2014	2015	2016	
1.Grain (including rice) and pulses,including	12,514	17,886.8	16,785.1	18,250.6	20,186.5	161.3
-wheat	9,841.1	13,940.8	12,996.8	13,747	14,985	152.3
-barley	1,490.6	2,539	2,411.8	2,675.4	3,231.3	216.8
2. Sugar beet	151.6	64.6	23.9	174.1	345.0	227.6
3. Sunflower	400.3	572.7	512.7	534	754.9	188.6
4. Potato	3,126.4	3,346.6	3,410.5	3521	3,545.7	113.4
5. Vegetables	3,061.5	3,241.5	3,469.9	3,564.9	3,795.1	124.0
6. Melons	1,649.9	1,713	1,928	2,087.6	2,070.9	125.5
7. Grapes	77.1	68	70.3	63.4	75.0	97.3
8. Berries and fruits	206.7	214.7	233	216.8	260.7	126.1

The gross output of crops significantly varied year on year in the studied period, which to a certain extent is due to the natural and climatic conditions of production, the decrease or increase in the area of cropland and possible setbacks in logistics and technical equipment of farms. In the considered period of time, crop output was greatly affected by the reallocation of cropland and crop yield.

In fact, the additional expanses of cropland and the improved yield increased the gross output of barley by 1740,700 t, sugar beet – by 193,400 t, sunflower – by 354,600 t, vegetables – by 733,600 t, melons – by 421,000 t, berries and fruit – by 8,800 t. Thanks to the increased yields, the gross output of grain and pulses grew by 7672,500 t, wheat – by 5143,900 t andpotato – by 419,300 t. The gross output of grapes was the only one to reduce by 2,100 t or 2.7%.

To further develop this topic, let us review the dynamics of such measure of agricultural land use efficiency as the gross output of individual varieties of crops per 100 ha of cropland.This dynamics is certainly positive, since the production output of all kinds of plants per 100 ha of cropland consistently grows.

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The overall gross output of grain per 100 ha of cropland in 2016 grew 70.3% compared to 2012, including wheat output –64.8% and barley – 109.8%.

The gross output of sugar beets per 100 ha of cropland increased 113.1%, sunflower – 85.5%, potato – 15.5%, vegetables – 9.3%, melons – 9.3% and berries and fruit – 22.7%. The only crop to demonstrate a decrease in gross output per 100 ha of cropland wasgrapes, down 1.4%.

The next measure of the efficiency of agricultural land use is the per-capita production output of basic crops. In the reviewed period of time, the per-capita production output of cropswas going up for all crops except grapes. Specifically, per-capita grain output was upby 394 kg, sugar beet – by 10.3 kg, sunflower – 18.4 kg, potato – by 13.0 kg, vegetables – by 31.0 kg, melons – by 18 kgand berries and fruits– by 2.3 kg. Per-capita grapes output is down by 0.4 kg.

The positive dynamics of crop output is partially driven by government subsidies. Subsidies for horticulture are aimed at cutting down on the costs of growing priority crops, orchards and vineyards, purchasing mineral fertilizers, herbicides and other agricultural chemicals, more cost-efficient watering, quality assessment of cotton, development of seed breeding, reducing the cost of fuel and lubricants and other materials, cutting down on the costs of growing crops in greenhouses, and at compensating leasing fees for agricultural equipment and supporting horticulture insurance, etc.

Let us take a closer look at horticulture subsidies over 2011-2015 (Table 2):

Table 2. Gross output per KZT 1 of subsidies, invested in the horticulture development

Indicator	Years					Rate of change
	2011	2012	2013	2014	2015	
1.Gross output of plant products, KZT bln	1,337.2	1,241.5	1,683.9	1,739.4	1,825.2	by 1.4 times
2.Amount of subsidies paid out, KZT mln	29,580.9	31,465.9	35,512.6	66,594.2	64,591.3	by 2.2 times
3. Gross output of plant products per KZT 1 subsidized, KZT	45.2	39.5	47.4	26.1	28.3	by 0.6 times

As can be seen from the table data, in 2011 the amount of subsidies was equal to KZT 29,580.9 million, but already in 2015 it increased to KZT 64,591.3 million or by 2.2 times. At the same time, the gross output of agricultural products increased from KZT 1,337.2 to 1,825.2 billion or by 1.4 times. In turn, the gross output per KZT 1 of subsidies in 2011 amounted to KZT 45.2, whereas in 2015 it decreased by almost half, i.e. by KZT 16.9.

"Hectare" subsidization of plant cultivating began to have a big impact on the return of agricultural products, which sharply went down, while the amount of subsidies from the state budget was growing regularly. The Ministry of Agriculture reported that since 2017 the hectare subsidy for plant production is abolished, subsidies are provided in accordance with the WTO requirements (Kazistaev, 2016).
Thus, in the period under consideration (2012-2016) there were positive trends in the development of plant production – gross harvesting of agricultural crops and their production per capita.

The output of livestock products depends on the households of the population by 71%, 15% is produced by peasant and private farms and 13% fall to agricultural enterprises. Livestock breeding is diversified in the region. Owing to the implementation of the "Sybaga" (subsidizing the purchase of breeding stock of cattle), "Kulan"

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(subsidizing the purchase of breeding stock of horses), "Altyn Asyk" (subsidizing the purchase of breeding stock of sheep) programs there is an increase in the number of livestock of all types, except for poultry and pigs. Livestock breeding is an important branch of the Republic's agriculture, which provides about 40% of its gross output. Protein is required for adequate nutrition of the population; it is found in food products such as meat, milk and eggs. In addition, this sector of agriculture provides the industry with wool, leather, lambskin, etc. In the livestock sectors, waste from crop production is actively consumed; it served as a basis for creating valuable organic fertilizers such as manure and slurry. While the plant production is of seasonal nature of, livestock farming allows using labor and material resources all the year round. The development of livestock breeding is promoted in the country by the richest pasture lands and favorable climatic conditions. In recent years, there have been steady growth rates of livestock number increase in the Republic.

In the period under consideration, the cattle headcount increased by 723.2 thousand heads or by 12.7%, including cows by 629.8 thousand heads or by 24.4%.

The increase in the headcount of cows has positively affected the results of agriculture, as these animals have the highest dairy productivity, requires cheaper feed and supplies the country's population with beef and veal.

Sheep farming is also the main branch of livestock breeding, owing to which the country's economy has not only meat, milk and lard, but also skin, fur sheepskin, lambskins and wool. In the period under study, the number of sheep and goats increased from 17,633.3 to 18,124.2 thousand heads or by 2.8%. There is a negative trend in the country – a decrease in the number of pigs. The situation is determined by the departure of a large number of people, who used to grow pigs and consumed meat and lard, outside the national territory. It should be noted that pig farming is a productive and fast growing branch of livestock breeding. In general, the pig headcount declined from 1,031.6 thousand heads to 834.2 thousand heads or by 19.1%.

In 2012-2016 horse breeding is developed quite steadily. The horse headcount increased by 573.0 thousand heads or 34%. The main products of horse breeding are meat, milk and skins. Saumal and kumis are produced from mare's milk. These dairy products are very healthy.

Camel breeding also is developed dynamically. Thus, camel headcount increased by 15.3 thousand heads or by 9.3%. The maintenance of camels is very profitable, since they do not require large labor costs, a large number of feeds and construction of capital facilities. The main products of these animals are meat, milk and wool; farmers produce a healing drink called shubat from camel's milk, which is popular among the population.
Poultry farming is an economically viable livestock breeding industry. Poultry farming provides the country's population with eggs, dietary meat, and industry with down and feathers. In the period under study, the poultry headcount increased from 33.5 to 36.9 million heads or by 10.1%.

It should be noted that a large proportion of livestock and poultry are managed in peasant (private) farms and private households.

Over the past five years, the average productivity of farm animals in domestic producers has also increased. Thus, in the period under consideration, the average weight of one head of cattle increased from 310 to 329 kg, that of sheep and goats from 38 to 39 kg, and that of pigs from 98 to 105 kg, milk yield per one forage-fed cow increased up to 105 kg, the average egg yield per one laying hen increased up to 20 eggs, and the amount of wool shorn from one sheep remained without changing – 2.4 kg. At the same time, in Kazakhstan there is a decrease in calf crop per 100 calving cows by 5 heads; being less by 3 heads lamb and kid crop, by 6 heads for foal crop and by 2 heads for camel colt crop.

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In this case, the low proportion of pedigree stock (for example, for meat cattle it is no more than 2.5%) is the main reason for the low productivity of livestock breeding in Kazakhstan. This situation is caused by the fact that in the country most animals are concentrated in the households of the population, hence this agricultural sector is characterized by low genetic potential, low animal productivity, inadequate nutrition and feeding conditions for modern technologies, lack of quality forage, insufficient care for animal health. In connection with the inaccessibility of water sources for the livestock watering, the potential of natural pastures is also poorly used.

It should be noted that the government increased annually the amount of subsidies for the development of livestock breeding in the country. Thus, over the recent 5 years the volume of state support for agriculture has increased by 3.0 times, but the increase in gross output of this sector of the economy was growing much more slowly (Table 3):

Table 3. Gross output per KZT 1 of subsidies invested in the livestock breeding development

Indicator	Years					Rate of change
	2011	2012	2013	2014	2015	
1.Gross output of livestock products, KZT bln	942.4	1,141.5	1,256.9	1,393.8	1,469.9	1.6 times
2.Amount of subsidies paid out, KZT mln	23,138.9	31,454.2	38,438.7	49,302.3	69,060.9	3.0 times
3. Gross output of livestock products per KZT 1 subsidized, KZT	40.7	36.4	32.7	28.3	21.3	0.5 times

As the table data show, the amount of subsidies in 2011 was equal to KZT 23,138.9 mln, but already in 2015 it increased to the level of KZT 69,060.9 mln or threefold. At the same time, the gross output of livestock products increased from KZT 942.4 bn to KZT 1469.9 bn or by 1.6 times. In turn, the gross output per KZT 1 of subsidies was equal to 40.7 KZT in 2011, but already in 2015 it decreased by almost half, i.e. by 19.4 KZT.

To increase the productivity and quality of livestock products, there are 33 areas of subsidies, which are divided into two large groups:

- To develop pedigree livestock breeding: the acquisition of pedigree cattle and sheep, the pedigree breeding of calving cows and ewes and other trends in the development of pedigree livestock farming;
-To improve the productivity and quality of livestock products, reduce the cost of production of milk, poultry, pork, horse meat, camel meat, fodder, fattening of bull calves, etc.

In 2015 KZT 69 bn were allocated for all areas of subsidies. Owing to this support, the share of the pedigree stock of all types of farm animals and poultry increased significantly and, by the end of 2015, amounted to 10.6% for cattle, 15.1% for sheep, 19.9% for pigs, 7.9% for horses; 13.1 % for camels and 17.1% for poultry. Undoubtedly, the activity of private farms in participating in the programs of the National managing holding "KazAgro" JSC, such as "Sybaga", "Kulan", "Altyn Asyk", played its role. Thus, for example, during the current year 75 thousand heads of pedigree cattle, 25.2 thousand heads of pedigree horses, 72 thousand heads of pedigree sheep were purchased. The number of the pedigree cattle herd reached 722 thousand heads, which is 22% of the total number of cattle. Subsidies are allocated for livestock breeding development from the republican budget, and from the regional, as well.

Due to the growth in the number of cattle, cows, sheep and goats, poultry and their productivity, production and sales of livestock products such as meat, milk and eggs are increasing, though wool production is declining (Table 4).

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Table 4. Livestock breeding production

Indicator	Years					Rate of change, %
	2012	2013	2014	2015	2016	
1. Meat production in carcass weight equivalent, thous. t	844.7	871	900.2	931	960.7	113.7
2. Milk production, thous. t	4851.6	4930.3	5067.9	5182.4	5341.6	110.1
3.Wool production, t	38.4	37.6	37.8	38	38.0	99.0
4. Egg production, mln pcs.	3673.4	3896	4291.2	4737	4757.2	129.5

In the period under study, meat production in slaughter weight equivalent increased by 116.0 thousand t or 13.7%; milk production also increased by 490.0 thousand t or 10.1% and increase in egg production made 1,083.8 mln pcs or by 29.5%. At the same time, wool production decreased by 0.4 tons or 1.0%. In general, the dynamics of livestock production was positive in this period.

Next, let us analyze the production of the main types of livestock products per 100 ha of agricultural lands in the Republic of Kazakhstan.

In 2016, in comparison with the base period, the production of meat, milk and eggs per 100 hectares of agricultural crops increased, and the production of wool reduced. Meat production in live weight per 100 ha of agricultural lands increased by 14.1%, milk – by 10.4%, eggs – by 29.9%, and wool production decreased by 0.6%.

Further, in our studies calculations we made as to the per capita livestock production in Kazakhstan. The increase in the number of livestock and poultry and in their productivity affected the livestock production per capita. Thus, in the period under consideration, meat production in slaughter weight equivalent per capita increased by 3.6 kg, or by 7.2%, milk by 11.2 kg or 3.9%, eggs by 48.3 or 22.2%. Since the volume of wool in the period under review decreased, this index per capita naturally decreased by 0.2 kg or by 8.7%.

Thus, in the considered period the livestock breeding sector develops quite dynamically and steadily. The output is growing in this sector of agriculture.

5. Discussion

The analysis of the majority of natural and relative indicators that assess the effectiveness of the use of land resources in Kazakhstan was made. The use of land resources was analyzed for the period 2012-2016. Over this period, there has been a positive growth dynamics of all the indicators under study, but a goal was set to determine the level of land use in 2016 compared with 1990 (Table 5).

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Table 5. Indicators assessing the effectiveness of the agricultural land use in Kazakhstan in 1990-2016

Indicator	UM	1990	2016	Rate of change,%
Land resources				
1.Agricultural land including	thous. ha	222,452.3	214,747.7	96.5
- farmland, including	-//-	35,576.8	24,794.6	69.7
- planted acreage	-//-	35,182.0	21,473.6	61.0
- hay lands	-//-	5,185.3	4,895.9	94.9
- pastures	-//-	181,340.7	179,925.6	99.2
-other lands	-//-	349.5		
Relative indicators assessing the effectiveness of the agricultural land use				
- a share of agricultural lands in total land area	%	85.2	82.2	-3.0
- a relative share of farmland in the structure of agricultural land	-//-	16.0	11.5	-4.5
-a relative share of agricultural crops sawn in the farmlands	-//-	98.9	86.6	-12.3
- all grain and pulses	thous. ha	23,356	15,403.5	66.0
- wheat	-//-	14,070	12,437	88.4
- barley	-//-	6,660	1,901.9	28.6
- sugar beet	-//-	44.0	12.6	28.6
- sunflower	-//-	137.0	807.5	by 5.9 times
- potato	-//-	206.0	186.7	90.6
- vegetables	-//-	71.0	145.9	205.5
- melons and gourds	-//-	45.0	93.9	208.7
- vineyards	-//-	24.9	14.6	58.6
-berries and fruits	-//-	96.5	44.4	46.0
Crop yield for certain agricultural plants				
- all grain and pulses	htw/ha	13.4	13.5	100.7
-wheat	-//-	13.8	12.1	87.7
- barley	-//-	17.0	17.1	100.6
- sugar beet	-//-	260.0	285.5	109.8
- sunflower	-//-	10.3	9.3	90.3
- potato	-//-	113.0	190.4	168.5
- vegetables	-//-	154.0	250.0	162.3
- melons and gourds	-//-	84.0	221.4	263.5
- grapes	-//-	80.5	60.8	75.5
- berries and fruits	-//-	41.9	81.5	194.5
Croppage for certain agricultural plants				
- all grain and pulses, including	thous. t	31,249.0	20,186.5	64.6
- wheat	-//-	16,351	14,985	91.6
- barley	-//-	8,500	3,231.3	38.0
- sugar beet	-//-	1,134	345	30.4
- sunflower	-//-	140.9	754.9	by 5.4 times
- potato	-//-	2,324.3	3,545.7	152.5
- vegetables	-//-	1,136.4	3,795.1	by 3.3 times
- melons and gourds	-//-	301.5	2,070.9	by 6.9 times
- grapes	-//-	138.6	75.0	54.1
- berries and fruits	-//-	301.2	260.7	86.6
Croppage for certain agricultural crops per 100 ha of planted acreage				
- grain and pulses, including	t	133.8	131.1	98.0
-wheat	-//-	116.2	120.5	103.7
- barley	-//-	127.6	133.2	209.8
- sugar beet	-//-	2,577.3	2,738.1	106.2
- sunflower	-//-	102.8	93.5	91.0

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- potato	-//-	1,128.3	1,899.1	168.5
- vegetables	-//-	1,600.6	2,601.2	162.5
- melons and gourds	-//-	670.0	2,205.4	by 3.3 times
- grapes	-//-	393.9	349.2	88.7
- berries and fruits	-//-	856.1	1,214.0	141.8
Plant production per capita				
- grain and pulses	kg	1,871.2	1160	62.0
-sugar beet	-//-	67.9	19.3	47.9
-sunflower	-//-	8.4	42.1	by 5.0 times
-potato	-//-	139.6	199	142.6
-vegetables	-//-	68.0	213	by 3.1times
-melons and gourds	-//-	18.1	116	by 6.4 times
-grapes	-//-	8.3	4.2	50.6
-berries and fruits	-//-	18.0	14.5	80.6
Livestock and poultry headcount				
- cattle, including	thous. heads	9,755.7	6,413.2	65.7
- cows	-//-	3,367.1	3,209.9	95.3
- sheep and goats	-//-	35,657	18,124.2	50.8
- pigs	-//-	3,223.8	834.2	25.9
- horses	-//-	1,626.2	2,259.2	138.4
- camels	-//-	142.5	180.1	126.4
- poultry	mln pcs	59.9	36.9	61.6
Livestock production				
- meat in slaughter equivalent	thous. t	1,547.6	960.7	62.1
- milk	-//-	5,641.6	5,341.6	94.7
- wool	-//-	107.9	38.0	35.2
- eggs	mln pcs	4,185.0	4,757.2	113.6
Basic livestock production per 100 ha of agricultural lands				
- meat in slaughter equivalent	t	695.7	447.2	64.3
- milk	-//-	2,536.1	2,486.6	98.0
- wool	-//-	48.5	17.7	36.5
- eggs	mln pcs	1,881.3	2,214.5	117.7
Livestock production per capita				
- meat in slaughter equivalent	kg	92.7	53.6	57.8
- milk	-//-	337.8	298.1	88.2
- wool	-//-	6.5	2.1	32.3
-eggs	pcs	250.6	265.5	105.9

Comparing the indicators of 1990 with those of 2016, it can be seen that the country's agricultural lands are not used at the proper level. First, the agricultural lands reduced by 7,704.6 thousand hectares, and, secondly, there is a decrease in farmland for 10,782.2 thousand hectares, including planted acreage for 13,708.4 thousand hectares, hay lands for 289.4 thousand hectares and pastures for 1,415.1 thousand hectares. Accordingly, other lands increase by 4,782.1 thousand hectares. Also, the share of agricultural land in the total land area is reduced by 3.0%, the share of farmland in the structure of agricultural land decreased by 4.5%, and a relative share of the planted acreage of agricultural crops in the farmland decreased by 12.9%.

In the period under consideration, the structure of planted acreage also underwent significant changes: mainly the areas sown with grain and pulses reduced by 7,952.2 thousand hectares.

On the one hand, this is caused by optimization of the cultivated lands conducted in the recent years. And the saddest thing is the decrease in planted acreage for sugar beet by 71.4%. Sugar beet is the only domestic product for sugar production. Currently, the existing situation with sugar production causes anxiety in the country. Domestic sugar is not enough to meet the needs of the population in this product, which are provided by imports

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from Russia, Belarus and Ukraine. In addition, the sugar factories of the country process imported raw cane sugar that is delivered to the country duty-free until 2019. At the end of this time, the duty per 1 ton of imported raw sugar will be USD 250, which in turn will cause a rise in price of domestic sugar and its non-competitiveness in comparison with sugar production from sugar beets in the countries of the near abroad. And this in turn will affect the stoppage of the work of local sugar factories. In this case, the country will be completely dependent on imports.

Planted acreage for grapes also decreased by 10.3 thousand hectares or 41.4%, areas for cultivation of berries and fruits decreased by 52.1 thousand hectares or 54%. The needs of the population in these plant products are also provided by imports.

Planted acreage for other crops is growing: areas sown with sunflower increased by 5.9 times, and those planted with vegetables, melons and gourds doubled. The decline in acreage for potato cultivation can be explained by its overproduction in the country.

Crop yield of most crops has increased. Increase in crop yield and planted acreage increased the croppage of vegetables by 3.3 times, melons and gourds by 6.9 times. Only the growth of planted acreage increased the sunflower croppage by 5.4 times. And the increase in potato yield provided for its croppage by 52.5% compared to the base period. The decrease in planted acreage and yield of individual grain crops reduced croppage of wheat to a level of 14,985 thousand tons, barley – to 3,231.3 thousand tons, grapes – to 75.0 thousand tons. And, despite the increase in the yield of grain and pulses, their croppage decreased by 11,062.5 thousand tons, sugar beet croppage fell by 789.0 thousand tons, with croppage of berries and fruits decreasing by 40.5 thousand tons.

Croppage of certain agricultural crops per 100 hectares of planted acreage is increasing for almost all crops.

Plant production per capita for grain and pulses, sugar beet, grapes, berries and fruits is reduced compared to the base period, but sharply increases for sunflower (by 5.0 times), vegetables (by 3.1 times), melons and gourds (by 6.4 times) and potato (by 42.6%).

Thus, land resources in terms of cultivating plant products are mainly used effectively for growing sunflowers, vegetables, potatoes, melons and gourds; for other crops, the croppage has not reached the 1990 level, or has changed slightly.

However, the situation is the worst with the development of livestock breeding in the Republic. In 2016 the livestock and poultry population did not reach the level of 1990: the cattle headcount decreased by 3,342.5 thousand heads or by 34.3%, including cows by 157.2 thousand heads or by 4.7%, the number of sheep and goats decreased by 17,532.8 thousand heads, pigs' population reduced by 2,389.6 thousand heads, and that of poultry – by 23.0 million pieces.

Over the 26-year period there was a slight increase in the number of camels by 37.6 thousand heads and horses by 633.0 thousand heads.

The decrease in the number of livestock and poultry affected the livestock production. Thus, meat production in slaughter weight equivalent decreased from 1,547.6 to 960.7 thousand tons or by 37.9%, milk production from 5,641.6 to the level of 5,341.6 thousand tons or by 5.3%, wool production reduced from 107.9 to 38 thousand tons or by 64.8%. Only the number of eggs increased by 572.2 million pieces, or by 13.6% in the period under study. The growth of egg production is caused by a sharp increase in the egg-laying rate of chickens. Accordingly, with the decrease in the output of livestock products, their production per 100 hectares of agricultural land is reduced.

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Thus, meat production in slaughter weight equivalent decreased by 248.5 tons, with the decrease in milk production by 49.5 tons and in wool production by 30.8 tons. In turn, the number of eggs increased by 333.2 million pieces.

The livestock production per capita is one of the main indicators of the land use effectiveness. The magnitude of these indicators is also low in comparison with 1990. Per capita meat production in slaughter weight equivalent decreased by 39.1 kg, with the decrease in this indicator for milk by 39.7 kg and for wool by 4.4 kg.Only the number of eggs per capita increased by 14.9 pieces.

Thus, Kazakhstani livestock breeding not only failed to reach the level of 1990 indicators, but it cannot provide the corresponding level of consumption for many products.

Next, let us compare the agricultural land use in our country with that in Russia, Belarus and Ukraine in terms of the gross output of agricultural products per 100 hectares of agricultural land. These indicators of the four countries are compared in US dollars (table 6).

Table 6. Gross output of agricultural products per 100 hectares of agricultural land in the Custom Union members in 2016

Indicator	UM	Russia	Belarus	Ukraine	Kazakhstan
1. Gross output of agricultural products	USD bn	84.1	7.8	24.7	10.8
2.Agricultural area	mln ha	222.1	8.5	41.7	214.7
3. Gross output per of agricultural land	USD thous.	37.87	91.76	59.23	5.03

The table data indicate that the most effective use of agricultural land is observed in Belarus, then in Ukraine, the third place is occupied by Russia and Kazakhstan is ranked the fourth. The high gross output of agricultural products per 100 hectares of agricultural land in Belarus can be explained by the large plowness of the territory, high crop yield and livestock productivity, the availability of sufficient water resources, which are evenly distributed throughout the country. Thus, the proposed criterion for assessing agricultural land is a convenient tool for international comparisons of the level of agricultural development.

The analysis of 2016 indicators showed that the agricultural lands are not used at the proper level in the Republic as compared with 1990: most of the indicators assessing the effectiveness of their use were reduced. Moreover, the inventory of agricultural lands that was conducted in 2012-2014 revealed 11.4 million hectares of unused land. And if we compare the results achieved with the results of economically developed countries, the main indicators of livestock productivity and crop yields lag behind the world figures. Thus, in the Republic of Kazakhstan the average live weight of one head of cattle is 300 kg, whereas in such countries as the USA, Canada and Germany this figure exceeds 500 kg. The average milk yield per cow in Kazakhstan is 2.2 thousand kg per year (this indicator making 8.6 thousand kg in the USA, 7.8 thousand kg in Canada, 6.7 thousand kg in Germany, and 3.5 thousand kg in Russia). Wheat yield in the RK is 10.8 cwt/ha (being 31.7 cwt/ha in the USA, 35.9 cwt/ha in Canada, and 22.3 cwt/ha in Russia). Corn yield in Kazakhstan is 52.8 cwt/ha (being 99.7 cwt/ha in USA, 95.9 cwt/ha in Canada, and 60.1 cwt/ha in Russia), etc. (Zvereva & Glushko 2013)

It should also be noted that in the Republic, the average annual growth rates of food production as a whole do not keep up with the growth rates of consumption and income of the population, as a result of which the free niche in the market is replenished by imports and its share in domestic consumption remains very significant (Kozenko & Zvereva 2008).

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That is why it is necessary to radically change the attitude to the land (as the main means of agricultural production).

Conclusions

At present, the land has been brought to a completely unsatisfactory state: a large number of lands are abandoned, there is a deficit of irrigation water, soil degradation and erosion, soil fertility is reduced, and the production capacities of processing enterprises are not fully utilized due to the lack of necessary raw materials.

To address this situation, the concept of a new state program to support the agribusiness industry for 2017-2021 was formulated at the end of 2016, one of the tasks of which is to create conditions for the efficient use of land resources.
The implementation of these measures will increase the planted acreage in 2021 by means of diversifying, developing fallow lands and using vacant waste lands for agricultural crops. Thus, wheat will cover 10,132 thousand hectares of land, barley – 2,787 thousand hectares, oil-yielding crops – 3,000 thousand hectares, fodder crops – 4,393 thousand hectares, sugar beet – 32 thousand hectares, fruits, berries and grapes – 65.0 thousand hectares, vegetables – 161 thousand hectares, etc. (Report, 2014). In 2021, the yield of grain crops will be 13.9 cwt/ha, oil-yielding crops – 10.2 cwt/ha, sugar beet – 350 cwt/ha, vegetables – 257 cwt/ha, melons and gourds – 234 cwt/ha, potatoes – 195 cwt/ha and fruits and berries – 70 cwt/ha. The increase in planted acreage and growth of crop yield will contribute to the increase in the crop production output: barley up to 4,004 thousand tons, rice – up to 387 thousand tons, oil-yielding crops – up to 3,046 thousand tons, sugar beet – up to 1,120 thousand tons, vegetables – up to 4,132 thousand tons, fruits, berries and grapes – up to 421 thousand tons.

The livestock and poultry population will increase in livestock breeding, namely: cattle – 6,951 thousand heads, horses – 2,957 thousand heads, sheep and goats – 21,100 thousand heads, pigs – 825 thousand heads, and poultry – 48,516 million heads. Not only livestock and poultry headcount will increase, but also the share of breeding stock: cattle – by 16.9%, horses – by 8.0%, sheep and goats – by 17.7%, pigs – by 17.0%, camels – by 18% and poultry – by 31.2%. Also, significant changes will occur in the productivity of livestock and poultry. Thus, the average milk yield per 1 cow is planned to reach 2,406 kg/year, the average weight of one head of cattle will be 377.9 kg, sheep – 42 kg, pigs – 109 kg and poultry – 2.4 kg.

In turn, the increase in the number of livestock and poultry and their productivity will increase the livestock production output in 2021: poultry meat to 298.0 thousand tons, beef – to 491 thousand tons, mutton – to 161 thousand tons, pork – to 133 thousand tons and milk – to 5,665 thousand tons.

Thus, the successful implementation of this State Program will reduce imports of certain priority types of products by means of increasing volumes of own production, and increase the percentage of national consumption of domestic products.

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EVALUATION OF THE EFFICIENCY OF INDUSTRIAL MANAGEMENT IN HIGH-TECHNOLOGY INDUSTRIES*

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Abstract. The realization of structural changes in high-technology industries requires an evaluation of the effectiveness of taken decisions. For this purpose, the paper considers the technical and economic feasibility of developing a system of indicators in industrial management, which will allow increasing the competitiveness of products. A set of indicators was developed, based on the formalization of the main characteristics and interrelation of the organizational structure, and an integral estimation of the organizational potential of high-technology enterprises was proposed. The application of such a technique in practice will give a preliminary conclusion about the nature of structural transformations. In developing the methodology, a criterion is proposed for estimating the competitiveness of a high-technology enterprise, which is based on the ratio of its potentials to actual risks. Structurally functional identification of the potentials of the processes of functional systems made it possible to reveal the features of the application of analytical models for determining the accumulated potentials in the production system. This gives the possibility for segmentation of the enterprise's competitiveness and determination of areas with different efficiency of resource consumption.

Keywords: industrial enterprises; high-technology products; produc-tion processes; competitiveness; high-technology industries

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1. Introduction

The creation of knowledge-intensive products is one of the main components of the effective development and operation of most industrial enterprises. Their task is to maximize the effectiveness of the management system. In this regard, the choice of indicators characterizing the final results of the work of these enterprises is of great importance. Changing the configuration of the organizational structure of high-technology enterprises is associated with the need to introduce organizational *and* economic methods and procedures aimed at a standard unified information environment that ensures achieving some technological, economic (including operational ones) characteristics and indicators of knowledge-intensive products. One of the most important trends in improving industrial management in knowledge-intensive industries is the improvement of the quality of industrial Indicators and the search for new ones.

When calculating the generalized indicators of production and sales volumes of high-technology products, the authors propose the following indicators: volume of high-technology products; work-in-process inventory; ratio of high-technology products; ratio of high-technology products to work-in-process inventory; volume of high-technology products sold. The introduction of such industrial and financial-economic indicators will make it possible to determine the necessity of carrying out structural transformations in high-technology industries in order to optimize enterprises and reduce excess production capacity, and the advisability of organizational decisions on structural changes in the production system at enterprises. All this predetermined the development of a methodological tool for the effective management of production in high-technology industries.

2. Review of literature

In order to develop some management solutions for effective mechanisms for knowledge-intensive enterprises, it is necessary to use a single conceptual construct and some methodological tools to evaluate their competitiveness. Many of its definitions testify to the complexity of this economic category and the possibility of a diverse study.

It is advisable to analyze the effectiveness of organizational management structures of enterprises on the basis of the following approaches: financial and economic; expert-methodical and resource-potential ones. Various approaches to the effective management of production processes in the creation of high-technology products are discussed in scientific papers by Panahifar *et al*. (2014), Li *et al*. (2017), Zemlickienė *et al*. (2018), Chen *et al*. (2016), etc. Methodological tools for assessing the competitiveness of the industrial sectors are considered in the scientific papers by Knutstad and Ravn (2014), Berger (2014), Huys *et al*. (2013), De Sousa Damiani (2016), Hong *et al*. (2016), Ingvaldsen (2015). The issues of enterprise evaluation of efficiency are discussed in scientific works by Pokrajac *et al*. (2016), Lyu *et al*. (2016), Batkovskiy *et al*. (2016), Lee (2011), Manturov and Efimova (2012), Rolfsen and Langeland (2012), Narkunienė and Ulbinaitė (2018).

When analyzing the effective management of organizational structures, the indicators in Table 1 are used.

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Table 1. Various indicators used in the analysis of effective management of organizational structures

Item number	Indicators
1.	Valuation indicators based on the analysis of financial and economic performance
2.	The complex index calculated by the ratio of profit (as a rule) to the indicators of financial and economic activity of the enterprise
3.	Indicators used in ranking their sample multitude
4.	The complex indicator – E_s/E_p, combining the indicator of the economy of the management system E_s (the ratio of management costs to the cost of fixed assets and working capital) and the index of effectiveness of production E_p (the ratio of productivity to the number of employees)
5.	Indicators used in the expert method of evaluation (goals and functions of management, characteristics of its process, methods, etc.)
6.	Indicators characterizing the target (*P/S*) and resource (*P/Z*) efficiency: $E = \phi(P/S; P/Z)$
7.	Groups of interrelated indicators characterizing resource efficiency (*P/Z*)
8.	Indicators used in the implementation of resource and potential approaches to analysis: $E = \phi(T - I)$, criterion: $E \to min$

The calculation of these indicators is acceptable, as a rule, to estimate the functioning of the existing organizational structure. Carrying out their calculation in the absence of actual data, for a future perspective, calls for methods of forecasting and modeling.

One of the effective models of industrial management for knowledge-intensive enterprises is the network model, which implies the existence of a structure of enterprises, consisting of separate units, united within a common value chain. The evaluation of effectiveness of network industrial management of high-technology enterprises is a complex scientific task, which has not been resolved to date. The analysis of the toolkit for estimating the effectiveness of industrial management of high-technology enterprises was carried out in the works by Batkovskiy and Kalachanov (2015), Radu (2018), Morrissey *et al*. (2018), Silva and Borsato (2017), Sparrow and Cooper (2014) and Kowalska (2016). The particularity of this toolkit in high-technology industries has been studied in the works by Ganjeizadeh *et al*. (2017), McNamara (2018), Efimova (2015), Vonortas & Zirulia (2015).

Summarizing the results of these authors' studies, it should be noted that many issues of the problem have not yet received the proper theoretical interpretation and need further research. First of all, a systematic analysis of the specifics of the evaluation of the efficiency of industrial management in high-technology industries is needed.

3. Materials and Methods

3.1. Generalizing indicators of production and sales of high-technology products

The calculation of generalized indicators of production of high-technology products is a necessary component in estimating the effectiveness of the industrial management. When calculating production volumes, a system of particular and generalized indicators should be used, since particular indicators are set for each individual type of product and are developed using all three types of meters, and generalizing indicators characterize the total volume of production and, because of a wide variety of manufactured products, are developed in the value or labor measurement. Generalizing indicators include indicators of production P_T, work-in-progress inventory P_n, gross production P_v, net products (normative) P_h, unsold P_{np} and sold products P_p. Since the total volume of high-technology products should be determined in the cost and labor measurement, therefore, the volume of high-technology products in the cost measurement is calculated by the formula (1):

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$$P_T = \sum_{i=1}^{n} N_i Z_{0i} + \sum_{j=1}^{m} P_{Tj}\,, \tag{1}$$

where n – the number of types of products planned for issue in physical terms; N_i – program of the i-th type of products planned for issue; Z_{0i} – the wholesale price of a unit of the i-th type of products; m – the number of types of work and services planned in monetary terms; P_{Tj} – the amount of production of services and services of the j-th type, planned in monetary terms.

The volume of knowledge-intensive products in the labor measure is determined by the formula (2):

$$P_T = \sum_{i=1}^{n} N_i t_{ci} + \sum_{j=1}^{m} P_{Tj}\,, \tag{2}$$

where t_{ci} – fixed labor intensity of a unit of the i-th type of products; m – the number of types of work and services planned in labor terms; P_{Tj} –volume of production and services of the j-th type, planned in labor terms.

The amount of work in progress is calculated at the beginning and at the end of target periods by types of products. The planned volume of the work in progress will be determined with ensuring the rhythmic work of the enterprise from the first days of the period following the planned one according to the following formula (3):

$$P_N = N_{sut} T_z\,, \tag{3}$$

where N_{sut} – average daily output in the period following the planned one; T_z – the standard duration of the production cycle of manufacturing products in days in the period following the planned one.

The planned volume of the work in process should ensure the production of products within time equal to the duration of the production cycle. In order to obtain a general indicator of the amount of work in progress, it is necessary to determine the value P_N by types of knowledge-intensive products in value and labor measurement. The volume of unfinished production P_N in the value measurement by kinds of knowledge-intensive products will be determined by the formula (4):

$$P_N = N_{sut} T_z C_{pr} K_{nz}\,, \tag{4}$$

where C_{pr} – the production cost of a unit of a product in the period preceding the planned one, K_{nz} is a coefficient that takes into account the increase in costs.

Since the cost growth ratio is the ratio of the actual cost of work in progress to its value at the end of manufacturing and characterizes the average cost of products in the work in process, it is proposed to use two methods of determining K_{nz} – the accurate method based on the actual distribution of work in process for operations or stages of the production process and the enlarged one. With the enlarged method of calculation, the process of increasing the costs invested in work in progress can be presented graphically under certain assumptions simplifying its calculation. As the production passes through the manufacturing process for the operations and stages of the production process, the cost of this product is gradually increasing. Therefore, in order to correctly determine the amount of work in progress in the cost measurement, one needs to know the nature of the increase in costs for production. The increase in costs can be uniform, directly proportional to the time of production (cycle time) or uneven. The nature of the increase in costs depends on the ratio of the elements of costs for manufacturing products and the structure of the manufacturing cycle and is of great importance, since it determines the amount of binding of circulating assets in work in process, i.e. the speed of their turnover. The

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measure of the binding of working capital is the production of costs for the time they are in circulation. When determining K_{nz} by the enlarged (graphical) method, it can be assumed that the process of increasing costs will occur directly in proportion to the production cycle (T_P).

Next, let us consider two cases of having the cost of manufacturing high-technology products: there are no initial expenses; there are some initial expenses. When there are no initial expenses, K_{nz} is determined by the graphical chart shown in Figure 1.

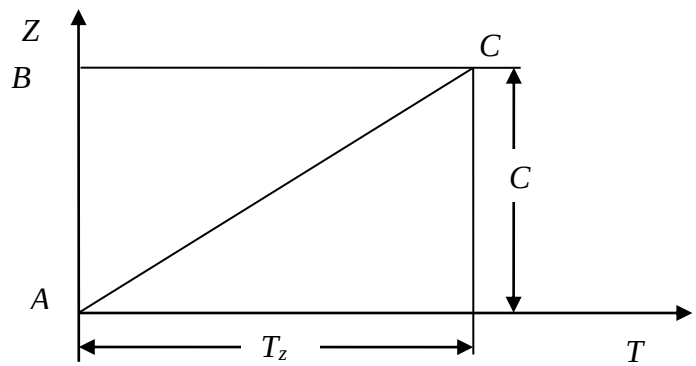

Fig. 1. The graphical chart of absence of initial expenses for production of high-technology products
Source: compiled by the authors.

The graph shows that the abscissa is the manufacturing time of the product (T), and the ordinate is the cost of manufacturing (Z). The investment of funds in work-in-process corresponds to the area of the triangle ACD (1/2 $C_{pr}T_z$). The cost of products in unfinished production corresponds to the area of the rectangle ABCD at the end of production ($C_{pr}T_z$).

Thus, the value K_{nz} will be determined by the ratio of the area of the triangle ACD to the area of the rectangle ABCD (5):

$$K_{nz} = \frac{1/2\, C_{pr}T_z}{C_{pr}T_z} = 0.5\,. \qquad (5)$$

When the initial expenses correspond to the material expenses (Z_M) fully invested in high-technology production at the time of its commencement, and the remaining costs increase, K_z is determined by the graphical chart shown in Figure 2.

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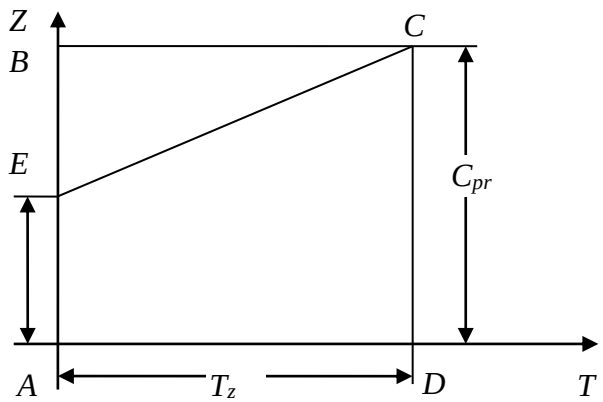

Fig. 2. The graphical chart of availability of initial expenses for production of high-technology products
Source: compiled by the authors.

It can be seen that the investment of funds in work-in-process corresponds to the area of the rectangular trapezoid AECD (6).

$$K_{nz} = \frac{Z_M T_z + \frac{1}{2} T_z (C_{pr} - Z_M)}{C_{pr} T_z}. \quad (6)$$

Applying the ratio of initial expenses to total expenses C_{pr}, the formula (6) is transformed through $K = \frac{Z_M}{C_{pr}}$ and takes the following form (7):

$$K_{nz} = 0.5(K + 1), \quad (7)$$

where K_{nz} takes any values from 0.5 to 1.

The volume of unfinished production in the labor measurement by types of products is proposed to be determined similarly to its calculation in value terms using the formula (8):

$$P_N = N_{sut} T_z t_{izd} K_{TG}, \quad (8)$$

where t_{izd} – labor intensity of manufacturing the product in standard hours; K_{TG} – the coefficient of technical readiness as the ratio of the actual labor input of the work in process to its labor input at the end of manufacturing and characterizing the average labor intensity of products in incomplete production.

The calculation procedure for K_{TG} is similar to the calculation of K_{nz}. The total amount of work in progress in value and labor terms is determined by summing up the individual indicators for the entire range of products. The volume of gross output is good to define in cost and labor measurements by the formula (9):

$$P_v = P_T \pm \Delta P_N, \quad (9)$$

where P_T – the planned volume of commodity output in the respective meters, ΔP_N – a change of the balances of work in progress (10),

$$\Delta P_N = P_{nk} - P_{nn}, \quad (10)$$

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where P_{nk} – the amount of work in progress at the end of target period; P_{nn} – the amount of work in progress at the beginning of target period (determined by inventory).

To ensure the normal course of production, it is necessary to determine a rational ratio in the change in the amount of work in progress P_{nk} and P_{nn}. Depending on the ratio P_{nk} and P_{nn} there could be the following version of the relationship between P_v and P_T:

1) $P_v = P_T$, this means that $\Delta P_n = 0$, i.e. $P_{nk} = P_{nn}$

This option is typical for the steady production of knowledge-intensive products, when the volumes of production in the previous and subsequent periods are equal to each other.

2) $P_v > P_T$, this means that $\Delta P_n > 0$, i.e. $P_{nk} > P_{nn}$.

This option is typical for developing high-technology production, when the volume of production increases in the subsequent period;

3) $P_v < P_T$, this means that $\Delta P_n < 0$, i.e. $P_{nk} < P_{nn}$.

This option is typical for production curtailment when the products are removed from high-technology production in the subsequent period, and the incomplete production is converted into finished products.

The volume of gross output of high-technology enterprises should also include changes in the balances of outstanding expenses for special equipment (11):

$$\Delta R_{co} = R_{cop} - R_{copg}, \tag{11}$$

where R_{cop} – expenses for the manufacturing of special equipment in the target period; R_{copg} – the amount of paid back costs for the production of special equipment in the target period.

Thus, the volume of gross output of high-technology enterprises is determined by the formula (12):

$$P_v = P_T \pm \Delta P_n \pm \Delta R_{cop}. \tag{12}$$

The volume of net output in accordance with the above calculations will be determined by the standards of net production (NCP). Net output calculated by *NCP* is called standard net output. The standard net output is a part of the check price of the product including wages and deductions for social insurance to profit. The standard net output (*NCP*) for a specific knowledge-intensive product will be determined by the formula (13):

$$NCP = Z_{np} + Z_{np}K_z + P_{pn}, \tag{13}$$

where Z_{np} – basic and additional wages for manual workers with deductions for social insurance in the planned calculation of cost of the product; K_z – the coefficient of the ratio of wages of the industrial and production personnel of the enterprise for the maintenance and management of production to the wages of production work, P_{pn} – the profit on the basis of standard profitability is K_z calculated according to the basic data of the preceding year by the formula (14):

$$K_z = \frac{Z_{nnn} - Z_{np}}{Z_{np}}, \tag{14}$$

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where Z_{nnn} – basic and additional wages of industrial and production personnel; Z_{np} – basic and additional wages of manual workers.

Let us calculate the profit P_{pn} according to the profitability standards approved in relation to the cost price less direct expenses by the formula (15):

$$P_{pn} = 0.01 R_n C, \tag{15}$$

where R_n is the standard profitability; C – cost-per-unit less expenses.

Further, the volume of standard net output is calculated on the basis of the components of gross output by summing the volume of commodity output expressed in the standard net output, and the volume of standard net output in changing the balances of the work in process. If knowledge-intensive products are planned in physical terms, then the volume of standard net output is equal to (16):

$$P_c^{'} = \sum_{i=1}^{n} NCP_i N_i, \tag{16}$$

where *n* is the number of types of high-technology products planned for issue in physical terms; NCP_i – the standard net production of the *i*-th type of product; N_i – a program of the *i*-th type of high-technology products planned for issue.

If the production is planned in value terms, then the volume of standard net production P_c is determined by the formula (17):

$$P_c^{''} = \sum_{j=1}^{m} P_{Tj} K_{NCPj}, \tag{17}$$

where *m* – the number of types of products planned for issue in value terms; P_{Tj} – the volume of commercial output of the *j*-th type, planned for issue in value terms (in wholesale prices), K_{NCPj} – the norm coefficient of net products of the *j*-th type. The norm coefficients of net output can be calculated according to the formula (18):

$$K_{NCP} = \frac{P_c}{P_T}, \tag{18}$$

where P_c – the volume of standard net products; P_T – the cost of the same amount of knowledge-intensive products in wholesale prices of a high-technology enterprise (P_c and P_T according to the data of two years preceding the target year).

The volume of standard net products for work in process is (19):

$$P_{cn} = \Delta P_n K_{NCP} \tag{19}$$

where ΔP_n is the change in the balances of work in progress; K_{NCP} – the norm coefficient of net output (defined as the ratio of the volume of standard net output for all products with a long production cycle (over two months) to the corresponding volume of marketable output).

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The total volume of standard net output is obtained by summing all the results obtained (20), (21):

$$P_c = P_c^{'} + P_c^{''} + \Delta P_n K_{NCP} \tag{20}$$

or

$$P_c = \sum_{i=1}^{n} NCP_i N_i + \sum_{j=1}^{m} P_{Tj} K_{NCP} \pm \Delta P_n K_{NCP} . \tag{21}$$

The volume of unsold output should be calculated as of the end and beginning of the target year, and the rest of unsold output at the end of the current year is the stock of unsold output at the beginning of the target year when calculations are conducted by types of knowledge-intensive products. When calculating the target stock of unsold output at the end of the planned period, it is necessary to summarize the stock of the finished knowledge-intensive output in the warehouse and the finished output shipped to the consumer taking into account that payment in the target period will not be made. Then the planned stock is (22):

$$P_{npk} = (T_{kl} + T_{ok}) N_{sut} Z_{do} , \tag{22}$$

where T_{kl} – the standard stock of finished output in the warehouse for preparing it for shipment, in days; T_{ok} – the standard term of document flow for shipped products, in days; N_{sut} – average daily output in the period following the target one (it is necessary to take a five-year plan of a high-technology enterprise); Z_{do} current wholesale price.

Then the volume of sold products can be calculated (23):

$$P_p = P_T + P_{npn} - P_{npk} , \tag{23}$$

where P_{npn} – the volume of unsold knowledge-intensive products as of the beginning of the target period.

3.2 Evaluation of the integration of production capacity

Using a set of indicators of the functional structure of the production system of the enterprise (see Table 2), which is based on the formalization of the main characteristics and relationships of the organizational structure, its integral evaluation can be calculated.

Table 2. The proposed indicators of the functional structure of the production system of the enterprise

Principles	Indicator	The calculating formula	Name
Updating	K_{aF}, K_{aN}, K_{aC} – updating coefficient (functions, elements, and links)	$K_{aF} = F_n / F_{ob}$ $K_{aN} = N_n / N_{ob}$ $K_{aC} = C_n / C_{ob}$	F_n – necessary functions; N_n – the number of useful elements; C_n – the number of useful links; F_{ob}, N_{ob}, C_{ob} – the total number of functions, elements and links in the system.
Concentration	K_{bF}, K_{bN}, K_{bC} – the coefficient of functionality level (concentration	$K_{bF} = F_{ocn} / F_{ob}$ $K_{bN} = N_{ocn} / N_{ob}$	F_{ocn} – the number of basic functions; N_{ocn} – the number of carriers of basic

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Principles	Indicator	The calculating formula	Name
	functions, elements and links)	$K_{bC} = C_{vs} / C_{vn}$	functions; C_{vs}, C_{vn} – the number of external and internal links.
Compatibility	K_{cF}, K_{cN}, K_{cC} – compatibility coefficient (functions, elements, and links)	$K_{cF} = 1 - F_{\kappa} / F_{ob}$ $K_{cN} = 1 - N_{\kappa} / N_{ob}$ $K_{cC} = 1 - C_{\kappa} / C_{ob}$	F_{κ} – coordination functions; N_{κ}, C_{κ} – respectively, the number of intermediary elements that perform the coordination function.
Flexibility	K_{fs} – the coefficient of functional potential; K_{cs} – the coefficient of the potential of links	$K_{fs} = F_p / (F_p + F_{ob})$ $K_{cs} = C_p / (C_p + C_{ob})$	F_p – the number of potential functions; C_p – the number of possible links;

Source: compiled by the authors.

The use of these indicators allows giving a preliminary conclusion. The value of the indicator that determines their organizational potential reflects only the formal side of the interaction of the integrated enterprises. The formation and justification of the initial data for preparation of management decisions concerning the implementation of innovative measures are determined by the state of the segments of the domestic and foreign markets for the respective products. A methodology for calculating the integration of the industrial and production capacity of an enterprise can be developed on this basis.

3.3 Estimations of the accumulated potential of high-technology enterprises

To carry out all the strategic planning activities of business processes in a high-technology enterprise, there should be an indicator "accumulated potential" of an enterprise $X(\alpha, t)$, which depends on the time *t of* some flow $x(t)$, as a function defined by the expression (24):

$$X(\alpha, t) = \sum_i \frac{x(t - \tau_i)}{(1+\alpha)^i}, \tag{24}$$

where α – the level of specific profitability of production in the relevant market segment, %; $x(t - \tau_i)$ – the volume of income received from the sale of manufactured products for the target period $(t - \tau_i)$ in the currency of the country of origin.

The indicator "accumulated potential" $X(\alpha, t)$ reflects the result of the company's incomes and payments of previous years. The increase (from *U* to "input" to *X* "output") in the index "accumulated potential" $X(\alpha, t)$ can show robustness against competiveness of the company. Next, the ratio of the output potential *U* to the input potential *X is* calculated. It makes it possible to estimate the accumulated potential during the target period. At the same time, it is possible to justify the increase or decrease in the obtained integrated characteristic of the company's competitiveness (formula 25):

$$\mathrm{k_{кс}} = \frac{\mathrm{X}}{\mathrm{U}}. \tag{25}$$

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In the process of determining the groups of parameters of the enterprise's competitiveness, the main indicator is β. Its value can be determined from the formula 25 and compared with the result obtained $k_{\kappa c}$. The area of unsustainable development of a high-technology enterprise establishes an increase in the capacity at the input, and the production capacity of the enterprise is reduced as a result of inefficient use of resources. In this situation, the value should meet this condition: $k_{KC} < \beta$. The increase in the output potential *X* over the input potential *U* can be due to an increase in the production potential and a change in the input flow to the subsequent result. This condition is met when the activity area of a competitive high-technology enterprise $k_{KC} > \beta + \Delta\beta$. If the condition $X > U$ is met, the condition $\beta < k_{KC} < \beta + \Delta\beta$ shows that the margin of competitiveness is reduced. Thus, the point k_{KC} is closer to the coordinates *X*, *U* and the probability of crossing the boundaries increases. The value of intervals $[\beta, \beta + \Delta\beta]$ can be used to combine high-technology enterprises with the aim of increasing the competitiveness of knowledge-intensive products.

The deviations from positive maximum values of the coefficient k_{KC} from β or creation of conditions k_{KC} within the scope of the allowed values are the key task in the production management and industrial enterprise. It should be noted that any organizational decision should be ensured by exceeding *X* by *U*, and when estimating the forecast advantages of the competitiveness of enterprises, it is necessary to take into account the length of the time interval and the reserve of production capacity.

4. Results and Discussion

Estimation of the effectiveness of high-technology enterprises competitiveness.

Formulation of the task. Let us suppose a company "A" has a gain of 50 billion USD, the balance is 150 billion USD, the company "B" has a gain of 15 billion USD, the balance is 150 billion US dollars. It is necessary to calculate the efficiency of the potential of enterprises taking into account their integration.

The solution of the task. The average values of the competitiveness coefficients k_{KC} for enterprises "A" and "B" over the period of 4 years are equal to 0.28 and 0.08, respectively. The comparison of these indicators allows stating that the competitiveness of the second enterprise is 3.5 times lower than the former has. The analysis of the trends of the calculated values k_{KC} (Table 3) indicates their growing difference among companies and a significant drop in the competitiveness of a company "B" in 4 years.

Table 3. The values of k_{KC} enterprise competitiveness index

Company's name	1 year	2 year	3 year	4 year
Enterprise A	0.7	0.2	0.1	0.2
Enterprise B	0.2	0.1	0.0	- 0.1

Source: compiled by the authors.

The negative value of k_{KC} (-0.1) shows inefficiency in the use of the assets of the enterprise – with an increase in 4 years in both non-current (by 30%) and working assets (by 6%): the growth of the accumulated potential of assets is accompanied by a decrease in the value of the accumulated potential of proceeds from the sale of products. The alliance of enterprises "A" and "B" while restructuring the production system when integrating

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leads to an average value of the competitiveness index at the level of 0.18. The initial decline in the competitiveness index k_{KC} to zero is replaced by an increase in this value, which characterizes the manifestation of positive changes caused by restructuring (Table 4).

Table 4. The values of the index of competitiveness k_{KC} in the integration of enterprises

Company's name	1 year	2 year	3 year	4 year
Company A + Company B	0.5	0.2	0.0	0.1

Source: compiled by the authors.

If these structural changes in the production system of two enterprises remain, achieving the competitiveness of company "A" (k_{KC} = 0.7) should help to reduce this long period of increasing the competitiveness of the new integration of enterprises.

Conclusions

The realization of structural changes in high-technology industries requires an estimation of the effectiveness of taken decisions. The way of determining the economic feasibility of organizational solutions is focused on fixing the dynamics of competitiveness of the transformed object. The proposed criterion for estimating the competitiveness of a high-technology enterprise is based on the correlation of its potentials over a certain time interval taking into account actual risks. The establishment of the boundary values of the indicator k_{KC} makes it possible to segment the competitiveness space and identify areas of different resource consumption efficiency. It can be seen that there is a lag in one of the indicator of average competitiveness of the compared enterprises; the analysis of the dynamics k_{KC} determines not only the progressive or regressive nature of the trend but also provides an opportunity to reasonably choose the production site as the core component of the subsequent integration of producers.

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ANALYSIS OF THE DEVELOPMENT TERMS OF THE RADIO MARKET IN THE SLOVAK REPUBLIC *

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Abstract. The radio market in the Slovak Republic is characterized by the introduction of a dual system that brings the market environment of supply and demand after the change of social conditions after 1989. Since the main source of funding for commercial radio stations and partial revenues of public radio stations is revenue from the sale of advertising space, their main objective is to maximize their share of the results achieved (the number of listeners and the total market share) from advertising within the ad. The main objective of the presented research study is to analyze the development trends of selected Slovak broadcasters in the monitored period 2011-2015, focusing on the analysis of the listening volume and the amount of financial resources spent on advertising for selected Slovak radios in the Slovak Republic.

Keywords: radio stations; broadcast; market development; market of radio stations; analysis; advertising amount

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1. Introduction

The size of the radio market can be analyzed based on two fundamental aspects: share of listening to radio (audience rate) and the amount of advertising placed in the broadcast. For television and radio media, the "audience rate" indicator is used, which represents the proportion of viewers and listeners watching individual programs in the 15-minute interval. (Kita, 2010, p. 351; Duľová Spišáková et al. 2017) "In general, the advertiser is interested in the audience, which tells how many people are watching the station when the advertisement is broadcast." (Burton, Jirák, 2001, p. 322) serve as a warning signal to avoid a radio station if it does not want to lose its listeners, or vice versa, how to keep it up for its listening. When analyzing listening, it is advisable to develop each of the selected radios separately, to find the most important events that have influenced the development of the radio and then to see the radio market in a comprehensive way.

Tracking of ad volume may be important for listeners in the form of physical and legal persons who are potential advertisers on that radio. "Advertisers are scheduled to adhere to complex criteria from advertisers with the aim of maximizing the revenue for the company." (Toth, Mura, 2014)

The radio market in the Slovak Republic during the financial and economic crisis (Toth, Mura, 2014) recorded an economic recession and a decline in marketing investments (Poliačiková, 2017, Mura et al. 2017). As noted by Patrik Groma (2016, p. 55), investment in the advertising market in Slovakia in 2010 (in the time of the crisis) has fallen by half compared with 2008 when it was greatest. Even from the above, we were interested in the development of the radio market in the Slovak Republic in recent years.

2. Methodology

We have divided the research model into a pre-empirical phase (research area, topic, objectives of investigation, research questions) and the empirical phase (data collection, data analysis, and answer to the questions). The design of the research area and the research topic can be defined as follows.

Research area: selected national radio broadcasters in the Slovak Republic.
Research topic: determinants of the market share of selected Slovak radio stations in the Slovak Republic.
The main objective of the presented research study was to analyze the development trends of the selected Slovak broadcasters in the monitored period 2011-2015.

The secondary research goal of the empirical part was to analyze the audience and volume of spent financial resources for advertising for selected Slovak radio companies in the Slovak Republic. The market share of the radio station and the number of listeners along with the coverage of the radio is the most important parameter for the advertiser. Based on this data, it is decided whether the volume of radio advertising investments in radio spots is the right choice, so it can bring the expected effect. It focuses on putting the ad in the broadcast to cover the area where it needs to reach out to potential customers and listen to the radio, then it can choose the most seamless option for itself, choose one radio station, deploy an advertisement to multiple radio stations, focus on nationwide coverage or only regionally. The advertising space of the radio can select and have price lists where the client can choose what he needs.

In the case of further planning and research, we prioritized the concept of research questions prior to identifying research problems, as recommended by Keith F. Punch (2008, p. 29). We identified one major research question (VO) that we have developed on three other specific research questions:

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The main research question: What were the developmental trends of the market of selected Slovak radio stations in the Slovak Republic during the monitored period 2011-2015?

Specific question: What is the development of listening to selected Slovak radio stations in the monitored period 2011 to 2015?
Specific question: What was the development of the advertising volume in selected Slovak broadcasters between 2011 and 2015?

Research base: There are currently 41 radio stations and radios in Slovakia that have allocated frequencies for broadcasting via terrestrial broadcasters and the Internet, including nationwide, multiregional, regional and local radio stations. Due to the extensive research file, we decided to focus on the 5 most popular 5 Slovak radio stations: Radio Expres, Radio Slovakia, Radio Fun, Europa 2 radio and Fine radio, based on the Median SK survey[†], which was held in 2016.

Several research methods have been used to investigate the problem. Data collection was obtained by analyzing the audience. Data is processed based on available surveys, TNS Slovakia, Ltd., which, within the framework of its activity, is conducting monitoring of advertising expenses at radio stations or a national MML-TGI survey of MEDIAN SK, which monitors the listening frequency of radio stations in several annual waves surveys conducted on the sample of respondents aged 14-79 years. This research sample is always in a different number, in the analyzed years ranged from 4076 to 4385 respondents.

Data was further analyzed by statistical methods (statistical average, time series analysis) and comparative methods. When analyzing time series, the most commonly used graphical method is used. This graphical analysis is important, for example, for preliminary data analysis. It is easy to read the basic information about development and to reflect this data (Kovaľová, Kulčár, 2017). The most commonly used chart for such an analysis is the line graph. It is composed of two axes - a horizontal one on which the time variable is located and the vertical one, on which the time series values are located. In addition to this graph, you can also use a column graph. (Rublíková, Příhodová, 2008, Cseh Papp et al., 2018).

The basic characteristics of time series are divided into two large groups. The first are the descriptive characteristics (diameters) and the second are the rates of dynamics. Determining the average time value may be important for some analyzes. The dynamics rate plays a major role in characterizing the basic features of the timeline development. We will use a simple chronological average for the analysis.

3. Result and Discussion

Based on the analysis of the development trends of selected Slovak broadcasters in the Slovak Republic during the monitored period 2011-2015, the following conclusions can be drawn:

The top market share in all the monitored periods was Radio Expres, which reached 19.3% market share in 2011, and it is interesting to note that this position has been defended despite its lowest share among these years. Behind it was Radio Slovakia with 16.6% and 3.3% less, with the result of 13.3% of the market share being Fun Radio. Below the 10% threshold, with 8.4%, Radio Gentle was placed in the penultimate position, with Radio Europe 2 having the smallest share of analyzed radios with 6.7%.
The year 2012 brought the three radio stations an increase in their share compared to the previous year. Radio Expres has improved and finished with the highest share of 19.5%. Although with 2.6% downward versus Radio

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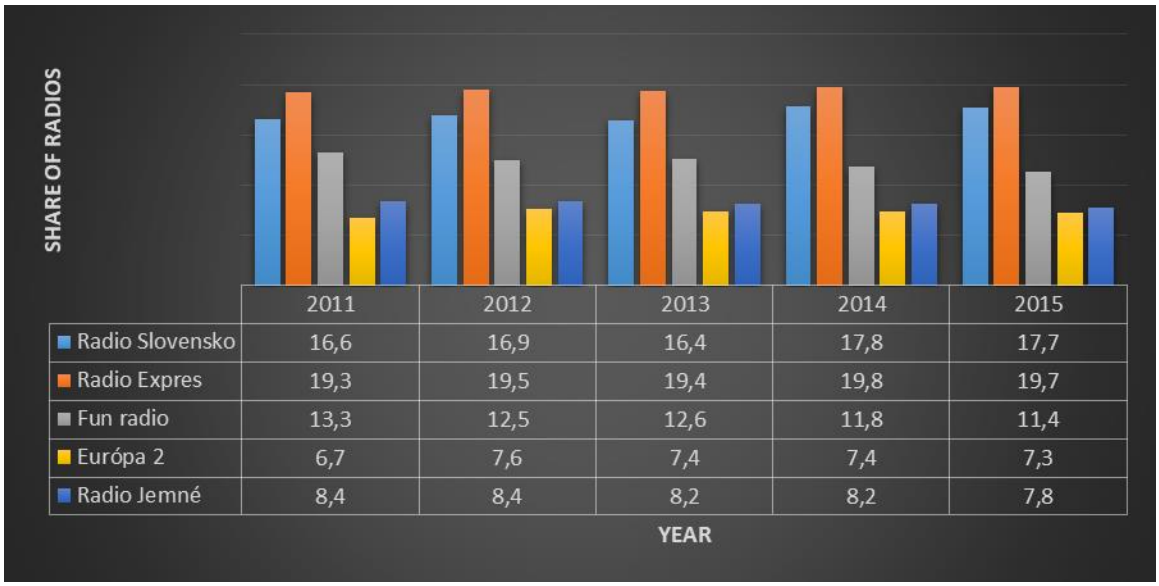
Expres, the second-best position was again defended by the public service Radio Slovakia with 16.9%. Decrease compared to 2011 recorded the Fun Radio by up to 0.8% and reached a market share of 12.5%. This was one of the biggest surprises this year, as this radio has not recorded such a year-long decline in its history. Similarly, the fourth position was defended by the Jemné radio with the same market share as last year, and although Radio Europe ended fifth as a fifth, it achieved the highest year-on-year increase by 0.9% and its share of 7.6% in the radio market.

In 2013, the order also did not change, and the numbers were very similar to the previous year. The same share and therefore 3rd place occupied Fun Radio, which defended its last year's share of 12.5%. Other radios have experienced year-on-year decreases ranging from 0.1 to 0.5%, which can be considered as minimum deviations.
The year 2014 was somewhat more interesting when comparing the results, as the leader of the Radio Expres market reached almost 20%, as well as Radio Slovakia with a year-on-year increase of up to 1.4% and 17.8%. The opposite and falling trend was recorded by Fun Radio, which dropped to 11.8%. Radio Europe 2 and Fine remained at the same level of the previous year.

In 2015, the watched radios fell again, though only by 0.1 to 0.4%, but we can say that no other radio did not endanger its position until it was noticed that this fall was shifting radio Europe 2 and Gentle there remains a minimal difference between them, and their next development will certainly be interesting to follow.

A summary of the development of the radio market in Slovakia and their share was also recorded through Figure 1, whereby we are also able to visualize the situation on the radio market in the period under review.



	2011	2012	2013	2014	2015
Radio Slovensko	16,6	16,9	16,4	17,8	17,7
Radio Expres	19,3	19,5	19,4	19,8	19,7
Fun radio	13,3	12,5	12,6	11,8	11,4
Európa 2	6,7	7,6	7,4	7,4	7,3
Radio Jemné	8,4	8,4	8,2	8,2	7,8

Fig. 1. Radio market share report 2011 – 2015 (%)
Source: Processed from the results of the MML-TGI National Survey of MEDIAN SK

Based on the analysis of the listening of selected Slovak radio stations in the Slovak Republic in the monitored period 2011 to 2015, the following conclusions can be drawn:

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Radio Expres reached the highest average daily listening rate in 2011, when the number of listeners was less than 870,000, Slovakia was the closest to the top radio with the number of listeners 746,573. About 150,000 less listeners had Fun Radio, below 600,000. Approximately the same distance in number of listeners was followed by the Jemné radio, which reached just over 377 thousand listeners that year, and the youngest radio of the monitored - Radio Europe 2 listened to an average of over 300 thousand listeners.

The year 2012 was successful for some radio stations, including the first Radio Expres, when its number of listeners jumped to 881 thousand, and Slovakia could be happy with an increase of 14 thousand listeners. The decline of the radio market we recorded in 2012 was associated with a significant drop in audience of more than 30,000. The exact opposite was the radio Europe 2, which during the year could convince its qualities up to 345,019 listeners, which was an incredible jump among all radio stations this year, as the increase was up to 45,000 new listeners compared to the previous year. There was almost no change in the number of listeners in Radio Delight, although the minimum increase of less than a thousand listeners could not be overlooked. 2013 was a declining one, as each of the radio stations surveyed experienced a drop-in listener, and none of them could stand in the way. Radio Slovakia lost less than 30 thousand, Radio Expres by about 15 thousand, Fun radio with at least 300 listeners and Radio Europe 2 and Fine by about 15 thousand listeners. However, this loss did not cause this radio socket to endanger another radio, or some of them would be pushed to the bottom of the radio.

The year-on-year results were significantly better in 2014, when the first public radio circuit, Slovakia's radio recorded a record year-on-year increase of its listening base, by as little as 65,000 listeners, and it was the highest number since 2011. Of course, that in the past has reached more numbers and the possibility of broadcasting through commercial stations has significantly weakened its market position, we perceive this positive shift as a breakthrough. Radio Expres has improved by less than 20,000 listeners, but Fun Radio has dropped down to nearly 40,000 listeners, and we have been able to track its dramatic weakness in the percentage assessment as well. Radio Europe 2 and Delice defended their figures and we did not notice any significant differences compared to the previous year.

The year 2015 was influenced not only by increased listening to other national and non-radio watchers, but also by a great upheaval in the radio market, when NRSR MPs approved an amendment to the Act on Mandatory Quotas for Slovak Music. Radio, even though the law came into force only in 2016, it had to adapt to this unsuitable situation and gradually change its broadcast and its structure. And since the listener was accustomed to his favorite radio, he was given the opportunity to prefer it and wanted a program better for radio that played other than Slovak songs. This boom was temporary because, ultimately, the obligation to play at least 20 percent of Slovak production in 2016 and 2017 at least 25 percent will have to be met by all Slovak commercial radio stations. Public radio and its channels have these percentages increased first to 30% and later to at least 35%. Another condition of this law is to play these songs in the 6th to 24th hours, that is, at times when the listener has no chance to avoid them and the radio to fulfill this duty during the night broadcast, when the listening radios are logically the lowest.

We can therefore blame the decline of the Slovak Radio by about 10,000 listeners, as well as the 20,000-pound decrease of Radio Fun as well as the Fine Radio. In approximately the same numbers, only Radio Expres and Europe 2 were moving.

An overview of listening for the 2011-2015 reference period is shown in Figure 2 and contains the exact figures for the number of listeners in each year.

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	2011	2012	2013	2014	2015
Radio Slovensko	746573	760571	733482	797851	788742
Fun radio	595934	563843	563546	526164	508111
Radio Európa 2	300776	345019	329970	326984	327721
Radio Expres	869596	881046	866471	884374	882051
Radio Jemné	377611	378438	362886	365378	347149

Fig. 2. Radio listening report 2011-2015 (in audience count**)**
Source: Processed from the results of the MML-TGI National Survey of MEDIAN SK

Based on the analysis of the volume of advertising in selected Czech broadcasters in the years 2011 to 2015, the following conclusions can be drawn:

In 2011, less than € 77 million was spent on radios on the radio. It was no surprise that the biggest share of this volume went to Express, which had the highest market share that year. He sold more than € 23.5 million for his ad sales. The second largest amount was attributed to Fun Radio, and it was less than 19 million euros. An interesting fact compared to these two radios is that even though Fun Radio broadcasts up to 400 hours of commercials and Radio Expres only around 300, there is a significant difference in the profits of these radios. Radio Expres reached 30.7% of the volume of advertising and Fun radio a little less, and 24.7%. In smaller numbers the other 3 watched radios moved. Through them, much less money has been invested. The third on the ladder was the Gentle Radio, which sold over 7,5 million Euros of advertising space, the Public Radio of Slovakia for nearly 7,4 million Euros and the least received radio Europe 2 and less than 5,8 million Euros. These investments have also determined the proportion of radio advertising with the result of Radio 10%, Radio Slovakia 9.6% and Radio Europe 2 with 7.5%.

The increase in advertising revenue recorded total radio stations in 2012 by EUR 4.3 million compared to the previous year. When comparing the watched radios with the previous period, we can also see how radios were developing in this direction. The biggest surge in investment was surprisingly by the Delight radio by 15.3%, the Radio Express by more than 12%, the Fun radio had to be satisfied with a 5% increase. Radio Slovakia also sold more than 1.4% of the advertising space, with some increase without price changes, nor can it be expected, because it has a legally defined advertising space that it can sell, and it does not have much space in comparison to commercial radios. This year, the only radio recorded a decrease in the volume of advertising Europa 2 radio by -2.3%.

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The decline in the amount of radio advertising investment was recorded in 2013. The year-on-year decline was 4.4%, after a decrease of 3.6 million euros. Surprisingly, Radio Slovakia recorded an increase of 3.8%, followed by Radio Expres +0.8%, the other radios received year-on-year minus numbers. Radio Europe 2 in this direction decreased by -6.6%, Radio Delicate by -6.1%, Radio Fun by -4.8%. Even after these year-on-year changes, however, there was no change in the percentage of the volume of radio advertising. For the third year, Radio Expres has the largest volume of 34.49% and the highest in the current reporting period. Fun radio reached 24.24%, Radio Delicate Less than 11%, Radio Slovakia kept its average level at 9.9% and Europe 2 again the smallest share 6.82%.

The year 2014 already indicated an upward trend and a positive development for some radios. Total spending on the media has finally exceeded 1 billion and has also been reflected in radio advertising, but in reallocating to individual radio stations. Fun Radio has sold its ad space with the highest ever increase + 24.23%, still a still newcomer to the Gentle +10.42% radio. The curve of other radios had a decreasing tendency. Radio Slovakia dropped by -5.39% and compared to 2013 by about 400 thousand euros. Radio Expres went down by 1.2 million, a drop of 4.36%, only Radio Europe 2 remained stable. In the stock, Fun Radio was the most significant player, gaining 33% market share, but still the second best, Radio Expres did not jump with its 36.15%. Overall, the other radios also had a higher share this year. Radio Slovakia reached over 10.3%, Radio Mere over 13% and Europa2 almost 7.5%.

In the period under review, the year of 2015 was the most investment-intensive year. Almost 1.3 billion euros were invested in advertising, and radio stations were also pleased. The year-on-year increase in investments from suppliers exceeded the plus value of + 16.7%, and it was purely from the sale of radio advertising. Once again, the largest share of advertising is attributable to Radio Expres in 2015, and more than 35%, Fun Radio sold its space by more than 4.5% year on year, Radio Slovakia up 22.47%. Maybe the link to radio sales through radio services has caused an enormous increase in profits from the sale of advertising via Gentle Radio - up to + 40.44% year on year, as was Radio Europa 2 with an increase of + 6.44%.

After performing and evaluating all analyzes, it can be stated that even if the market share of radios in the market for listening has its own development assessed on its own parameters, the market for advertising on these radios is comparable with it.

During the monitored period of 2011 to 2015, it is also seen in practice what we have also pointed out with theoretical knowledge. Listeners are the most important part of each radio. Their number and effort to increase them guarantees them positive results in terms of their market share. This is also considered by advertisers and their decision-making on the radio station is clearer and easier.

Both markets are somewhat affected, as can be seen in particular in the radios in both regions. The proportion of ad volume in the watched radio is shown in Figure 3.

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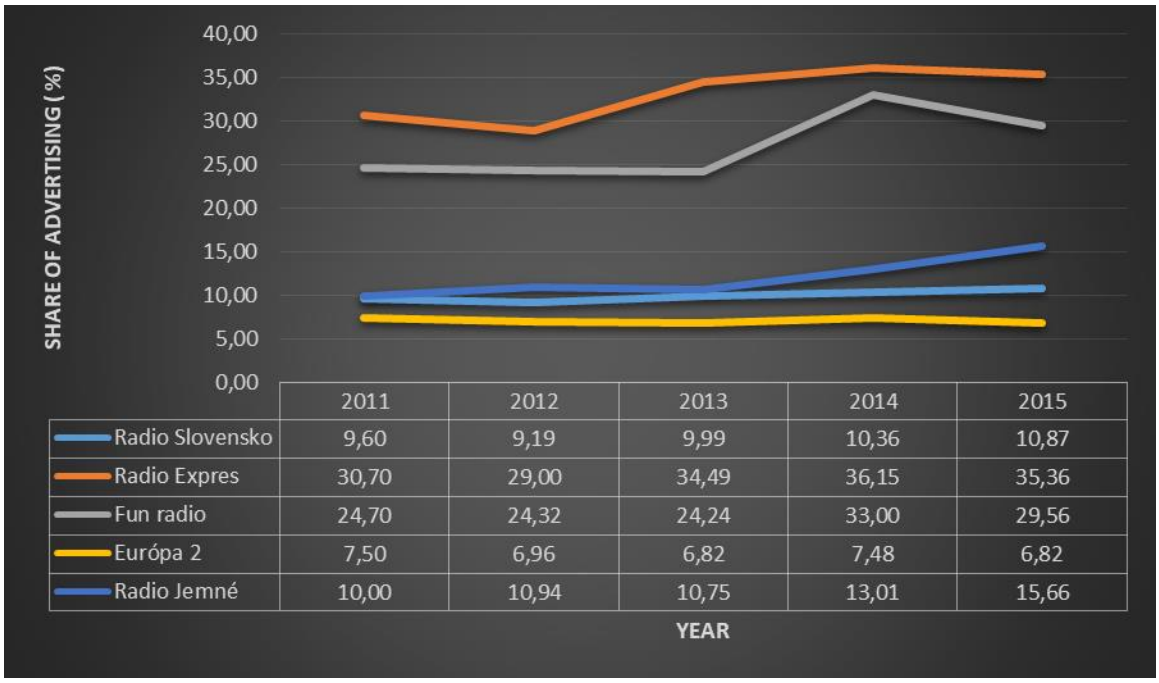

	2011	2012	2013	2014	2015
Radio Slovensko	9,60	9,19	9,99	10,36	10,87
Radio Expres	30,70	29,00	34,49	36,15	35,36
Fun radio	24,70	24,32	24,24	33,00	29,56
Európa 2	7,50	6,96	6,82	7,48	6,82
Radio Jemné	10,00	10,94	10,75	13,01	15,66

Fig. 3. Overview of the volume of radio advertising in 2011-2015 (%)
Source: Processed from the results of TNS Slovakia, Ltd.

As we already have seen in this discussion, even after the advertising market has suffered from the economic recession and overall decline in marketing investment, we see how the development of radio advertising investment is rising again. For the sake of clarity, using Figure 4, we have attempted to show the specific development of radio advertising investment expressed in exact figures in EUR.

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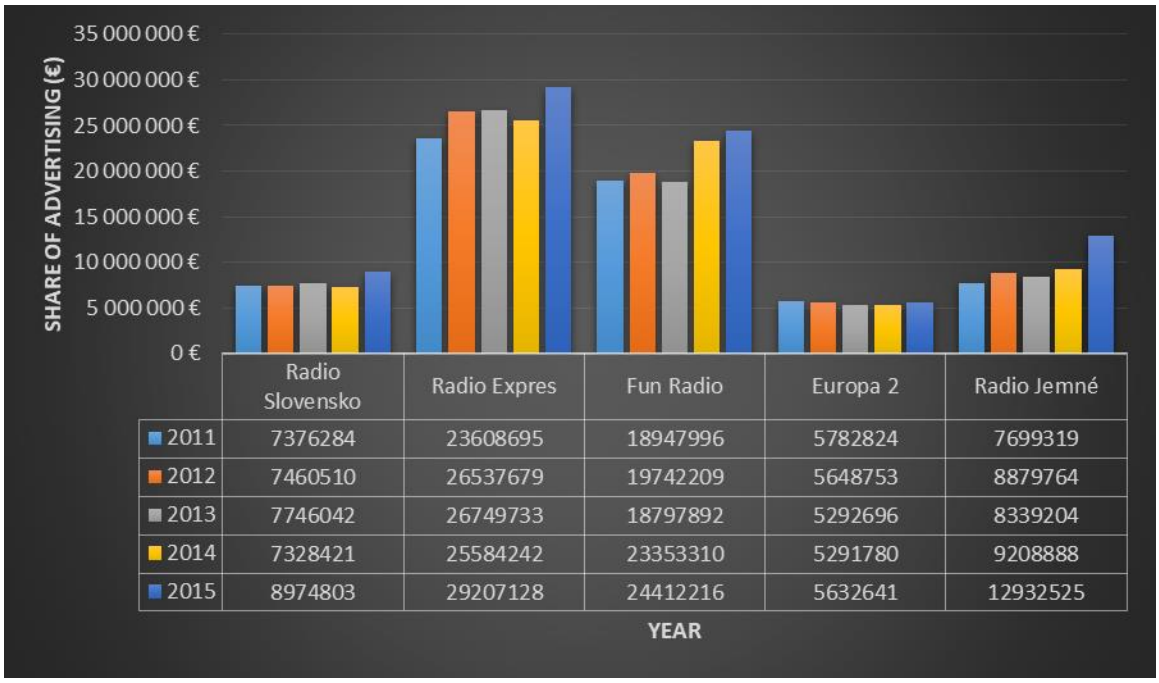

	Radio Slovensko	Radio Expres	Fun Radio	Europa 2	Radio Jemné
2011	7376284	23608695	18947996	5782824	7699319
2012	7460510	26537679	19742209	5648753	8879764
2013	7746042	26749733	18797892	5292696	8339204
2014	7328421	25584242	23353310	5291780	9208888
2015	8974803	29207128	24412216	5632641	12932525

Fig. 4. Overview of the volume of radio advertising in 2011-2015 (€)
Source: Processed from the results of TNS Slovakia, Ltd.

4. Conclusion

Based on the analysis of the development trends of the selected five Slovakian radios in the Slovak Republic during the monitored period 2011-2015, the radio market was more stable, with the radio stations not ranked in the highest positions. While there have been minor variations in the market share of radio frequencies, whether in decline or increase, the order of these radios has not changed in one year. It can be said that the very success of radio stations to succeed in the market and to achieve a certain market share depends primarily on the size of the market and the number of competitors. Each radio station has its own defined format as well as its target group, and in many cases, these target groups and their age definition are very similar. For this reason, listeners are the most important aspect in determining their share of the radio station market, and are also a magnitude that decides on the decline or increase of the market share of each radio.

In the period under review, following the economic recession and the decline in marketing investments after the financial and economic crisis, we have seen a clear increase in investment in radio advertising. It should be noted that the development of investments in radio advertising influences a number of factors, with priority being not only to the economic and market situation of investors, the development of the economy, but also to the growing number of radio broadcasters and the situation on the media market. It is also necessary to attach great influence to the social behavior (Benda-Prokeinová et al., 2017) and to the continuous development of broadcasting. The radio market is also nowadays requiring ever greater compromises. In many cases, it happens that the radio advertising space is being sold together with another competitive station because advertisers are demanding it from the point of view of the most effective investment of advertising finance in terms of advertising efficiency and targeting the audience.

The media market is one of the most dynamic parts of the economy, as market conditions, media characteristics and audience preferences are constantly changing. For this reason, that radio stations constantly work on their development, broadcast structure, and adapt to the time that influences listeners. By fulfilling these goals, they have a prerequisite not only to keep their listener base, but also to try to increase it.

The beginning of the 21st century is characterized by a massive increase in information and communication technologies, resulting in the development of network media. Nevertheless, it must be said that radio has a significant place in the media system in the Slovak Republic and will be an important part of the media market in the coming years. In the case of radio, fortunately, the situation is not as dramatic as in the case of declining sales and daily press readings, as confirmed by several studies at home and abroad. (Lincényi, Fabus, 2017)

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THE PROCESS OF INDIVIDUALISATION OF PUNISHMENT IN INSOLVENCY CRIMES

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Abstract. In the context of considerations concerning justice in the punishment of criminal offenders it is necessary to focus on the issue of individualisation of the sentence. Through this process the court determines the offender's particular kind of punishment and sentence. The punishment should subsequently be an expression of society's idea of the state's fair reaction to the offence committed. The authors have focused on the process of individualisation of punishment in the case of sentencing offenders in insolvency crime. The theory of rational choice and ideals of restorative justice are of crucial importance in the authors' thinking. In reflection of the object of the criminal activity and the element of reciprocity (presuming rationality of the perpetrator) we come down to the suitability of the more common imposition of pecuniary penalty on these perpetrators. The text analyses both the advantages and disadvantages of pecuniary penalty, not just in relation to insolvency offenders.

Keywords: insolvency; insolvency crime; punishment; criminal liability; pecuniary penalty; individualisation of punishment

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JEL Classifications: K14

Additional disciplines: law

1. Introduction

Justice is an age-old human ideal, whose content has changed depending on the specifics of the particular stage of the cultural and historical development of human society. Over the course of these metamorphoses of society, not just the content of justice has changed, but also its position in the legal code of states of the continental legal system. The local legal system is based on elements of the Christian faith, Greek philosophy and Roman-law tradition (compare e.g. Kasinec, 2015). Celsus's statement that law is the art of goodness and equity (*Ius est ars boni et aequi*) is well known and it was Cicero who said that **justice ensures that everybody gets what they deserve** *(Iustitia in suo cuique tribuendo certinur).* **There thus exists between justice and law and age-old bond, which seeks to achieve voluntary acceptance of law from the side of its subjects.**

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Pinz succinctly states that *"it is the very idea of justice that provides for the phenomenon of the right to respect and gravity*" (Pinz, 2011) and for this reason, justice is *"inextricably linked to law itself and it can be said that justice is the essence, the core of law, or an immanent category of law"* (Cibulka et al., 2013). *This bond between law and justice has become inextricable in the conditions of a material legal state, in which legal methods of regulating society dominate. Law in these terms is perceived as an instrument serving to fulfil a given ideal.*

The value of justice, which has been given the form of legal principle upon its reception into the legal code thus became established in the legal codes of states having the continental legal system as a core constitutional principle (leading idea), representing the pillar of the proclaimed legal state. As a result of its presence in the material core of constitutions, it then feeds into all legal branches of the legal code and influences individual legal norms and legal institutes of these legal branches (including the way they are interpreted and applied). This concerns a core constitutional principle that should shine through into other legal regimentation, in particular that of a sub-legal nature, including implementing regulations, whilst such legal regimentation should also be interpreted in the light of the principle of justice. (Krajčovič, 2016). The above naturally relates in particular to the criminal law area, or (in the procedural sense) to criminal proceedings, as proceedings conducted in the purview of the Criminal Code, the purpose of which is: (1) to ascertain the offence and circumstances under which it was committed; (2) subsequent fair and expedient punishment of the offender; and (3) overall strengthening of citizens' trust in the state and authorities acting on its behalf (law enforcement agencies and courts) (compare Čentéš et al., 2012).

The requirement for justice (and the provision of adequate legal safeguards) is most often perceived particularly in relation to deriving responsibility for unlawful action (behaviour in society) especially in punishing the offender for committing a socially dangerous act classified as a criminal offence. The increased demand of society for preserving justice in criminal proceedings is given in particular by the "diversity" of the range of criminal sanctions and their sentences. The imposition and execution of the latter severely restricts the ordinary life of the offender, and this not just for the duration of the sanction imposed, but also after its execution (until the sentence is extinguished). It is on this basis that there rests the legitimacy of the requirement that the punishment imposed on the offender be neither inappropriately strict (Draconian punishment), nor formalistic – inappropriately mild. It is precisely this proportionality of derived repression that is the primary sign distinguishing retribution from revenge.

Both extremes of punishment are objectively unjust, jeopardising the achievement of the purpose of criminal prosecution. We define the purpose of punishment in accordance with § 34(1) of the Criminal Code as the protection of society against perpetrators by preventing a perpetrator from committing further criminal acts and creates the conditions for his correction in order that he lead an orderly life and concurrently discouraging others from committing unlawful acts; punishment also expresses the moral conviction of the perpetrator by society.

The need for proportionality was accentuated by Beccaria: The public interest is not only that crimes are not committed, but also that they are rarer. So obstacles that discourage people from crime must be stronger, to a degree that they are contrary to the public interest and correspond to the motive leading to committing the crime. The goal is therefore nothing other than to prevent a criminal from again harming citizens and to discourage others from doing the same. Punishments and the way in which they are imposed must be carefully chosen so that the punishment, once served, leaves a more effective and lasting impression on the minds of men and an impression less painful to the criminal's body (Beccaria, 2009).

Although thoughts of justice in a particular case are inextricably linked with the criterion of **equality** and equal (similar) approach to legal subjects in the same (similar) situation, there must not be confusion over the fact that crucial in searching for an answer to the question of who (or which perpetrator) deserves what in the particular

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case, is the actual **individualisation** of the imposed sanction. An individualised approach to each perpetrator is to ensure the fulfilment of the criterion of fairness of the punishment and in its content it expresses the level of the humanist approach to the perpetrator and the level of respect for his human rights. With this regard we agree with Henčeková, inspired by Fromm (Fromm, 2014), that for establishing justice it is not enough to set rules using purely logical, rational operations, but in these rules it is necessary to take into account primarily the person as a human being, which is not the opposite of a logical and rational approach, but is the boldest consequence of rationalism (Henčeková, 2017).

From the theoretical point of view it is necessary in this process to focus on (take into account) the relatively stable elements on which justice is based. The authors understand justice in its pluralistic sense and, in accordance with Schmidtz, recognise as relatively stable elements: *reciprocity, merit, equality and need*. (Schmidtz, 2015) **Only on the basis of weighing the above elements can there be determined and given to each perpetrator that what is right to him**.

From the practical point of view of criminal proceedings it is necessary to understand **individualisation of punishment** as the decision-making process of the criminal court conducted in the framework of the particular law-application process, in which there is a cumulative weighing (balancing) in particular of those facts relating to the perpetrator's deeds: *the manner in which the offence is committed and its consequence (violation of or threat to a legally protected interest), culpability (intentional negligence), motive, aggravating circumstances, mitigating circumstances, personal and other (family, property, etc.) circumstances of the perpetrator and, last but not least, the possibility of reforming the perpetrator.* Naturally, in certain cases it is necessary to reflect also other facts, e.g. *the degree of co-perpetration, the form of participation in the criminal offence, the multitude of criminal activity* or *the developmental stage of the offence.* Only in this way can it be ascertained what punishment and equally what scope of it will be **fair**, **proportionate** and **legal** in the individual case (compare Chovancová, 2017).

Criminal activity of a same type (economic, property, violent, etc.) has common implications for the process of individualisation of punishment. The object of criminal activity (legally protected interest, value) and the manner in which it is violated or threatened (the objective side of the subject matter) has an undoubted influence on the court's considerations regarding the area of fundamental human rights of the perpetrator that are to be affected by the sanction imposed. It thus represents a sort of guide in determining in what area of the perpetrator's normal life should suffer in the interest of fulfilling the purpose of punishment.

For the purposes of this study, we considered what common implications for the process of individualisation of sentences arise from the perpetrator having committed an insolvency crime that, in terms of the type of object, falls within the category of property crime. We particularly focus on the fact as to whether in terms of the reflection of the element (fairness) of reciprocity there can be identified the most suitable area of offender punishment that should be favoured in the process of individualisation of punishment. Naturally, accepting the possibility of considering a criminal prosecution, provided that the court can justify such choice accordingly.

The authors are of the opinion that generally the most appropriate alternative punishment imposed for committing any of the insolvency offences is pecuniary punishment, through the execution of which the perpetrator's property (asset values) is reduced. An important fact is that the state's claim from a legally imposed pecuniary penalty (from the legal point of view in the Slovak Republic) represents an intact (or untouchable) claim in the bankruptcy administration proceedings of a natural person. For such offences are punished in no small number members of statutory or other bodies of the bankrupt – legal person. Since the offender is required to pay (perform) the pecuniary penalty even though that the recovery of his other claims has ceased in consequence of a possible "declaration of bankruptcy", the inevitability of the punishment is thereby strengthened, and its essence

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lies in the fact that the timely detection of a crime and the imposition of a sentence should convince the perpetrator of the fairness and inevitability of the punishment not just in terms of the fact that it has been imposed, but also from the aspect of its probable execution, whereby it helps achieve the purpose of the punishment both at the level of repression and prevention (Kolesár, 2010). In comparison with the severity of the punishment, its inevitability acts to a much greater degree preventively *ex ante* (as regards potential perpetrators) as well as *ex post* (in the case of convicted and fairly punished offenders). This is the basic criminological fact we intend to take into consideration in the process of our reflections. It has to be noted, that M. C. Materni concludes likewise, in connection with Beccari's ideas in contrast to the ideas of Kant and Hegel, in his deep analysis of the theory of punishment. (Materni, 2013).

2. Insolvency offences directed at enrichment

For the purposes of this study, we focused on the group of **insolvency crimes** (in professional literature they are also referred to as bankruptcy crimes), that are of a property nature – their occurrence in society adversely affects another's property. Property crimes mean those offences having **property** as the primary subject matter. *"Property is, alongside right of ownership, also other property rights, whilst criminal law protection applies also to the undisturbed possession of a thing. (...) Property means not just a thing, but also various property rights (e.g. claims)"* (Mencerová; Tobiášová; Turayová et al., 2014).

The range of acts for which criminal sanctions may be imposed and aimed against property is not just diverse, but also numerous. In the Slovak Republic we understand property crimes as comprising in total 40 unlawful acts marked in the Criminal Code as a separate chapter. These are divided by legal doctrine (Mencerová; Tobiášová; Turayová et al., 2014) into 4 subgroups depending on the manner in which the perpetrators threaten or violate property rights:

- *crimes of a property nature aimed at enrichment to the detriment of third-party property;*
- *crimes of a property nature aimed at damaging the property of another;*
- *crimes of a property nature directed at usurping utility (furtum usus); and*
- *crimes of a property nature aimed at preying on the criminal activity of another person.*

Below we will devote our attention to the specific group of property crimes aimed at enrichment to the detriment of third-party property that have been committed in connection with insolvency proceedings or the bankruptcy of a debtor – bankrupt (de facto or pretended). We shall understand insolvency crimes as being synonymous with bankruptcy crimes. A specific feature of these acts is that in relation to the insolvency of a debtor the perpetrator through violating or threatening a legally protected interest sought to achieve benefit in his property integrity, or in the property integrity of another person. **Benefit** consists in a quantitative increase in asset values compared to the state prior to committing the crime or no diminishment of these values in consequence of fulfilling statutory or contractual duty that the perpetrator or other person was obliged to fulfil in connection with the solution of the bankruptcy (or its prevention). The result sought by the perpetrator in committing the given crime thus is to be, if generalising to the greatest possible degree, the influencing of the (quantitative, qualitative) property values of the perpetrator or of another person that are affected in the process of the collective arrangement of the bankrupt's property relations. Enrichment should be effected to the detriment of the property of another, most commonly a creditor's claim.

Insolvency crimes we will therefore take to mean those crimes of a property nature that threaten or violate the property of another (mostly of an obligation-legal nature) in connection with this, usually, emergency means of arranging the property relations of a bankrupt. Thus, we are referring to the definition of bankruptcy crimes according to Púry, who characterises them as crimes whose commission is related primarily to contractual legal

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relations between creditors and debtors, with the bankruptcy of the debtor and its solution in bankruptcy or restructuring proceedings and where their subject-matter is the protection of creditors' property interests in satisfying the receivables, the fair resolution of the debtor's bankruptcy and proper course of the bankruptcy and restructuring proceedings (Púry, 2015).

These crimes can be subsumed both under the category of property crime and under the category of economic criminality (although it is based on economic crimes). According to Strémy, for classifying these deeds under property or economic crime, besides the object of the offence and besides the manner in which the crime is committed (the manner of fulfilling the objective aspect of the subject matter) the person of the aggrieved is also relevant. Insolvency crimes fall under property criminality if a natural person is harmed and under economic criminality if a legal person is harmed (Strémy, 2010). We apply a different opinion to the above breakdown. What is significant is, in our opinion, the fact of the (non-)existence of the relation of the criminal activity to the business (economic) activity of the aggrieved and of the perpetrator and the state of the bankruptcy in which these subjects are found. An insolvency offence will, therefore, fall under economic crime even if a natural person – entrepreneur is harmed by the deed. Irrespective of this issue, though, it is necessary to emphasise that insolvency crimes are always of a property nature (they violate or threaten the property of another) and for this reason we will analyse them in the context of the specifics of property crime.

The object of protection is specifically (directly or indirectly) **creditors' claims** that are to be collectively arranged as a result of bankruptcy. There is sought both the protection of creditors' claims (subject-matter) and concurrently also the protection of their enforceability. This is an *ultima ratio* means in relation to protecting the proper and timely achievement of the purpose of insolvency proceedings (bankruptcy, restructuring or consolidation). At the same time we state that not all insolvency crimes are aimed at enriching the perpetrator or another person, as we also indicate that crimes of a different nature (related offences) are committed in conjunction with insolvency crimes.

The essence of these **related offences** lies in the fact that from the time aspect they occur before the debtor goes into bankruptcy, they have a negative impact on the property situation of the creditor or debtor, or may be a consequence of the debtor's bankruptcy itself. Here we can mention in particular the offence of embezzlement, the offence of fraud, the offence of violating obligations in the administration of third-party property, the offence of distorting economic and commercial records, the offence of frustrating the execution of an official decision, the offences of tax and corruption crimes (Ľorko; Smalik, 2017). It is necessary to pay special attention to corrupt behaviour in connection with insolvency proceedings, since the fulfilment of its purpose and the proper and lawful fulfilment of the obligations of entities involved in it are particularly jeopardised by such behaviour (Kováčiková; Kováčik, 2017). We therefore identify with Blažek's opinion that in the case of some of the mentioned group of crimes it is private-law corruption *de facto* without a formal legal indication as a corruption offence (e.g. machinations in connection with bankruptcy and settlement proceedings) (Blažek, 2017).

From the aspect of the objective side of the subject matter, the group of insolvency crimes is succinctly characterised by Beleš as crimes relating to the legal relations of creditors and debtors, the group object of which is the protection of creditors' property rights as well as the protection of the public interest in the lawful and proper course of insolvency proceedings; this concerns crimes relating to the bankruptcy of a legal person (fraudulent bankruptcy, culpable bankruptcy), crimes committed by debtors aimed at frustrating the satisfaction of a creditor (harming a creditor, favouring a creditor), violating obligations in the administration of third-party assets and crimes relating to frustrating the proper course of insolvency proceedings (machinations in connection with bankruptcy and settlement proceedings, frustration of bankruptcy and settlement proceedings) (Beleš, 2017).

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Property is therefore protected by these subject-matters against undiligent or fraudulent conduct of the bankrupt (culpable bankruptcy, fraudulent bankruptcy), against a breach of statutory or contractual duty to act in accordance with professional diligence (breach of obligations in management of third-party property) and the criminal-law protection also protects creditors' right to satisfaction of their claims in accordance with the principles of insolvency proceedings (favouring a particular creditor, frustrating bankruptcy and settlement proceedings).

It is therefore clear that the category of insolvency crimes, with the exception of the offence of violation of obligations in the management of third-party assets, is a **subcategory of property crimes aimed at enrichment to the detriment of third-party property**. In terms of penalisation proceedings, this concerns various deeds. Their commission leads to the exclusion or limitation of the diminishment of the bankrupt's property in the given proceedings (frustration of bankruptcy or settlement proceedings), but also the unlawful acquisition of property benefit in contravention of the principles of insolvency proceedings (favouring a particular creditor) in the collective arrangement of the bankrupt's property relations.

2.1. Sociological background of the debtor's bankruptcy

The sociological-legal context of the examined issue should not be overlooked. First of all we focus on the object of the perpetrator's attack – property. Property can be understood as chattels accumulated in connection with performing various activities in the course of human life, they may be acquired through donation, other means of alienation or inheritance. Most commonly, the source of property is the work effort of an individual in the form of performing paid work or business activity. It may also be acquired by a repaid loan, in which a person undertakes to repay a borrowed amount of money with interest at set due dates.

Regardless of the method of acquisition, the amount of property values influences an individual's purchasing power – the ability to satisfy subjective needs at a particular moment by procuring goods and services for accumulated property values. Besides this, property is a significant part of an individual's social status and therefore fundamentally determines his social standing. It is on this basis that the legitimacy of the protection of property rights (values) by criminal law standards rests.

Besides things, property comprises also **claims** and other asset values that are most frequently a subject of attack in insolvency crimes. Claim must be understood as a subjective right of a creditor to the provision of a certain performance from a debtor, to which there correlates the debtor's obligation to provide such performance. An individual in the course of his life enters into myriad legal relations, from which he incurs subjective rights and obligations. In these relations he holds the status of creditor or debtor, and in synalagmatic relations is concurrently a creditor and debtor to another contracting party. With regard to the fulfilment of contractual obligations, in international and national law there is established the principle of *pacta sunt servanda*, which seeks to preserve certainty in obligation-legal relationships. According to this guiding idea, it is necessary that what the legal entity agreed on be fulfilled. The co-contractor fairly and legitimately relies on the provision of such performance.

The belief that the ideal state is achievable when all obligations cease through the fulfilment of the contracting parties' obligations (solution), is undoubtedly utopian. For objective or subjective reasons, the contracting parties fail to fulfil their obligations properly and on time. As a result the contracting partners' claims mature when this subjective right of the creditor to the provision of the mentioned performance is enforceable. Claims arisen may be individually sued for and performance can be claimed at court. In the case of success at court the creditor may initiate enforcement action to the detriment of the debtor. This is an individual way of recovering a creditor's claim.

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The number of liabilities of a particular legal or natural person is, in today's globalised world, not limited and therefore this burden can, particularly in the course of doing business, often become unsustainable. A debtor thus gets into bankruptcy – a state of insolvency or overindebtedness. It is an objective condition that occurs independently of the will of the subject at the moment when the necessary legal pre-requisites arise; a fundamental requirement being a plurality of creditors (Žitňanská; Ovečková, 2013). The debtor is required to avoid bankruptcy and in the impending occurrence of bankruptcy the debtor is required to promptly take appropriate and proportionate measures to avert it (§ 4(1) of the Act on Bankruptcy and Restructuring). If a debtor is actually entering bankruptcy, the legal code of the Slovak Republic provides for the institutes of bankruptcy, restructuring and consolidation, as a collective way of arranging the property relations of debtors – bankrupts, in the legal codes of the European Union (naturally with certain modalities).

In the case of a debtor's bankruptcy, this is a fairer and more timely way of the collective recovery of creditors' claims in comparison with their individual efforts to achieve enforcement in execution proceedings, where in satisfying creditors' claims there applies the principle of priority (supplemented by the principles of priority and proportionality). We can perceive insolvency proceedings also as proceedings in which there is a collision of interests of the parties involved, and this not just between the debtor and its creditors, but also mutually between creditors themselves. In this model there is the place of the administrator, who in insolvency proceedings equally has his own subjective interests. The parties to these proceedings endeavour to satisfy their interests in these proceedings to the maximum extent possible. It is no surprise that in the collision of such interests it is tempting for the parties involved to not proceed in a standard – lawful manner, mostly for **mercenary motives**.

We therefore analyse criminal activity in insolvency proceedings in the context of economic models of crime, where the perpetrator presumably considers the advantages and disadvantages of fulfilling a legal obligation and, on the other hand, the benefits and risks of unlawful conduct that would grant him a relatively great satisfaction of its receivables or similar property benefit. Neither should there be omitted reflections regarding legal-psychological starting points to the examined issue, since these are arguments relevant for the considerations of the court in individualising punishment. In accordance with Gábriš we see the consideration of psychological knowledge in combination with findings from other sciences as an instrument for the correct understanding of the reasons and external as well as internal factors influencing human decision-making, where this knowledge is intended to ensure greater effectiveness of the law in its prescriptive mission.(Gábriš, 2017).

2. Criminal law consequences of insolvency crimes

We approach our reflections regarding the suitability of alternative punishment imposed on perpetrators of insolvency crimes. On the basis of rational consideration, for the process of individualisation of punishment we recommend the most suitable area of prosecution of such perpetrators, provided that other facts, in particular the perpetrator's legitimate needs, do not necessitate a different area of recourse against his human rights.

Before the consideration itself, it must be borne in mind that the consequences of unlawful conduct represent a threat that should deter a potential perpetrator from committing it. In crime prevention this concerns a scientifically justified, deliberate, purposeful, planned and coordinated action on the causes and conditions of criminality with a view to eliminating them, potentially through a suitable selection of methods and forms to at least in part eliminate and concurrently support the creation of anti-criminogenic conditions. (Holcr et al., 2011; Zoubková et al., 2011). This is the preventive effect of criminal law repression (*ex ante*) and any deterrent effect is necessarily linked with the threat of statutory enforcement – represented by a sanction and the procedural-law enforcement procedure of its imposition and recovery.

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Sanctions should, therefore, always be selected in such a way that legal norms regulating social relations are as effective as possible, in order that the objective pursued by legal norms can be fulfilled. It should be borne in mind that legal norms are issued for the purpose of regulating social behaviour (Allott, 1981), whereby the selected method of regulation has a significant impact on the subsequent effectiveness of those legal norms. If legal norms are to be effective, the lawmaker cannot proceed arbitrarily, but the chosen method of regulating social relationships must be the result of rational reasoning that is to be proposed in relation to the given criminal activity. Sanctions imposed (not just) by courts for a violation of an effective legal regulation must be chosen equally rationally. The social effectiveness of law is not just dependent on the degree of the deterrent threat of a potential sanction, but also on other factors that must unconditionally be taken into account in individualising sanctions. Sociological approaches to law have pointed precisely to this phenomenon. This, however, does not mean that the type of sanction and its intensity are irrelevant in relation to the violation of the law (M. m. Večeřa; Urbanová, 1996).

In connection with the issue of the effectiveness of a law, Večeřa and Urbanová identify a range of circumstances influencing its effectiveness, namely (1) **the nature of the regulated social relations** (where this points to the difficulty of regulating social relations outside the framework of social control); (2) **the quality of laws** (their unambiguity and understandability); (3) **the stability of the legal code** (in order that there are not overly frequent changes in valid and effective law); (4) **the frequency of the violation of law** (suffering a violation of legal norms causes social disintegration); (5) **the quality of law enforcement agencies**; (6) **the respect in which the law and lawmaker** are held; (7) **the relationship of law and extra-legal social norms** (the consistency or conversely inconsistency of these normative systems); (8) **the level of legal awareness**. These circumstances, in the authors' opinion, have an impact on whether a legal standard will be effective or ineffective (Večeřa; Urbanová, 1996).

There cannot be omitted the issue of **legal awareness, as an intermediary act between the legal norm and lawful conduct of a social subject**. Even if legal regulation of social relations derives from the existence of the irrefutable legal presumption that everybody knows the valid law (and *ignorantia iuris neminem excusat*), sociological surveys have confirmed that this presumption is not based on reality and many subjects commit illegal conduct precisely in consequence of not knowing the valid and effective legal regulation. An important intermediary variable between law and the actual behaviour of an individual is therefore legal awareness, which in professional literature is characterised *"as a complicated, internally structured social phenomenon based on elements of knowledge of law, social legal ideas, on concepts of valid law and on concepts of ideal law"* (Bakošová; Vaculíková, 2003). For this reason we must not overlook the need for correct and suitable communication of the content of legal norms to their addressees, since the level of legal awareness is another prerequisite for the effectiveness of a legal norm. Appropriately chosen sanctions may have a not insignificant impact on the level of legal awareness among the addressees of legal norms.

It may reasonably be assumed that in the case of persons seeking to gain advantage in the form of unjustified property benefit in connection with a debtor's bankruptcy, this interference in their property sphere represents a subjectively significant infringement of their rights. In insolvency proceedings the property benefit is achieved prevailingly at the detriment or harm to others' claims. In consequence of the perpetrator's criminal focus, it may reasonably be assumed that particularly these perpetrators will consider pecuniary punishment penalising their property integrity to be a punishment that will deter them from this criminal activity.

With the above there is inevitably connected with the application of elements of restorative justice (by way of social corrections). It is this approach that ensures achievement of the purpose of punishment concurrently with the necessary rehabilitation and reintegration of the perpetrator into an environment in which he has with

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members of society diverse social relations that were affected in consequence of the crime. We agree with Strémy and Klátik on the issue of the suitability of increased use of strategies with a reintegration effect on the perpetrator, since the perpetrator will again successfully re-enter ordinary life, begin working normally and produce material value for society (in particular through gainful activity), a benefit for society and for the perpetrator himself. This goal, though, primarily depends on the choice of methods, means and procedures that enable a successful re-socialisation process outside the prison environment (Strémy; Klátik, 2018). The decision as to what particular means of rehabilitation is, though, dependent on facts described in the first chapter.

Many theories devoted to the issue of criminal behaviour work from the assumption of a rationale choice by the perpetrator, who weighs the potential benefit from a criminal act in relation to the possible punishment that may follow in the event of his conviction for committing it. Both Beccaria and Bentham have identified the relation between these variables. The utilitarianist Bentham worked from the assumption that it is the **benefit from the criminal act that is a driving force and a motive for committing an offence, whilst fear from possible punishment is a force that should discourage a person from unlawful conduct**.

But Beccaria and Bentham are not fathers of the theory of rational choice. They are representatives of relative theories of punishment, according to which punishment should not just be a form of retaliation for the perpetrator, but should also have other social goals (purposes). Relative theories are based on the principle of *"punitur, ne peccetur"*, according to which punishment exists so that no evil be committed (Urbanová, 2006). In the given case this concerns a deterrent theory that is based on the assumption of a certain rationality on the side of the potential perpetrator of the offence, meaning that if the threatened punishment for committing an offence is sufficiently strict, many potential perpetrators are demotivated from committing it.

If the punishment is mild, it will mean that the potential perpetrator will be rather more willing to assume the risk that this punishment will potentially be imposed on him. Modern deterrent theories no longer reckon just with the threat of formal sanctions, but take into account also informal sanctions, which can concurrently act deterrently on the certain perpetrators in relation to potentially committing an offence (moral conviction from side of society, the conscience of the perpetrator himself). Other variables, though, that can have an effect on the perpetrator's decision as to whether he commits the offence or not, remain unaffected.

These incomplete ideas were later complemented by economic models of criminality. Despite the fact that they cannot fully explain many crime-related phenomena (e.g. recidivism), they are of some benefit to the issue examined. In the models in question, there are detailed the kinds of advantages, gains or benefits, as well as the disadvantages, costs and losses that perpetrators of criminal acts achieve through committing them, and on the basis of weighing them they decide as to whether they commit the act and undertake the risks of the possible consequences or not. The advantages and disadvantages depend on the kind of offence and the perpetrator's personality, whilst where this concerns advantages, in some cases it is monetary gain, in other cases it is psychological benefits, such as satisfying a craving or sense of excitement from danger, etc. As regards disadvantages, these may include, in particular, direct material costs associated with the preparation and commission of the crime (e.g. purchasing weapons, equipment, etc.), furthermore there are psychological disadvantages (e.g. fear, anxiety, guilt, etc.), but also punishment and costs and consequences connected with it (whether direct or indirect, formal or informal).

In relation to the examined issue of insolvency crimes, they can be considered as beneficial may be considered the **direct material gain consisting in minimising or completely eliminating the consequences of bankruptcy (insolvency or over indebtedness) on the property integrity of the bankrupt – for the perpetrator's current and future property values, or in eliminating the satisfaction of the debtor's liabilities by way of fraudulent**

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pretence of bankruptcy. This direct material gain (procuring unjustified benefit) may consist, inter alia, in affecting the legality of:

- **asset management in insolvency proceedings** (including the process of identifying seasonable assets – concealing property; stating false information in the list of assets and liabilities);
- **the process of monetising the bankrupt's assets,**
- **satisfying creditors' receivables from the bankrupt's assets (in terms of the amount and priority);**

and also in

- **causing a state of bankruptcy in the interest of frustrating a creditor's satisfaction;**
- **frustrating a creditor's satisfaction by removing assets, encumbering a certain movable or immovable asset, by assignment of a receivable or by assumption of a debt, etc.;**
- **applying a non-existent right (claim) against a debtor of another creditor, in consequence of which its satisfaction is frustrated;**
- **favouring a creditor, with subsequent frustration of the satisfaction of another, earlier creditor;**
- **private law corruption – machinations in connection with insolvency proceedings;**

Disadvantages include **criminal sanctions and other sanctions**, including **social defamation** and **costs connected with criminal proceedings** (in particular legal defence). From categories other than criminal law sanctions this primarily concerns sanctions in the framework of insolvency proceedings – for example failing to provide cooperation in ascertaining assets in bankruptcy proceedings. In terms of economic models of criminality, a perpetrator acts judiciously and rationally, selects and considers whether he will commit a criminal act or not, by analysing potential benefits and costs (Eide, 1973). Even though these models fail to explain the causes of committing many kinds of criminal acts, in relation to insolvency crime, their significance is indisputable.

From among the economic models, it is necessary to mention in particular the **theory of rational choice**, which came into criminology, sociology and other sciences via economics (where it was used to analyse, for instance, the potential behaviour of customers in a market). By means of the theory of rational choice, one can understand human behaviour (Green, 2002). At the level of criminal law, it can be argued that, in contrast to deterrent theories, it takes into consideration not just formal and informal forms of sanctions, but also many other factors that influence individuals' specific behaviour. The essence of this theory is that individuals rationally choose how to behave on the basis of an analysis of potential benefits and costs associated with the selected behaviour. Its attention is, therefore, not focused on social, cultural or biological factors having an impact on human behaviour. **It focuses on the costs and benefits associated with a particular model of behaviour** by a given subject, Whereas these are always relevant when considering crimes directed at enriching the perpetrator, including insolvency crimes.

The theory of rational choice, while it does not count on full rationality of an individual, taking into account all possible factors and their significance, it does nonetheless work from the assumption that an individual prior to committing the deed itself weighs up the pros and cons associated with the particular conduct (naturally only those he is aware of). Within the theory of rational choice it is possible to consider not just the determinants of a particular person's conduct, but also how these determinants can be influenced, in particular by way of:

a) **increasing costs (cons) associated with committing a crime;**
b) **increasing the benefits (pros) associated with not committing a crime;**
c) **reducing the advantages gained from committing the offence;**
d) **reducing the cons associated with complying with the applicable law.**

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The application of the theory of rational choice can also contribute significantly to suppressing the unlawful behaviour of individuals. In relation to the analysed issue of insolvency crime, it is perhaps most necessary to reflect on the appropriateness of sanctions imposed by courts and prescribed by law, since an effectively selected sanction (in terms of kind and scope) is an elementary precondition for individual prevention in the case of a given perpetrator. The criminal-law sanction is, thus, the primary disadvantage in the process of a perpetrator‘s considerations regarding unlawful enrichment at the detriment of third-party property. These disadvantages must then be appropriately communicated in relation to (potential) perpetrators so that they recognise the disadvantages of their conduct, otherwise the achievement of the desired change in behaviour is jeopardised.

It may be concluded that whereas traditional criminological and sociological concepts build on the conditionality of human behaviour with socialisation and the social environment of the individual, economic models are built on faith in the rationality of the individual, who is contemplating committing a crime. Their significance, though, lies not just in enabling understanding of the causes and reasons that led the perpetrator to commit a crime, but lies also in the field of criminal law or regulation. The authors see the importance of economic models in the fact that they perceive economic analysis to be a further circumstance that may impact the effectiveness of a law. **The focus and intensity of a potential sanction recourse** against subjective rights is another circumstance conditioning the effectiveness of legal regulation. The given variable is reckoned with particularly by perpetrators of deliberate crimes aimed at enrichment. It cannot under any circumstances be regarded as negligible, since *"... that what in the end result motivates people in a proactive approach to fulfilling obligations imposed by law (in favour of the general good) is the very threat of sanction – harm, the burden of which a person feels also subjectively in ordinary life. Nonetheless, a person is, though free and can voluntarily decide to bear consequences associated with unlawful conduct. Therefore, the consequence of unlawful conduct should always be less favourable in comparison with the „price" of fulfilling the statutory duty"* (Čentéš, Krajčovič, 2016).

In the spirit of the theory of rational choice, we reflect on the implications of the reciprocity element for individualisation of (alternative) punishment for an insolvency crime committed.

3. Reflection of reciprocity in the individualisation of punishments for insolvency crime

We can summarise the above in that efficient punishment evokes a result that the convicted person selects available forms of satisfying their needs and excludes their satisfaction in ways contrary to legitimate needs, interests and goals. Through the correctional effect of criminal justice, the perpetrator is re-educated, his legal awareness and legal knowledge is increased and naturally the level of his legal socialisation is affected.

We are of the opinion that in insolvency crimes (aimed at enrichment) an effective alternative punishment (from the aspect of repression and prevention) is **pecuniary punishment**. This criminal law sanction of a property nature, achieves identicality between the field of the recourse against the perpetrator and the field in which the benefit from the criminal activity was to have been gained. Imposing and executing punishment in fact achieves the diametrically opposite effect from that which the perpetrator of the conduct intended. Instead of economic benefit, there is a reduction in the perpetrator's property (harm to his property values). It is precisely this form of reciprocity that we perceive to be crucial to fulfilling the purpose of criminal law repression.

In agreement with Schmidtz we perceive this reciprocity to be a core element of justice. Schmidtz sees it in a positive sense as a basic bond, the glue of a good community of people and also as an assessment criterion of the basic structure creating an environment in which there occur everyday exchanges of reciprocal dealings. (Schmidtz, 2015) Reciprocal relations represent an example of an ideal society. What is important is that **mutuality conditions the nature of response to the occurrence of a certain phenomenon** that is the cause of a

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given consequence. The primary phenomenon is the offence and the nature of reciprocal approach is conditioned by the specificities of this primary phenomenon, the occurrence of which raises the need for a response from society and the state.

We agree as well with Svatoš (Svatoš, 2014), that just knowing the causes of a certain phenomenon is a prerequisite in order that in future the person deliberately evokes or facilitates the emergence of such phenomena that have proved to be beneficial to him and conversely that he be deliberately prevented or restricted or impeded the occurrence of such phenomena that have proven unfavourable for him. The reciprocal approach influences the subjective sensibility of the sanction imposed, whereby the preventive-correctional action on the perpetrator is maximised, whilst in the case of pecuniary punishment the repressive function and the corrective function are fulfilled concurrently (Kolesár, 2010 and Strémy; Klátik, 2018). And it cannot be overlooked that often it is this reciprocity of punishment that matters more to the aggrieved than the damage compensation itself. It needs to be stated that it is certainly not possible, at today's level of cultural and historical development, to speak of reciprocity in the spirit of Hammurabi's axiom *"an eye for an eye, a tooth for a tooth"*, although reciprocity has limits to its acceptability.

Even in this negative meaning (at the level of punishing unlawful conduct) reciprocity is a fact that can ensure good life in society. The given approach in individualising punishment, naturally following mutual reconciliation with other elements of justice is capable of fulfilling primarily the preventive-corrective function of criminal law.

As has been mentioned, in insolvency crimes, what is **essential is the legitimate protected interest (value) that was jeopardised or violated by the perpetrator**. In the case of intentional insolvency crimes, this is not an arbitrary conduct by the perpetrator. It is conditioned by various factors that have activated the perpetrator toward the illegal act.

From the legal-psychological point of view there are specific causes for each behaviour of an individual. The initial moment for influencing behaviour is the feeling of a certain deficiency and subsequent awareness of a need to obtain the lacking object, lacking value. The underlying cause of a certain behaviour in a particular situation is therefore a **need** and its objective is to **satisfy** it. Through the activation of the need in awareness (recognition of the need) the need transforms into an interest, which in contrast to the need, is now specifically oriented. An important and indispensable role in this process is played by values, or the value orientation of the personality. These perform the role of some sort of lead or mediating link between the directional and target component of motivation, the motivation process toward conduct (Houbová et al., 2008).

"The target represents the concluding, and in linear sequence, the last significant motivational variable. It concludes and fulfils the meaning of the whole process; it represents the ideal result of anticipation of the activity (...) Through achieving the goal, the need is satisfied (...) the state of the organism becomes relatively balanced" (Houbová et al., 2008).

The motivational process preceding the perpetrator's action must be reflected in the framework of considerations regarding reciprocity and the effectiveness of punishment. If the starting point for the perpetrator's action was a sense of lack of property integrity and the need to acquire the lacking object (enrichment at the expense of the bankrupt's estate or his creditor), even at the cost of committing an unlawful act, so it is rational and effective that the sanction impacts directly on this area. This identicality of the area of recourse against the perpetrator with the area in which benefit from the criminal activity should have occurred, will enable the fulfilment of the preventive-corrective function of criminal law – signalling the economic disadvantageousness of the unlawful act. In connection with this punishment, Mencerová has stated that "*the property nature of pecuniary punishment makes from it a means for achieving the purpose of punishment, particularly in cases where the perpetrator has*

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committed an offence of a property nature." (Mencerová; Tobiášová; Turayová et al., 2013). Strémy and Klátik likewise identify with this opinion and state that its imposition comes into consideration particularly in the case of property and economic offences, in the case of offences against public order and generally dangerous offences (Strémy; Klátik, 2018).

The sanction will be subjectively perceivable and, in the realm of rational choice theory, will signal the disadvantageousness of the offence for the perpetrator. It will be achieved through the harm to the perpetrator's property integrity in consequence of accepting the interest of satisfying a certain material need by means of criminal activity. This area of the perpetrator's life will, from the quantitative aspect, get into a more adverse state for the perpetrator, leading him to recognise the need to satisfy property needs solely in approved ways. The corrective effect will be achieved through the identicality of these two areas and, for this reason, it is appropriate to impose precisely a pecuniary punishment (as an alternative punishment), either alone or alongside another punishment.

The above is acknowledged also by the lawmakers of the Slovak Republic, when by means of § 56(1) of the Criminal Code they state that "*Pecuniary punishment may be imposed by the court in an amount from €160 to € 331 930 on a perpetrator of an intentional offence* <u>*by which he gained or attempted to gain property benefit*</u>" and only paragraph 2 of that section mentions the possibility of imposing a pecuniary punishment also for offences other than property crime. A court may impose a pecuniary penalty without the conditions referred to in section 1 being fulfilled, if it imposes the penalty for a misdemeanour and, having regard to the nature of the misdemeanour committed and the possibility of the perpetrator's correction, it does not impose a custodial sentence (compare Burda; Čentéš; Kolesár; Záhora et al., 2010). Naturally, the amount of the pecuniary penalty does not depend on the property benefit obtained or intended, and this may even exceed the pecuniary penalty. It needs to be stated that the amount of a pecuniary penalty should depend on whether a reparations sanction has concurrently been imposed (not necessarily in criminal proceedings). If a pecuniary penalty is imposed alongside compensation for damage caused, then it should be milder than in the case where it is not possible to impose damage compensation, and the benefit from the criminal activity is drawn off by way of the pecuniary penalty. Its individual differentiation should be designed also so that (separately or in combination with damage compensation) the perpetrator's property integrity becomes more unfavourable than it was before committing the criminal offence. Even despite the fact that in § 56(1) of the Criminal Code this is a classical and not teleological norm, the purpose pursued by the legislator must be fulfilled in the decision-making activities of criminal courts. It is possible to diverge from this will only if there exist reasons (legitimate needs of the perpetrator) for imposing other punishments (e.g. compulsory labour, etc.). If we work from favouring ideals of restorative justice, we must prioritise punishment not connected with custodial sentencing, unless this is necessary. For the area of criminal-law recourse against insolvency crimes committed for mercenary motives, this implies the appropriateness of imposing pecuniary penalty or other appropriate alternative punishment.

One factor excluding the imposition of this alternative punishment is primarily its <u>unenforceability</u> – the situation when the current and (likely) near-future property situation of the perpetrator does not allow for the execution of a pecuniary penalty either at all or only at the detriment of jeopardising the perpetrator's basic existential needs. Pecuniary punishment always affects not just the perpetrator himself, but also his family and close persons. This fact cannot wholly be excluded and makes the imposition of a punishment unacceptable only in the case of disproportionately severe impacts on persons financially dependent on the perpetrator. Pecuniary punishment likewise cannot be imposed in the case where this would lead to frustration of the aggrieved party's claim to damage compensation caused by the criminal offence.

In considering the enforceability of pecuniary punishment, it must be borne in mind that it needn't be made in a single payment, but it is permissible that it be paid in regular monthly instalments (on the basis of a court order).

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This procedure is justified by the amount of the pecuniary punishment imposed and by the perpetrator's personal and property situation. Under the legal code of the Slovak Republic, the court determines the amount and maturity of instalments, in a length of at most one year from the sentence entering into force. In this way even a convict with little property is given an opportunity to voluntarily pay the imposed pecuniary punishment within his possibilities in the form of regular instalments. At a minimum amount of punishment spread over 12 regular monthly instalments, this represents a monthly payment (regular net penalty) of **€ 13.33**, which in today's macroeconomic situation and labour market situation makes the given alternative punishment acceptable for most perpetrators. Payment of a pecuniary punishment in monthly instalments is admissible particularly in cases where payment of the whole pecuniary punishment would, in view of the convict's property relations, be inadmissible, though where the perpetrator's situation makes it possible that the penalty be paid in instalments.(Čentéš et al., 2015). The pecuniary punishment should, therefore, be an expression of the convict's possibilities and capabilities. The possibility of its payment in regular instalments, from the theoretical aspect, ensures also equality before the law – that the perpetrator's creditworthiness does not influence the (im)possibility of an alternative solution to the criminal case.

Last, but not least, as has already been mentioned, pecuniary punishment is an effective instrument of punishment, also for the reason that in the case of a natural person's financial reconciliation, this represents an intact claim, and the perpetrator is not relieved of it in this way. The recoverability of certain receivables in the reconciliation process lapses, though the above does not apply in the case of pecuniary penalty claims (particularly in the case of its settlement in regular monthly instalments). The subjectively perceivable harm is thus felt by the perpetrator even despite any declared bankruptcy. The imposition of pecuniary penalties thereby motivates perpetrators to economic activity, whereby they are not enabled to avoid fulfilling them without actually feeling the infringement on their rights.

Conclusion

In this study we focused on the individualisation of punishments in the case of those insolvency crimes aimed at enrichment of the perpetrator. This group of unlawful acts is linked with the state of the debtor's bankruptcy and the collective settlement of his property relations, particularly those of an obligation-legal nature (claims). It is not uncommon for perpetrators, for mercenary motives, to attempt to avoid fulfilling their statutory duties in connection with solution of a bankruptcy (either their own or that of another debtor). When the perpetrator commits any of the above mentioned criminal acts, it is a sovereign right of the state to punish him fairly. Fair punishment is primarily proportionate punishment that is concurrently both expedient and effective.

When it comes to the question of fairness of punishment, one has to consider the elements of which justice (in terms of fairness) consists. With this regard, the authors have analysed the fairness of punishment in accordance with Schmidtz´s theory of justice. According to this theory, justice (fairness) consists of *reciprocity, merit, equality and need* as its relatively stable elements and only on the basis of weighing the mentioned elements can one determine and give to each perpetrator what he deserves – a fair (and proportionate) punishment. All of these elements should thus be kept in mind by judges of criminal courts, who individualise the punishment in insolvency crimes (and other crimes as well). In case of insolvency crimes, it is necessary to focus on the element of reciprocity, which reflects the fact that the perpetrator has targeted the property of others with his criminal behaviour.

In the interest of choosing an appropriate type of punishment and its scope, while preserving the ideals of restorative justice, it is necessary to clarify in detail all relevant circumstances of the case in the process of individualising the punishment by the criminal court. On the basis of the correct methodological procedure in

specifying the criminal-law norms for specific cases there should subsequently be selected a punishment fulfilling the above-mentioned attributes, which naturally in a legal state also include legality (of the punishment).

The authors work from the basis of the appropriateness of imposing a pecuniary punishment as an alternative punishment for insolvency crimes committed for a mercenary motive. We reach this conclusion on the basis of the theory of rational choice, presuming a greater degree of (economic) rationality of perpetrators of property crimes. If a perpetrator voluntarily satisfies his needs in an unlawful manner, it is necessary to accentuate to him the severity of the result of violating the law (and legitimate values protected by it), and this severity should be subjectively perceptible. If a pecuniary penalty is imposed, there arises to the perpetrator suffers the diametrically opposite effect from that which he intended to achieve through his criminal activity. Recognising this fact facilitates individual prevention, since the perpetrator will *pro futuro* select ways of satisfying his subjective needs, from fear of recurring punishment, what is perceptible. These reflections must also include the standing of pecuniary punishment in reconciliation proceedings, where this concerns an intact legal claim that does not lapse in the given proceedings. The above contributes to the irreversibility of the punishment, conditioning its effectiveness. We therefore view the more frequent imposition of pecuniary penalty as an effective tool for preventing the occurrence of unlawful conduct in connection with the insolvency of a particular person and its solution.

In the interest of fairness of punishment, the level of punishment must be individualised so that it is proportionate. Where the benefit from the criminal activity is drawn off by the punishment, it should be individualised in a greater scope in comparison with its imposition alongside the obligation to pay compensation to the aggrieved party. It is precisely its appropriateness that conditions the subjective perceptibility of the punishment (the subjectively felt repression), that should signal to the perpetrator the disadvantage of violating the law. In the process of individualisation in the interest of personality and enforceability of the punishment, it is always necessary to consider whether the convict should pay it in a single sum or in regular instalments.

The individualisation of punishment for insolvency crimes is thus a complex and complicated process and undoubtedly a challenge for criminal courts. In this study we have expressed our opinions in favour of imposing pecuniary punishment (as one of the alternative punishments), while our methodological starting points and considerations, we hope, will serve in application practice as some sort of guide in decision-making in the given criminal cases.

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SECOND PENSION PILLAR PARTICIPANTS' BEHAVIOUR: THE LITHUANIAN CASE*

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Abstract. Defined contribution pension pillars often require participants to take an active role in selecting pension funds during the whole accumulation period. It is expected that pension a fund participant will select an appropriate investment strategy and investment risk during the different stages of the accumulation phase and depending on the years left until retirement. In this paper, we have analysed the behaviour of second pillar pension fund participants in Lithuania from the establishment of the second pension pillar (2004) till Q3 of 2016. The aim of the study is to evaluate how rational second pension pillar participants were in decisions on selecting the accumulation rate, the appropriate pension fund (investment strategy and investment risk) and changing the pension fund over the accumulation period during various stages of the economic cycle in the financial markets. The results show that the majority of second pension pillar participants are irrational in selecting participation rates. Additionally, it was also observed that the majority of pension fund participants make irrational choices on selecting the pension fund (investment strategy and investment risk) and changing it over the accumulation period. The majority of pension fund participants have selected an inappropriate pension fund (investment strategy and investment risk) with regard to the accumulation period left till retirement. Moreover, participants are passive and tend not to change pension funds during the accumulation period. Pension fund participants who did change pension funds made irrational decisions and chose inappropriate pension funds (investment strategy and investment risk): in case of peak periods in stock markets, the majority of second pension pillar participants changed pension funds by switching from the funds with a lower proportion of equities to those with a higher proportion of equities or changed their pension fund to a fund in the same investment risk category. Moreover, in case of bottom periods in stock markets, the majority of participants did the opposite, switching from funds with a higher proportion of equities to those with a lower proportion of equities.

Keywords: Pension funds; Pension fund participants' choice; behaviour finance; life-cycle investment

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1. Introduction

The fully funded second pillar pension was introduced in Lithuania on 1 January 2004 as a part of the reform of the pension system, which previously was based only on the pay-as-you-go principle.

The introduced second pension pillar is based on individual fully funded accounts of participants who are allowed to pay a part of their obligatory pension insurance contribution into their personal account, instead of paying the full contribution into the state social insurance fund. Due to this, the acquired old-age pension rights of the participants are proportionally reduced.

The second pillar is administrated by pension accumulation companies, which manage several pension funds with different investment strategies. Participation in the second pension pillar – unlike in many other countries with a similar system – is completely voluntary in Lithuania. By the end of 2016 Q3, more than 1.25 million participants – 96 per cent of those insured for a full pension – were accumulating capital in second pillar pension funds. The main principles of the pension reform in Lithuania are similar to those of many other post-communist countries (Latvia, Estonia, Poland etc.), where pension systems were reformed earlier (see Égert, 2012; Volskis, 2012).

In Lithuania, pension accumulation companies are offering pension funds with various investment strategies. They can offer a pension plan with up to 100 per cent of assets invested in equities. Each pension accumulation company is offering 3 to 6 pension funds. In Lithuania, pension funds are divided into four groups according to their investment strategy. This division should allow the monitoring, evaluation, and comparison of the investment results of second pillar pension funds with a similar investment risk. Most of the second pillar pension funds are "mixed": assets of second pillar pension funds are invested into high investment risk asset classes (e.g., equities) and into less risky asset classes (e.g., government bonds). The differentiation of investments according to high investment risk asset classes (equities) is the simplest way for classifying pension funds into different groups. According to the data of the Bank of Lithuania (2017), second pillar pension funds are divided into the following four groups depending on the share of investments into equities:

- conservative pension funds (assets under management (hereinafter, AUM) are not invested into equities);
- pension funds investing a small part of assets into equities (up to 30 per cent of AUM are invested into equities);
- pension funds investing a medium part of assets into equities (up to 70 per cent of AUM are invested into equities);
- pure equity pension funds (up to 100 per cent of AUM are invested into equities).

It is expected that a pension fund participant will be active and will change their pension fund strategy (risk) during the long-term pension accumulation period, and a life-cycle funds market does not exist.

In 2008-2009 global financial crisis significantly affected the second pillar pension too. On the one hand, the accumulated capital lost value due to turbulence in financial markets, on the other hand, fiscal deficit contributions to second pillar pension funds were decreased from 5.5% to 2% in 2009. Later, the Lithuanian government decided to change participation the level (rules), and in 2013 the participants of second pillar pension funds had to choose their participation level (contributions level) by selecting one of the following options:
A) to stop further participation in the second pillar. In this paper, this option was not analysed, as only 24 thousand participants out of 1117 thousand (or 2.1%) selected it.
B) to increase participation in the second pillar (by paying additional 2 per cent contribution supplemented with the state contribution of 2 per cent of average country wage).
C) To stay in the previous participation level (see Maccioni, Gudaitis, 2014).

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The aim of this paper is to evaluate how rational second pension pillar participants were in their decisions on selecting the accumulation rate, appropriate pension fund (investment strategy and investment risk), and changing the pension fund over the accumulation period during different stages of the economic cycle in the financial markets.

2. Behaviour in defined contributions pension accumulation period

Decision making on long-term investments, such as a pension has not been analysed systematically in literature. Collard (2009) indicated a widespread lack of knowledge and understanding about how people choose pension (and investment) funds. In order to fill existing knowledge gaps, the authors of this paper evaluated three key aspects of pension fund participants' behaviour in choosing pension funds for pension accumulation: the initial choice of investment strategy, attitude and appetite towards investment risk and changing (switching) the investment strategy and risk during the accumulation period.

In scientific literature, the initial investment strategy choice in pension accumulation is analysed from the perspective of behaviour economics. Bodie et al (1992) showed that labour and investment choices are intimately related. Due to this, an individual simultaneously determines the optimal levels of current consumption, labour effort, and an optimal financial investment strategy at each point in his life-cycle. This research has laid the foundations for a life-cycle funds market. The optimal asset allocation for a long-term investor has been analysed by Campbell and Viceira (2002), who argue that many households are inadequately diversified and fail to optimize their portfolios correctly. The life-cycle model was thus reconfirmed as the optimal one. Blake *et al* (2014) investigated pension accumulation strategies under the assumption that the member is a rational life-cycle financial planner and has an Epstein–Zin utility function. One of key findings shows that optimal investment strategy during the accumulation phase of the plan is 'stochastic life styling', with an initial high weight in equity-type investments and a gradual switch to bond-type investments as the retirement date approaches in a way that depends on the realized outcomes for the stochastic processes driving the state variables.

However, in many countries the prevailing practice of pension accumulation systems, especially with voluntary participation like in Lithuania, is based on the offering of fixed investment strategy pension funds, and it is expected that pension fund participants will be active and will change the pension fund strategy (risk) during the long-term pension accumulation period, and no life-cycle funds market exists. As the results of previously conducted research in different countries show, participants are not willing to change the initially selected investment strategy. Benartzi and Thaler (2001) came to the conclusion that a clear link exists between the menu of investment funds offered and the eventual pattern of asset holding diversification in different asset classes. Moreover, participants use naive diversification strategies that are heavily influenced by the menu offered by the pension plan. Choi *et al* (2002) have analysed the choices of participants in defined contribution pension funds in the US. It was concluded, that in the case of automatic enrolment, participants remain at the default asset allocation specified by the employer. Tapia and Yermo (2007) compared ten countries that have implemented investment choice in the accumulation stage of their individual account pension system. Menu design (the number and structure of investment portfolio options available during the account accumulation phase) matters enormously for the choices actually made by investors. Another key conclusion is that participants do not exercise active choice.

Attitude and appetite towards investment risk in pension accumulation is another important element, which needs to be assessed by analysing participant's behaviour in choosing a pension fund. Peggs (2000) showed that material circumstances, cultural capital, the extent and quality of pension information and habitus affect the perceptions of pension choice and pension risks. The paper concludes that the expansion of pension choice has been, in many ways, negative rather than positive. Schooley and Worden (1999) concluded, that investment in

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risky assets is significantly related to socioeconomic factors, attitude toward risk taking, desire to leave an estate and expectations about the adequacy of social security and pension income. Dulebohn (2002) examined the significance of demographic and attitudinal/dispositional variables on employees' risk behaviour in selecting among investment allocation options provided by defined contribution pension plans. The results identified primary causes of risky investment behaviour, including income, age, other retirement plan participation, self-efficacy, knowledge of investment principles and general risk propensity. Research results of Clark and Strauss (2008) demonstrated that pension-plan participants do not appear to understand the risks associated with different types of retirement savings and pension plans. The gender, age, and income of plan participants can give rise to distinctive risk propensities, and marital status and, in particular, whether a spouse also has a pension can also have significant consequences for household risk preferences. Jonsson *et al* (2017) investigated the impact of financial literacy, risk attitude, and saving motives on the attenuation of mutual fund investors' disposition bias. The results show that investors with high levels of "market knowledge" and "mutual fund knowledge" are more likely to sell shares in a fund performing below the reference point, regardless of the performance of other funds in the portfolio. Foster (2015) analysed the attitude of young people to pension savings. The results showed that pension system development needs to be accompanied by access to suitable impartial guidance, in order for people to be able to make informed choices. Lusardi and Mitchell (2017) concluded that competent planning for retirement and investing of retirement assets requires individuals to understand the risk/return relationship and risk diversification.

Changing (switching) the investment strategy and risk is a third element of the participation strategy during the pension accumulation period. The evidence shows a general trend of low levels of changing investment strategy over the accumulation period (switching the fund) by pension fund (plan) participants.
Ameriks and Zelders (2002) analysed the portfolios and portfolio choices of US households. The results show an infrequency of active portfolio allocation changes, as almost half of the sample members made no active changes to their portfolio allocations over a nine-year sample period. There is very limited data about whether or not pension funds (plan) participants make rational choices when switching the fund. The research results show that the majority of pension plan participants pay insufficient attention to their investment portfolios and do not actively manage them (see, e.g., Abel, Eberly and Panageas (2013); Bilias, Georgarakos, and Haliasos (2009); Dellavigna and Pollet (2008); and Tang, Mitchell, Mottola and Utkus (2009)). Some opposite results are provided by Betermier *et al* (2017). The analysis of Swedish residents shows that over the life-cycle, households progressively shift from growth to value as they become older and their balance sheets improve. Additionally, Dahlquist *et al* (2017) conclude that in Sweden's Premium Pension System, active investors earn higher returns and risk-adjusted returns than inactive investors. A performance decomposition analysis reveals that most outperformance by active investors is the result of active investors successfully timing mutual funds and asset classes. It might be linked to higher financial literacy of a society (Lusardi and Mitchell, 2011).

3. Methodology and data

The authors analysed depersonalized data of all 1.2 million pension fund participants, provided by State Social Insurance Fund Board (Sodra), and the behaviour of pension fund participants during a period of 13 years. The analysis covers a period from the beginning of the reform in 2004 Q2 till 2016 Q3. The data sample allowed to identify the date when a citizen started to participate in the system, when they changed the fund (if they did at all), which investment strategy was chosen, and what participation level (contribution level) was selected. Additionally, the data sample allowed to identify sociodemographic factors, such as the age, gender, contribution size, and taxable income (salary) of the participant.

Firstly, the authors analysed the behaviour of participants when selecting a pension fund (investment strategy and investment risk). As it was described earlier, second pillar pension funds in Lithuania are divided into four groups

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according to their investment strategy (investment risk). It is expected, that young-age participants would follow a life-cycle investment strategy and select pension funds with higher investment risk (e.g. a pure equity pension fund) in the beginning of the accumulation period, and closer to retirement age they would gradually decrease investment risk by changing the pension fund to a more conservative investment strategy with a smaller proportion of equities. Due to data limitations, the authors made an assumption about how pension fund participants would select a pension funds investment strategy according to age and how pension fund participants would gradually change the pension fund – decreasing investment risk by selecting a pension fund from another pension fund category (Table 1).

Table 1. Participant age and suitable pension fund category

	Age groups			
Pension fund category	<44	45-53	54-57	58>
Conservative (0% equities)				X
up to 30% equities			X	
up to 70% equities		X		
up to 100% equities	X			

Source: authors' assumptions according to the data of The Bank of Lithuania (2016)

Additionally, the authors analysed which participation (contribution) level was chosen by participants during the 2013 reform (Option B or C, as described in the introduction). The authors analysed the selected participation (contribution) level by received monthly income. Participants were classified into 4 income groups by received salary size per month:

1. Up to minimum salary.
2. Above minimum salary, up to the country-average salary.
3. Up to 3 times the country-average salary.
4. More than 3 times the country average salary.

The authors made the assumption that for participants whose monthly income was below the country average salary (in 2013, the average gross country salary was EUR 646.3 and the minimum monthly wage was EUR 289.6), it was the most rational to choose option B rather than C, due to the fact that in such a situation the incentive from the Government would be higher compared to the participants' additional contributions to the second pillar pension fund.

Secondly, the authors analysed how active second pillar pension fund participants were in changing pension funds during accumulation. It was analysed how many times a pension fund participant changed pension funds, or if they have not changed funds at all, staying with the initial choice. Additionally, the authors have deeper investigated the behaviour of those participants who have changed the pension fund at least once, and tried to determine any special triggers or reasons for such behaviour over the accumulation period, specifically, triggers that would constantly reoccur and influence the peaks of pension fund changes.

Thirdly, the authors have analysed how rational were second pension pillar participants in changing pension funds during the peaks and bottoms in stock markets. We have selected four periods (2 peaks and 2 bottoms) in equity markets, based on the historical data of NYSE100 and EuroStoxx 50 indexes (Fig. 1). In each case, we selected a 4-month period (2 months before and 2 months after the peak or bottom) and analysed if pension fund participants have increased or decreased investment risk by switching the fund.

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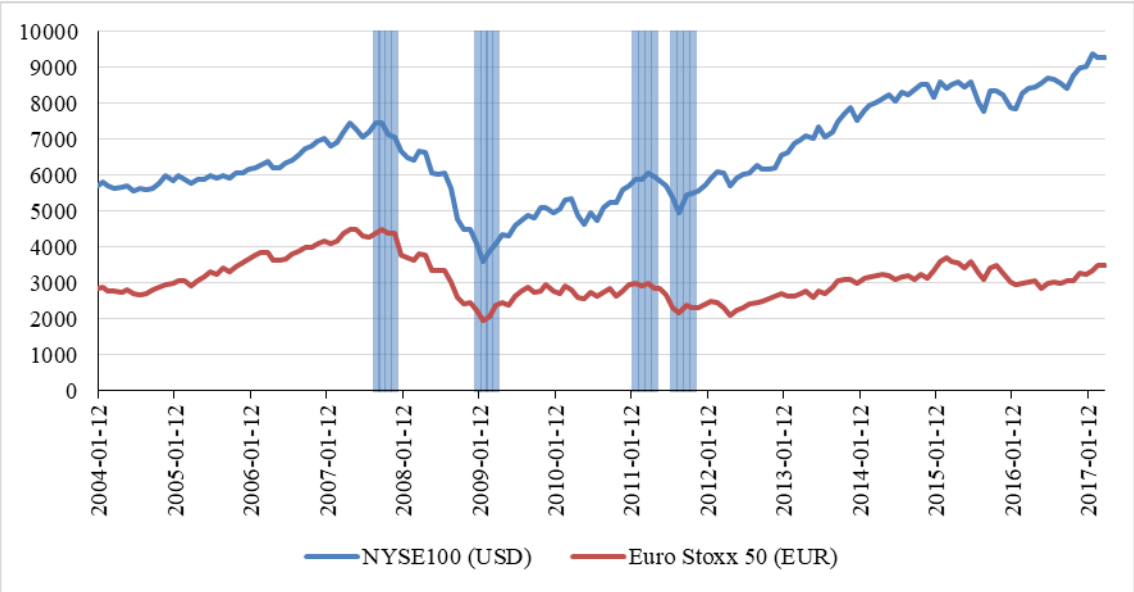

Figure 1. The close price of NYSE100 and Euro Stoxx 50 indexes and selected periods of peaks and bottoms
Source: "Yahoo finance" (09/04/2017)

The authors made the following assumptions:
a) In case of a peak period in stock markets, second pension pillar participants shall change pension funds by switching from the fund with the higher proportion of equities to the fund which has lower proportion of equities. If a participant changed the pension fund to a fund in the same category or if the participant changed a pension fund with a higher proportion of equities, then the authors stated that the participant made an irrational decision.

b) In the case of a bottom period in stock markets, second pension pillar participants shall change pension funds, by switching from the fund with the lower proportion of equities to the fund with the higher proportion of equities. If a participant changed the pension fund to a fund in the same category or changed a pension fund with a lower proportion of equities, then the authors stated that the participant made an irrational decision.

4. Results

Firstly, the analysis of pension fund participants' behaviour on selecting a pension fund (investment strategy and investment risk) showed, (Fig. 2, 3, 4), that, on average, 65.5 per cent of the participants selected an inappropriate investment strategy according to the life-cycle investment strategy. The largest discrepancies were observed among the youngest participants (74.5 % selected an inappropriate, too conservative investment strategy) and most senior pension fund participants (56.1 % selected an appropriate, too risky investment strategy). Due to the inappropriate choice of investment strategy and the level of investment risk, the youngest pension fund participants risk to accumulate insufficient assets in the second pillar pension funds due to a lower investment risk (potentially lower investment return) chosen in the beginning of the accumulation period. Meanwhile, senior pension fund participants risk to lose a part of their accumulated capital due to the a high investment risk chosen and potential significant market fluctuations at the end the of accumulation period (before the start of retirement).

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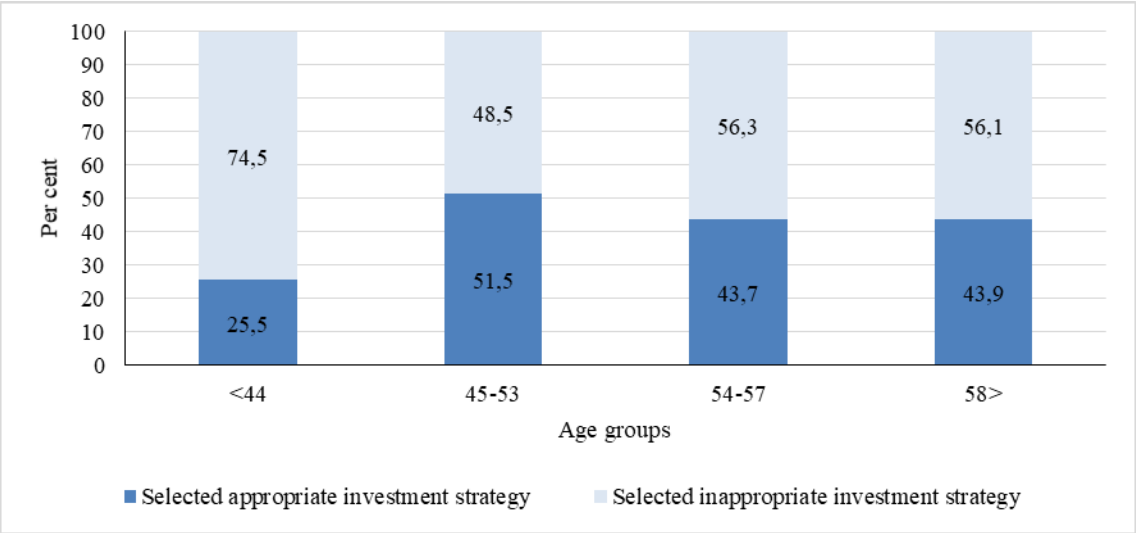

Figure 2. Selection of appropriate investment strategy according to second pillar participants' age

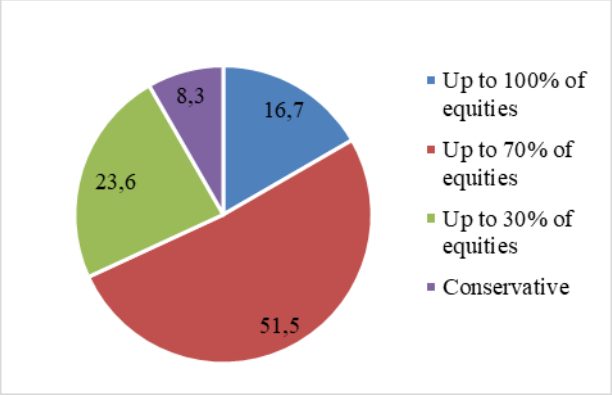

Figure 3. Second pillar participants by selected fund category at the end of 2016 Q3, per cent

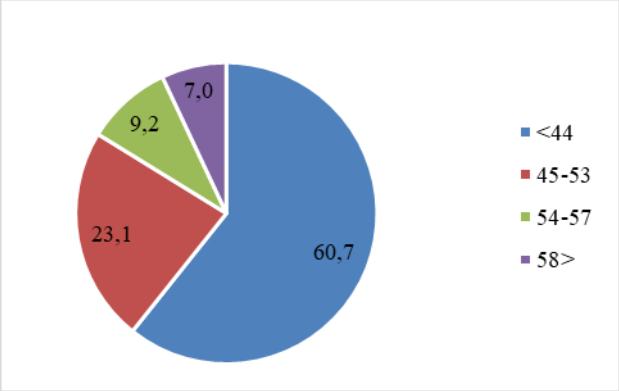

Figure 4. Second pillar participants by age groups at the end of 2016 Q3, per cent

An analysis of the participation (contribution) level, which was chosen by participants during the 2013 reform showed (Fig. 5), that approx. 39.3 per cent (34.8 per cent in EUR 290 and less range and 42.0 per cent in 290-646 EUR range) of all participants who received lower than average monthly income have selected to increase their contributions and to get an incentive from the Government. Comparably, only 31.7 per cent of the participants who have received higher than three times the country average salary have selected this option. However, more than half of all the participants selected to stay with the minimal contribution level and did not increase it. Additionally, an analysis of the participation (contribution) level – which was chosen by participants during the 2013 reform – showed (Fig. 5), that approx. 33 per cent of all participants who received lower than average monthly income have selected to increase their contributions and to get an incentive from the Government.

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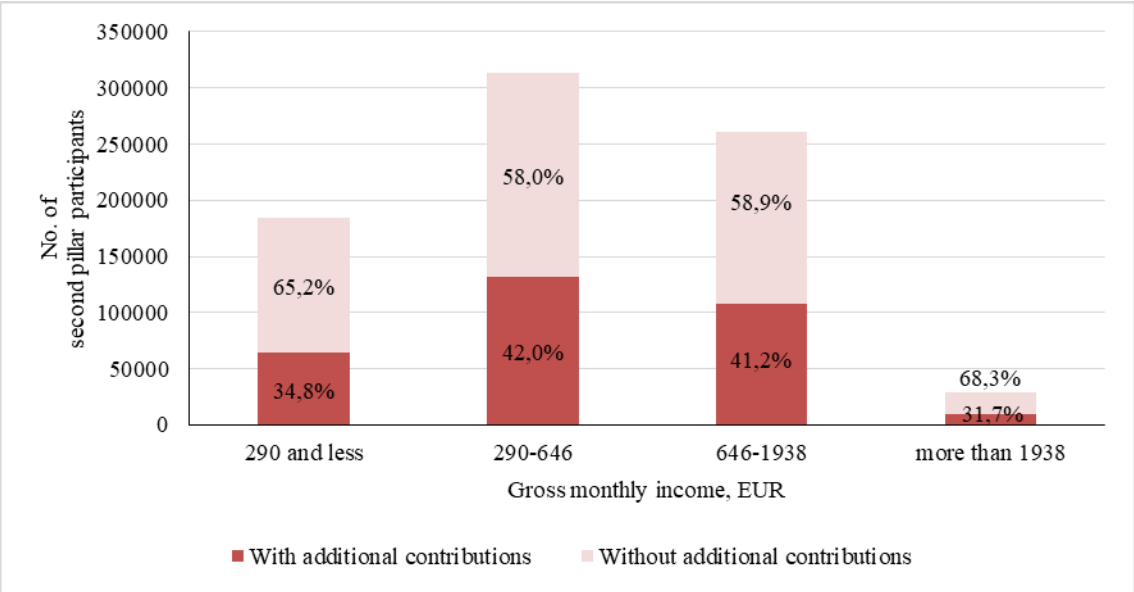

Figure 5. Second pillar participants who started to participate before the year 2013, by monthly income (in the year 2013) and participation level at the end of 2016 Q3

Secondly, the analysis of pension funds participants' activeness in changing the fund showed that participants are very passive and do not change the investment strategy (investment risk) during the accumulation period. During the analysed period (13 years), 75 % of participants did not change their initial selection and accumulated in the same pension fund from the beginning of accumulation. Additionally, 20 % of participants changed their pension fund only once (Table 2).

Table 2. No of Second pillar pension fund selections during the accumulation period (2004-2016 Q3).

No of pension fund selections'	Participants
1	931,764
2	249,749
3	45,987
4	8,123
5	1,966
6-10	1,143
11-20	148
21+	74
Total	**1,238,954**

Additionally, the authors have deeper investigated the behaviour of participants who have changed the pension fund at least once (2 and more selections) and tried to determine triggers or reasons over the accumulation period, which constantly recurred and influenced peaks of pension fund changes. A monthly split of participants' decisions to switch the fund is presented in Fig 6. The peaks of changes were observed in the beginning of each calendar year. According to the legal requirements, pension accumulation companies shall send an annual second pillar pension account statement to the participants. The authors made a conclusion, that after receiving the annual

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statement, pension fund participants switched the fund – or even pension accumulation company – more actively.

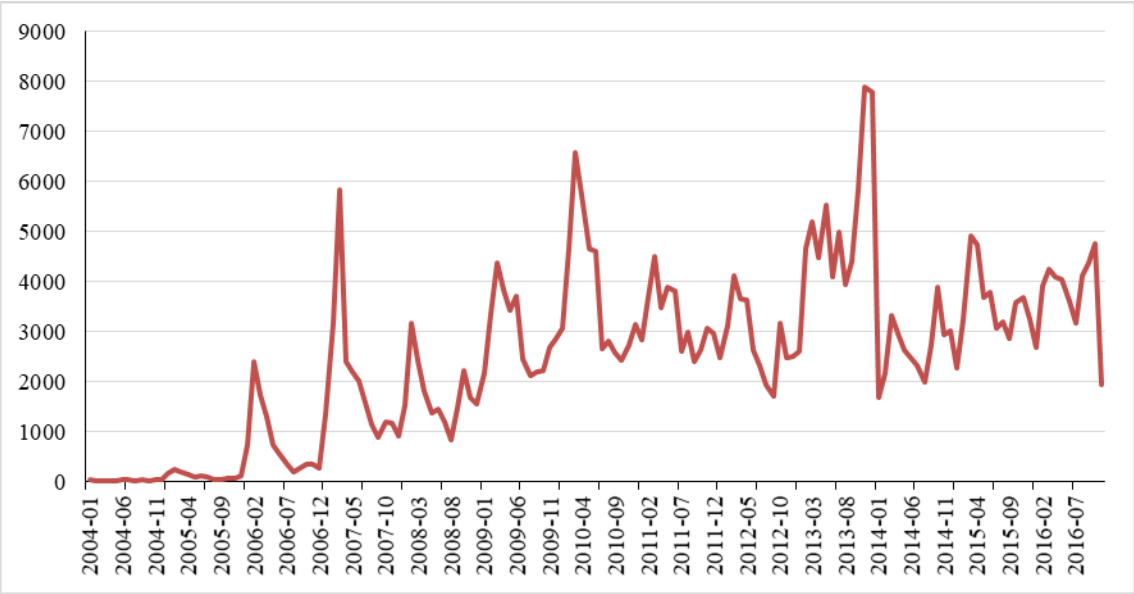

Figure 6. The number of participants' decisions to change Second pillar pension fund per month

Thirdly, the analysis of pension funds participants' behaviour in the case of equity price peaks (at the highest point of the equities' value) and bottoms (at the lowest point of the equities' value) showed that for both cases the majority of participants behave irrationally by changing the pension fund (investment risk and investment strategy).

In case of both analysed peak periods (2007 Sep-Dec and 2011 Feb-May) in equities markets, the majority of second pension pillar participants in all analysed age groups (Fig. 7 and Fig. 8) changed pension funds by switching from the fund with a lower proportion of equities to the fund with a higher proportion of equities or switched to a pension fund with the same investment risk.

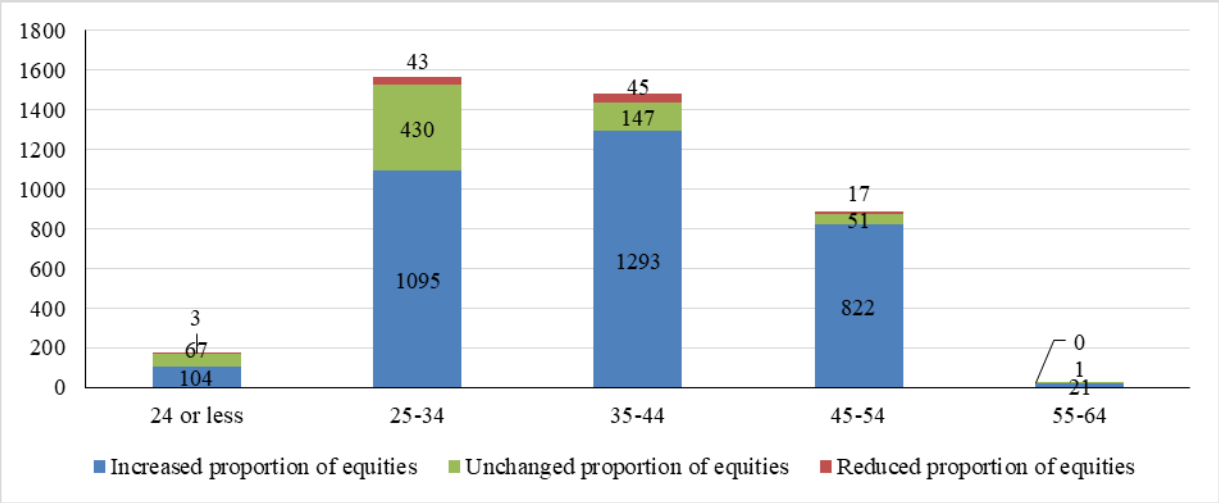

Figure 7. The changes of pension fund in peak period in equities markets according to participants' age (2007 Sep-Dec)

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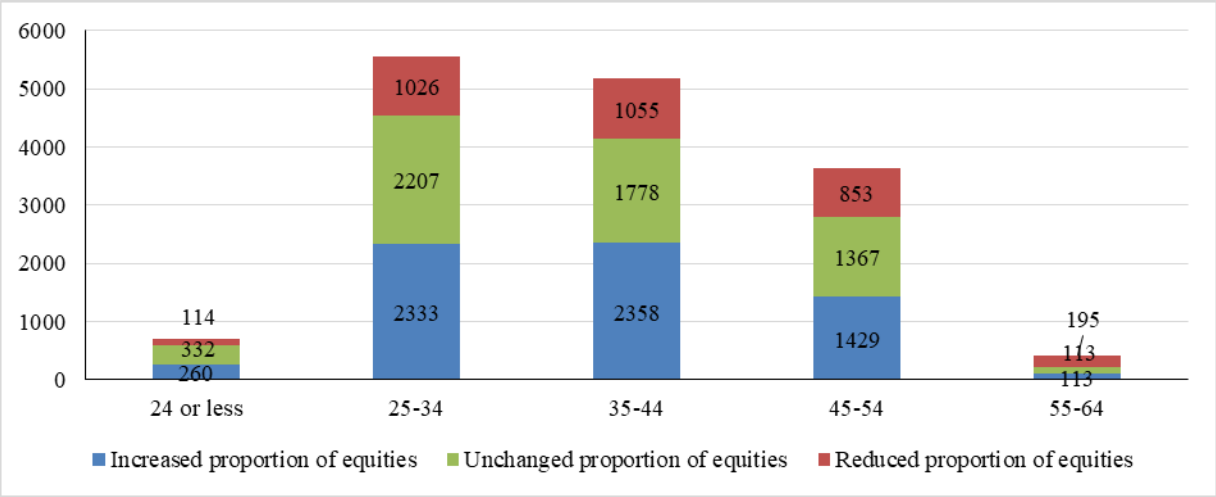

Figure 8. The changes of pension fund in peak period in equities markets according participants' age (2011 Feb-May)

The same results were observed in all analysed income groups (Fig. 9 and Fig. 10). The majority of participants in all income groups changed pension funds by switching from the fund which had a lower proportion of equities to the fund which had a higher proportion of equities or changed to pension fund with the same investment risk.

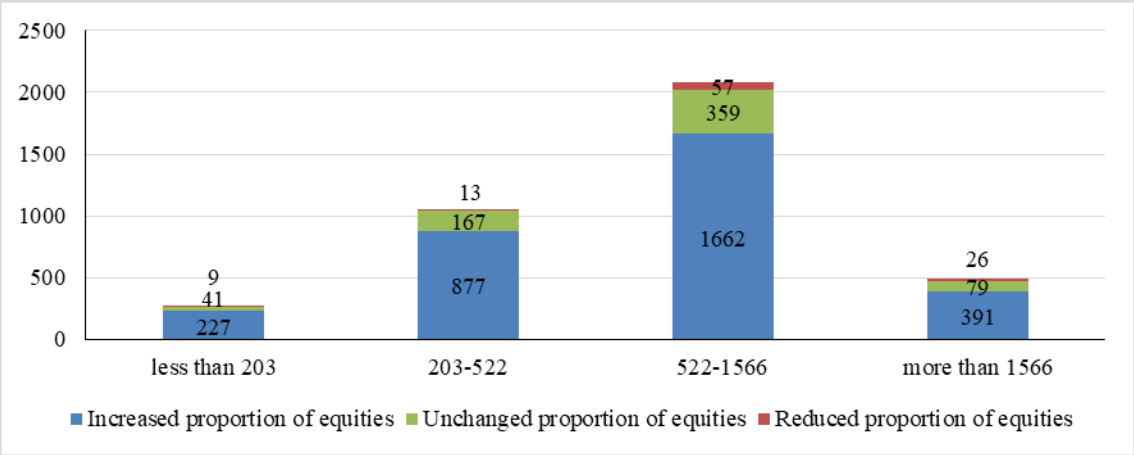

Figure 9. The changes of pension funds in peak periods in equities markets according to participants' income (2007 Sep-Dec)

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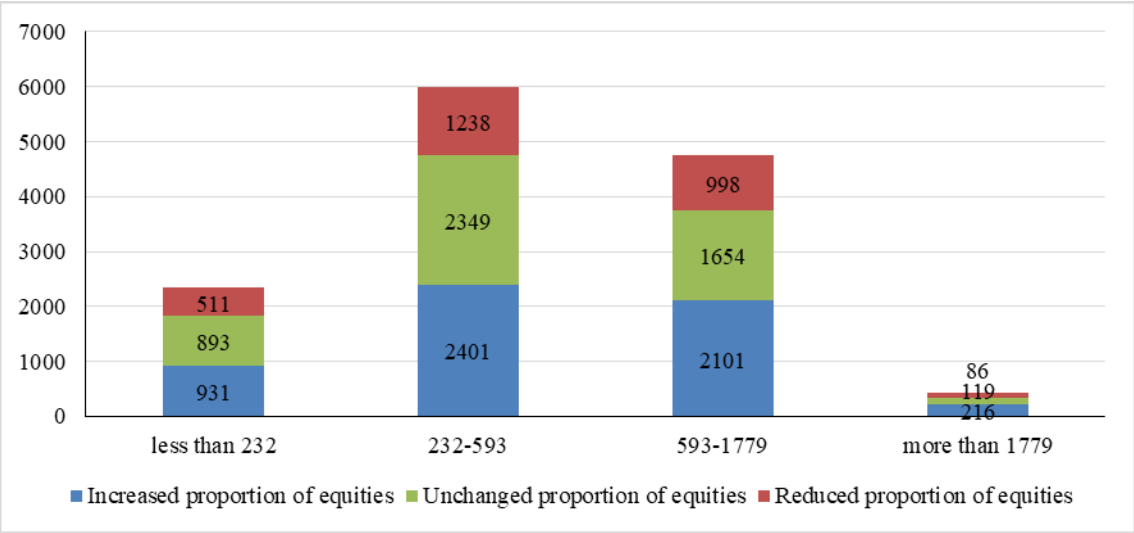

Figure 10. The changes of pension funds in peak periods in equities markets according to participants' income (2011 Feb-May)

In case of both analysed bottom periods (2009 Jan-Apr and 2011 Aug-Nov) in equities markets, the majority of second pension pillar participants in all analysed age groups (Fig. 11 and Fig. 12) changed pension funds by switching from the fund with the higher proportion of equities to the fund with the lower proportion of equities or have changed to pension funds with the same investment risk.

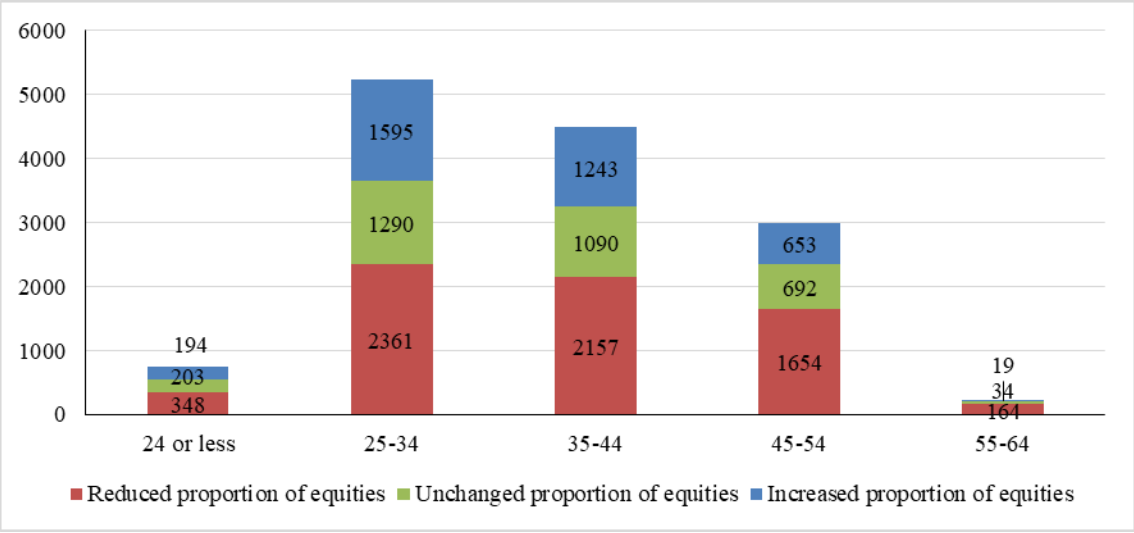

Figure 11. The changes of pension funds in bottom period in equities markets according to participants' age (2009 Jan-Apr)

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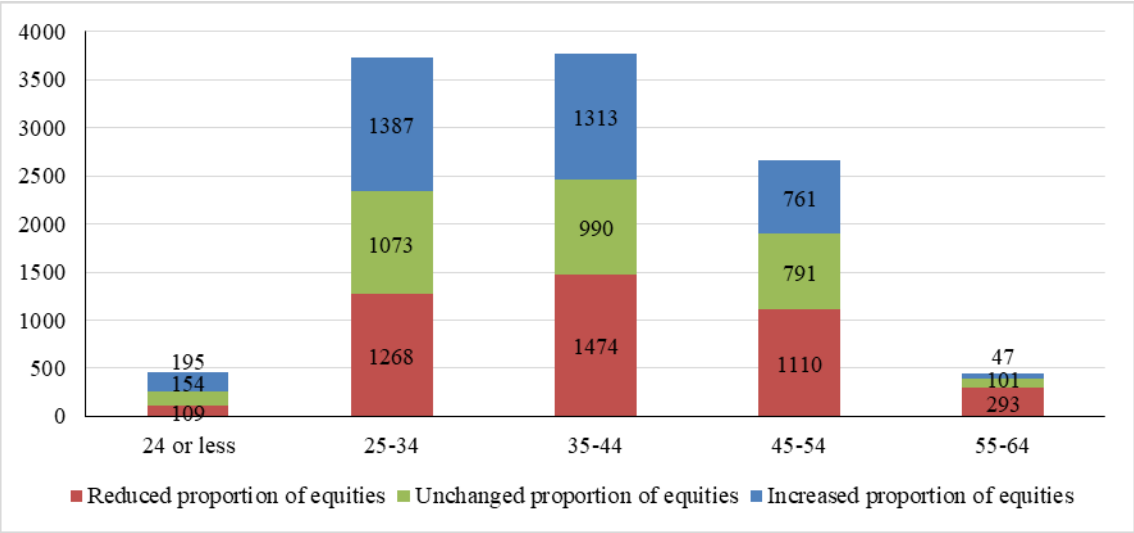

Figure 12. The changes of pension funds in bottom period in equities markets according to participants' age (2011 Aug-Nov)

The same results were observed in all analysed income groups (Fig. 13 and Fig. 14). The majority of participants in all income groups have changed pension funds by switching from the fund with a higher proportion of equities to a fund with a lower proportion of equities, or have changed to a pension fund with the same investment risk.

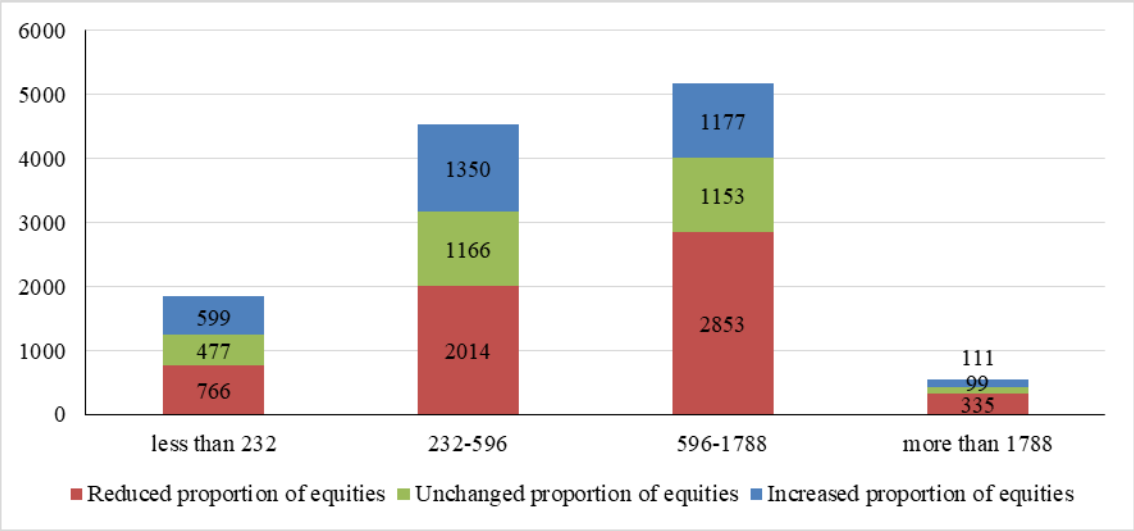

Figure 13. The changes of pension funds in bottom period in equities markets according to participants' income (2009 Jan-Apr).

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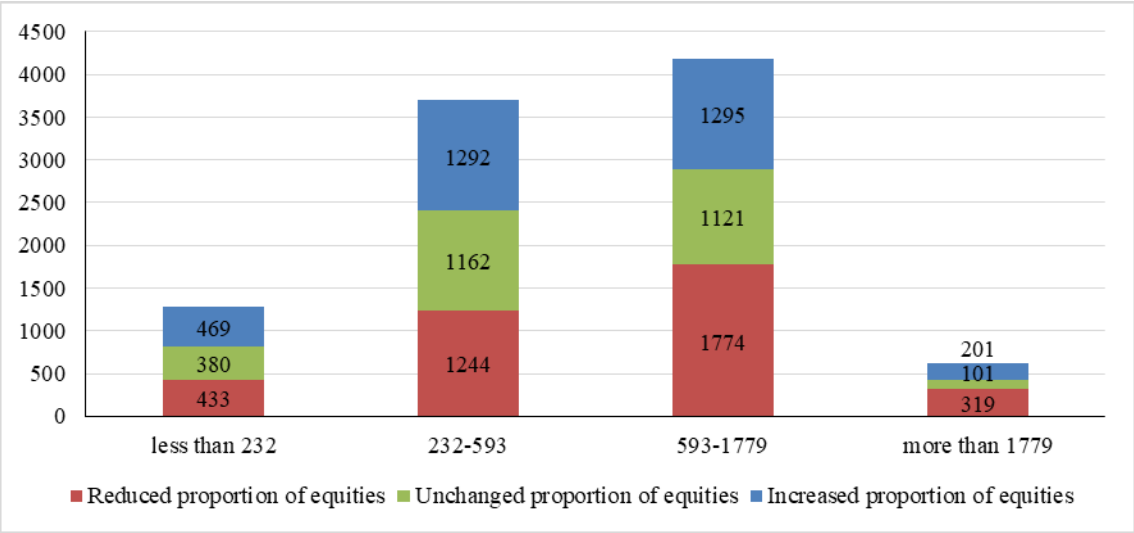

Figure 14. The changes of pension funds in bottom period in equities markets according to participants' income (2011 Aug-Nov).

Conclusions

The assessment of the database of all second pillar pension fund participants' behaviour in Lithuania from the establishment of the second pension pillar in 2004 till the 2016 Q3 showed that participants make irrational decisions in different stages of accumulation. This study provided evidence that second pillar pension participants are irrational in selecting the accumulation rate, appropriate pension fund (investment strategy and investment risk), and changing the pension fund over the accumulation period during different stages of the economic cycle in the financial markets.

The analysis of second pillar pension participants' data provided evidence that on average 65.5 per cent of the participants have selected an inappropriate investment risk and investment strategy according to the life-cycle investment strategy. Due to the inappropriate choice of investment strategy and the level of investment risk, the youngest pension fund participants risk accumulating insufficient assets in the second pillar pension funds due to the lower investment risk chosen in the beginning of the accumulation period. Moreover, senior pension fund participants risk losing a part of their accumulated capital due to the high investment risk chosen and potential significant market fluctuations at the end of the accumulation period (before the start of retirement). The analysis also showed that the majority of participants are inactive and do not change the investment strategy over accumulation period. During the analysed period (13 years), 75 % of participants did not change their initial selection and accumulated in the same pension fund from the beginning of accumulation. Finally, research showed, that the majority of participants who made the decision to change the pension fund (investment strategy and investment risk) during equity price peaks (at the highest point of the equities' value) and bottom (at the lowest point of the equities' value) in both cases behaved irrationally by changing the pension fund. In case of both analysed peak periods (2007 Sep-Dec and 2011 Feb-May) in equities markets, the majority of second pension pillar participants changed pension funds by switching from the fund with the lower proportion of equities to the fund with the higher proportion of equities, or have changed to pension fund with the same investment risk. In case of both analysed bottom periods (2009 Jan-Apr and 2011 Aug-Nov) in equities markets, participants acted in an opposite manner.

An analysis of the participation (contribution) level – which was chosen by participants during the 2013 reform – showed, that more than half of all the participants selected to stay at the minimal contribution level and have not increased it. This might potentially lead to low accumulated amounts for the retirement.

Additionally, research results provide important insights for public policy, with the possibility of including the preferences in regulations with the aim of benefiting pension fund participants in a long term perspective. Overall, the findings have important implications for introducing life-cycle investment strategies as a default option in the second pension pillar. Stricter rules are needed in terms of pension fund investment strategies and their linkage to a fund participant's age in order to increase compatibility between investment strategies and the investment risk of pension funds on the one hand, and the needs of pension system participants over their entire accumulation period on the other hand.

However, there are several limitations to the research. Firstly, the authors have analysed only data about the second pillar pension and did not analyse data about the third pillar pension, because it was not available. On the other hand, due to low participation levels in the third pension pillar, the outcome of the analysis would not significantly influence the achieved results. In order to make more critical conclusions, analysis of data from all three pension pillars would be necessary. Secondly, pension funds are long-term products, thus a 13-year period of analysis is relatively short compared with the whole accumulation cycle of 30–45 years.

Decision making on long-term investments, such as a pension has not been analysed systematically in literature. Future research of second pillar pension participants' choices in Lithuania should be compared with the behaviour of second pillar pension participants in similar markets, for example, those of the other Baltic countries and other Central European countries in order to make a more comprehensive comparison of factors that influence the behaviour of second pillar pension participants. Additionally, similar research should be repeated after several years, when pension funds will have been operating for 20 years or more.

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THE ABILITY OF LISTED COMPANIES TO OPTIMIZE THEIR CAPITAL STRUCTURE, SHAPE THEIR DISTRIBUTION POLICY AND FIGHT HOSTILE TAKEOVERS BY REPURCHASING THEIR OWN SHARES

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Abstract: The management of listed companies is faced with the decision to distribute the annual surplus to the shareholders in total or to reinvest it in order to achieve the company's goals in order to sustain the continued existence and growth of the company. In order to avoid a conflict of interest between the various parties of a stock corporation, compensation must be found so as not to jeopardize the company's goals and priorities. An optimization of the capital structure and a balanced dividend policy should contribute to the satisfaction of all stakeholders of a company. This article investigates the possiblity by using a share buy-back programm, a kind of capital reduction, as a strategic measures to reach both oft he goals. Sustainability in terms of financial stability should be at the forefront of management and ownership.

Keywords: Buy-back programm (BBP); reconciliation of interests; capital reduction; optimal capital structur; distribution policy; hostile takeover

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JEL classification: G32, G34, G35, G38

1 Introduction

One of the current and most important economic issues of our day is the share buybacks of listed companies. This is reflected in the total repurchase activity of the largest US listed companies between 2013 and 2016, with more than 60% of their constant free cash flow with a huge index total of more than $ 900 billion (see Figure 1). It reached the same volume as immediately before the financial and economic crisis. Apple alone, IBM, Exxon Mobile, Pfizer and Oracle invested more than $ 90 billion in 2014 (compared to 25 billion in the EU) in share buybacks. It is not a phenomenon limited to the United States, but an international trend.

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Due to the uncertain economic development of recent years, the number of share buyback programs in Europe has been lower than in the the United States, although international European companies (eg BP, Royal Dutch, Novartis and British American Tobacco) have made similarly high profits as US companies. Another reason for the diverging trends was the lack of past experience with buybacks, unclear tax regulations and the upcoming financial liberalization in Europe. In addition to dividend payments, US companies were able to reduce their debt by 40% through share buybacks. The listed companies of the Stanley & Poor's 500 Index hold $ 4.2 trillion in cash.

In Austria, share repurchase programs (BBP) amounting to between 5 and 10% of the share capital of resident companies have been decided and started in the last 5 years. The main companies were companies in the fields of technology, real estate and energy (eg Apple Austria, Telecom AG, CA Real Estate, Andritz AG, Maschinenfabrik Heid AG, Mayr Melnhof Karton AG, Austrian Post AG, EVN, Frauenschuh, 2014).

At first glance, one could attribute earning capacity to those companies that have invested their earned free cash flow in repurchasing their own shares than in the company's growth. But does not this just prove lack of ideas and investment opportunities in your own core business? In addition, this development benefited from weak economic growth as well as low interest rates, which made it possible to obtain favorable borrowing (Frauenschuh, 2014).

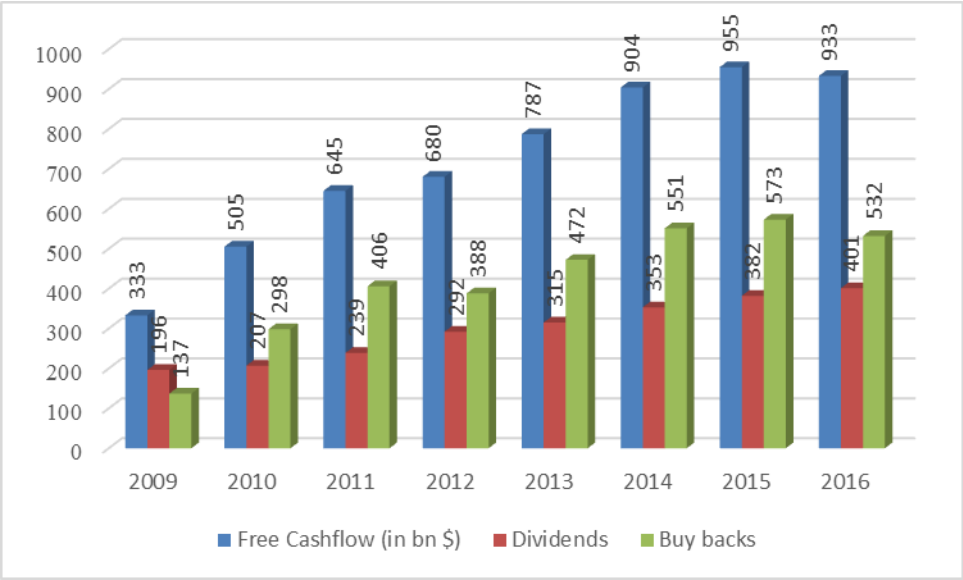

Figure 1. Development of share buybacks according to S & P 500
Source: http://spindices.com

In view of this explosive development, investors are questioning the dividend policy (Walchshofer, 2013), the analysts the motives of the management (Schmal, 2016) and the stakeholders questioning the company as a social value-adding institution (Freeman, 2010). In this field of tension, the trust of the owners in the company decisions is of great importance. The corporate constitution can provide security between management and owner (Schewe, 2005). In turn, corporate governance obliges corporate management to correct decisions in the target achievement processs (Wentges, 2013). In practice, the share repurchase can be used as an instrument to control the capital structure and dividend policy, as well as aspects of credit quality, operational lifecycle phases and defense against takeovers (Staroßom, 2012).

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2 Material and Methodology

The motives of starting buy back programs are very different and are shaped according to the ideas of two interest groups, the management and the shareholders (see Tab. 1), within the framework of the legal rules. It is therefore of great importance for the management, in order not to jeopardize the stability of the company and to create a balance of interests between share- and stakeholders. While the management aims for the positive development of the company, the shareholders, ideally, want a successful, long-term increase of their investment. You can distinguish the motives of both groups based on their corporate strategy and security pretense. A shareholder is not only interested in a payout, but also in the security of getting it in the future, otherwise he could invest his money in another company. Table 1 also identifies the strategic interests of management based on enumerated motives that serve to bring the company under even greater control. A buyback program can also convey the impression of lack of decision-making authority, unsuccessful market strategies and the lack of market-related growth prospects (Bösch / Ude, 2014).

The motives for profit distribution and reserve policy are based on target achievement strategies and the current possible success situation (Prätsch et al., 2012). The continued existence of the company will be ensured in the long term by planned debt repayments and investments, with the effects of modernization, development of new product, further expansion and stronger establishment in markets and business areas (Eilenberger et al., 2013). In particular, mature, high-profit products require long-term innovation and technical adjustments to avoid sales slumps (Portisch, 2008 & Porter, 2013).

In order to provide sufficient funds for investments, repayments and reserves, management makes decisions regarding income taxes and dividend payments. While taxes are defined under tax law, dividend policy must take into account the interests of all parties involved. Basically, decisions are made in the sense of improving the company situation. Thus, the profit distribution including the accumulation by owner interests, corporate strategies or signaling, the public advance notice of a possible BBP, may be affected (Guserl & Pernteiner, 2015).

Table 1. Motives for the share buyback

Financial policy motives	Shareholder political motives
Distribution of excess liquidity	Defense of unfriendly takeover attempts
Optimization of the capital structure and capital cost reduction by using the leverage effect	Use of own shares as transaction currency for company takeovers
Improvement of the company key figures	Influence on the shareholder structure
Signaling at undervaluation	Reduction of shareholder serving costs
Influence on the share price	Serving stock option programs for employees
Reduction of agency costs	
Distribution via share buyback due to tax benefits	
Listing on a foreign stock exchange	

Source: Bösch M./Ude E. (2014)

Due to the accounting policy, the company management sets, within the applicable law, accents to satisfy the satisfaction of the company's close groups. Measures taken, e.g. Recognition and valuation options can influence the current and future taxable profits (Lembke, 2009). Critical are too high valuations of future manufacturing and research & development and marketing expenses (Schierenbeck, 2003).

International companies also use different taxrates in the countries of their subsidiaries. The retroactive taxation of profits in the country of the parent company takes place i.a. based on a dividend distribution less deductions from international income tax regulations. The corporate governance strategy is eager to meet owners' demands for

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maximizing assets through tax breaks by adjusting period results, as high profits generate high taxes and reduce the proportion of investors in the company (Staroßom, 2012).

Optimizing the **capital structure** is important for companies to achieve lower capital costs, strengthen financial stability and improve credit-worthiness. There is no ideal theory (Guserl & Pernsteiner, 2015). The goal of the traditional approach (leverage) e.g. is the increase in equity. Borrowed capital should only be raised if it is cheap and its costs are not higher than the total profitability (Schmidlin, 2013). The agency approach, which incorporates the information advantage of management vis-à-vis lenders, in turn aims to provide a high level of equity. However, the freedom of design of management can lead to increasing indebtedness, risky investments and an imbalance in the capital structure. The entrepreneurial capital structure is determined not only by the different aspects and ways of thinking, but also by factual and event-related influencing factors such as capital increases, reductions, borrowings and above all through the distribution or dividend policy (Guserl & Pernsteiner, 2015).

The **dividend policy** serves to balance the interests of the company and the shareholders. The important points are the time and the amount of the distribution. The management and the supervisory board decide to use the surpluses of the financial year in compliance with the rules of the tax law, the bookkeeping and reserve policy (Perridon, Steiner & Rathgeber, 2014). The starting point is the generated free cash flow, the excess amount from the capital employed and the reinvestment. It serves in addition to the debt repayment of the dividend payment (Schmidlin, 2013).

Management uses the buy-backs as signal function in times of excellent corporate development by announcing dividend increases. This also suggests product improvments and a mature and saturated market and financial slumps. Accumulated surpluses increases the risk of **hostile takeovers**. In this case, the terms and conditions of acquisition will be improved until they are finally accepted by the corporate officers. High corporate liquidity surplus results in so-called bootstrap acquisitions. In the process, the takeover company finances the property with liquidity surpluses of the object of purchase (Guserl & Pernsteiner, 2015 & Staroßom, 2012).

Sustainable, successful and secure business policy is fundamentally based on a solid equity base. This is necessary to ensure ongoing product innovation, process improvements, international expansion and financial stability. Company helps a strong innovation orientation towards crisis susceptibility and coping. Further aspect in this regard enterprise size and environmental dynamics (Rößl et al., 2013). Companies with **mature products** in saturated markets are reacting with further developments or replacement products even before the sales slump. If the owners demand a profit distribution and the reserve volume is insufficient, the management should consider a capital reduction and inform the supervisory board about the situation (Prätsch et al., 2012 & Staroßom, 2012).

In the case of capital reduction, the literature distinguishes between ordinary, simplified or with the collection of own shares. The instrument serves to avoid losses or in case of reorganization. For the ordinary capital reduction, a majority resolution of the general meeting is required (creditor protection). It is made by reducing the nominal amount of the share, repaying it to shareholders or reducing its deposit obligations. It serves the repayment of capital to the shareholders. The decision must be entered in the commercial register. There is a lock-up period in which all creditors are satisfied before the payment to the shareholders.

The simplified capital reduction provides for an alignment of the share capital with the actual company assets. There is no payout, nor to release the deposit obligations. The capital reduction serves to cover losses as well as the cessation of tied reserves (max. 10% of the adjusted share capital). A profit distribution is only possible after 5 years, following a resolution by the Annual General Meeting. The simplified capital reduction is used in

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restructuring cases and is combined with a capital increase to attract funds and investors (Crone, 2014 & Aigner et al., 2009).

The third form of capital reduction is the retirement of shares. This can be done by repurchasing 10% of own shares or by compulsory redemption of shares. Genearlly the sale of own shares is in the Stock Corporation act of different European countries prohibited, as it leads to a reduction of the nominal capital or the liable capital (protection of creditors). However, sales authorizations may be granted, in the event of imminent serious damage, or in the case of offers to employees, members of the Supervisory Board, the Management Board and the remuneration of minority shareholders.

The buyback of own shares reduces equity. Remaining surpluses, without investment use, are distributed to the owners. The stock price itself remains the same, while the price is reduced by the dividend payment. When acquiring own shares, the nominal value is shown as a negative position against the share capital. The difference is allocated to retained earnings so that they are not used for distribution and payment to the owners.

One of the main motives for the share buyback is that one expects rising prices due to the positive business development and an announcement of dividend distribution and thus a price adjustment, the so far undervalued shares is brought about. Further motives may be based on employee participation, issue on foreign stock exchanges, adjustment of the investment structure or future stock market retreat (Aigner et al., 2009).

The **BBP** is proposed by the Executive Board and the Supervisory Board and initiated by the Annual General Meeting by means of a five-year limited authorization. Information obligations exist to the financial market supervisory authority, the stock exchange, as well as to owners and interest groups.

The executive committee publishes a prospectus, which announces the beginning, the term and the total volume. In the financial statements, the shares sold are presented in the balance sheet and explained in the notes to the annual report. The authorization ends with the end of the BBP (Sendel-Müller, 2009). In the EU (European Union), share buybacks were made possible by the capital guidelines. In Germany and other countries, the capital reduction was legitimized with the obligation to control and transparency of the companies (Frei & Schlienkamp, 1999).

The requirement for the topic is, in addition to a holistic view, to examine the BBP as a financial-strategic instrument. Based on the described motives, the design of the optimal capital structure and dividend policy shall be examined. In order to give the topic the necessary relevance, a practical calculation example will provide information in addition to the literature.

As stated in the introduction, executives of corporations use BBP to reduce annual surpluses and thus curtail different interests. In order to carry out this program, the corporate leadership needs persuasiveness to enforce its motives. If the balance of interests with the shareholders and stakeholders succeeds, the program can be started with the goal of optimizing the capital structure and the adopted dividend policy. Managers are expected to create the best possible conditions for achieving their business goals, based on their knowledge advantage (Guserl & Persteiner, 2015).

The paper tries to prove the effects of a BBP regarding the optimization of the capital structure and the dividend policy with the following theses:

- **Hypothesis 1**: The BBP improves the capital structure. This leads to an improvement in the credit rating of the company.

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- **Hypothesis 2:** The BBP aims to avoid high dividends in order to prevent hostile takeovers.

This investigation has a strong emphasis on the stability of the company through share buyback programs. In addition to the fiscal goals, the further development of the products and the concentration on the core business should not be forgotten.

3 Results

In the following, the optimization of the capital structure and dividend policy and the underlying motives, in a capital reduction of listed companies by the collection of shares are presented. In addition to the explanations on the theoretical approaches, key figures and analyzes should provide clarity on the established hypotheses.

The search for the **optimal capital structure** primarily serves to maximize total profitability and thus goodwill (Ehringer et al., 2013). Current literature relies on theories of leverage and the traditional approach in their studies of optimal capital structure (Guserl & Pernteiner, 2015). With the result that no optimal capital structure can be determined, since both theories include different starting points and influencing factors. The Irrelevance thesis of Modigliani and Miller (1958, 1961) starts from the perfect market, which neglects taxes, illiquidity and considers capital structure changes as irrelevant for shareholders. These assumptions led to discussions regarding the inclusion of individual decisions and operational structural characteristics (Guserl & Pernsteiner, 2015 & Staroßom, 2012). In the following, it is attempted, irrespective of these theories, to approximate an optimal capital structure.

According to international accounting standards (IAS), share buybacks reduce equity by selling costs. The consequences are the increase in the debt-equity ratio of the company as well as the threat to the protection of creditors (Bösch / Ude, 2014). Basically, the more equity, the higher the creditworthiness. Due to its interest rate and risk, equity is more expensive than borrowed capital, which can be obtained more easily by good creditworthiness and the costs can be deducted for tax purposes (Wagenhofer, 2008).

The optimal ratio between equity and debt capital can be calculated using the capital structure key figures as follows (Schmidlin, 2013 & Becker, 2009):

- The return on equity (1) is the interest on the shares held by the owners. The higher the debt ratio, the higher this ratio.
- This assumption applies as long as the return on capital (2) is higher than the cost of borrowing costs.
- Another measure of financial stability is the so-called gearing (3), the net debt to equity.

In the following simplified example, four assumptions have been made and are shown in the connected table and figure (taxes are not included):

a) Y-1: opening balance, borrowing interest rate 5%,
b) Y without loan: the previous year's funds were not distributed but used for the repayment of debts, the better credit rating was agreed to a new interest rate of 4%,
c) Y loan: the profit was distributed, a new loan has been taken (6% interest),
d) Y mix: The profit was completly used for dividend distribution (50%) and debt repayment (50%).
e) Y BBP: The profit was used for the repurchase of shares (50%), for the dividend distribution and debt repayment, therefore a new borrowing interest rate of 4% was agreed.

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Table 2. Development of the balance sheet structure

Ratios/Positions (in EURO)	Y-1	Y			
	Opening balance	without loan	loan	mix	BBP
ROE	20%	19%	16%	19%	20%
ROI	11%	11%	10%	11%	10%
Gearing	30%	10%	50%	20%	25%
Proportion per share	10%	10%	10%	10%	11%
Liquide Funds	500	500	500	500	500
Sharehoder´s Equity	5.000	5.000	5.000	5.000	5.000
Retained earnings					-500
Liablities	2.000	1.000	3.000	1.500	1.750
Debt Capital	5.000	4.000	6.000	4.500	5.000
Total Capital	10.000	9.000	11.000	9.500	9.500
EBIT	1.100	1.000	1.000	1.000	1.000
Interest on outside Capital	-100	-40	-180	-75	-70
Net Income	1.000	960	820	925	930

Source: own research

$$ROE = \frac{Net\ Income}{\emptyset\ Shareholder's\ equity} \quad (1)$$

$$ROI = \frac{(Net\ Income + interest\ on\ outside\ capital)}{\emptyset\ Total\ Capital}\ x\ 100 \quad (2)$$

$$\text{Gearing} = \frac{Interest\ bearing\ net-liquid\ funds}{Shareholder's\ equity} \quad (3)$$

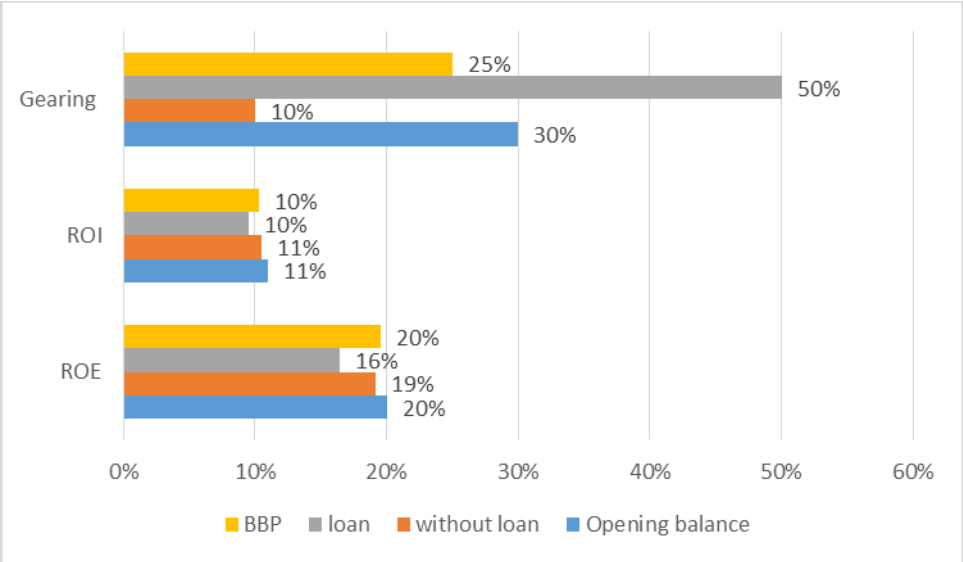

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Figure 3. Capital structure ratios; *Source*: own research

As shown in Tab. 2 and Fig. 3, the total distribution with simultaneous borrowing (assumption c) has a negative effect on the return on equity and a significant negative development of the debt ratio, because auf the new loan. While b) due to the improved creditworthiness could be arranged with the bank more favorable rates these remained the same for c) + e). Assumption b) focused on the repayment of debts in the amount of the annual surplus but to the burden of a missing dividend distribution.

The BBP used the proceeds for the share repurchase, the partial distribution (25%) and the loan repayments (25%). The result was an decrease of the debt ratio compared to the previous year, which helped shows an optimization of the capital structure (Pernsteiner & Andressner, 2014). Despite BBP's 50% use of the surplus, the BBP improved its financial structure and its share quota of share capital increased by one percentage point. In this case, despite a reduction in equity, there was an interest compensation with creditors and shareholders.

The examples are very different. Thus, in one case, a distribution defying high profits was waived to repay debt. The other variant, was a uniform distribution of dividend payment and debt repayment. The BBP achieved the same effects of the two approaches presented. However, in addition to the performance improvement, a rectification of the shareholder structur was effected. The strengthening of the creditworthness helps the company to borrow cheap money. However, these excellent figures can change significantly due to poor operating results.

High profits are necessary because of the interest on borrowed capital, the protection of creditors and a dividend policy designed in the interests of reconciliation of interests and shape the composition of the capital structure. For companies in the maturity phase, market saturation leads to sales and profit losses. Thus, it can be stated that there is no operational increase in profitability, because in addition to the profit potential loss potentials are also increased, so the structural policy, as the example shows, is suitable for lower interest rates (Bösch / Ude, 2014).

Companies with high surpluses, combined with low reinvestment requirements and a high potential for distribution, attract **willing-to-take competitors** or investment companies. By contrast, companies with high product maturity need to achieve innovation or new combinations of goods by investing in research and development quickly and extensively. With the distribution policy, corporate executives control the surpluses. The defensive strategy of threatened companies can be achieved by reducing the company's economic incentives through share buybacks, resulting in increased equity value, reducing the total number of shares, and initiating stock option programs for employees from whom companies can expect loyalty. (Bösch / Ude, 2014 & Johannsen-Roth (2001)).

The Stock Corporation Act regulates the general conditions for the appropriation of profits and thus sets the legal framework for the dividend policy. The owner shareholder is entitled to a profit, unless there are restrictions by law or statutes. Up to max. 50% of the surpluses can be retained by the Management Board and the Supervisory Board as retained earnings. In the case of a capital reduction, however, a profit distribution of more than 4% is only possible after two years from the date of liquidation. Creditors are not affected due to creditor protection. Reserves that are dissolved by the capital reduction must not be distributed as profit. As can be seen from the statutory provisions of the Stock Corporation Act, there are a number of possibilities to develop a dividend policy within the framework of the law and in the interests of all parties (Austrian Stock Corporation Act).

If a listed company is the target of a hostile takeover, the corporate executives, if it is against their will and to the detriment of taking over, will vigorously try to prevent this. The "receiving party" offers owners an offer to take over their shares. Most of the payments are financed through leverage buyouts in order to hide the intention to buy, or to undermine the long-winded acquisition via equity issues (Macharzina & Wolf, 2014). The repurchase

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of own shares can be used as a tool against hostile take-overs. However, the scope is limited to 10% of the nominal capital. Therefore, the solution can be found in the procedure and use of the interactions.

The realization of the BBP leads to a reduction in equity. If borrowing is financed, this increases the debt-equity ratio and thus the reduction of the company's liquidity, which is reflected in the purchase price/risk of the company shares (Johannsen-Roth, 2001). Another approach is to submit offers to sell-willing shareholders so that the shares remain in the company. Thus, an adjustment of the shareholder structure, a so-called squeeze-out, is achieved in the case of heterogeneous groups (Schremper, 2002). Another, but rather expensive, option is to buy back the shares directly from the "transferee" with an additional standstill agreement (Johannsen-Roth, 2001).

The results presented here showed the possibilities of share buyback programs for the executives of listed companies. Thus, by reducing excess liquidity through share repurchases, the capital structure and creditworthiness can be improved, shareholders and creditors can be equally satisfied. It can thus be tempted to strike a balance of interests between the goals of the company and the shareholders, by downsizing and improving the shareholder structure. Using several scenarios and relevant key figures, the author has tried to clearly illustrate the answers to both hypotheses. Recently, the design of working strategies, restricted by legal regulations, was explained to combat hostile takeovers.

4 Discussion

In the previous chapters, the motifs of a share buyback program known in the current literature were generalized and two motifs of them were hypothesized in particular. In principle, the repurchase of own shares is generally viewed critically. Arguments that reinforce these doubts:

- Financial resources that are used through disorderly repurchases without fsical effects,
- surpluses that are not invested in innovation and new product development as a result of the share repurchase are particularly important for mature products and mature markets,
- major shareholders, who only have the profitability of their deposits in mind and
- managers who abuse the share buyback to gain more personal goals, influence and power

According to hypothesis 1, the BBP was presented in this paper as an instrument for optimizing the capital structure using a practical calculation model with key figures. The result of the assumptions underlying the model showed an improvement in creditworthiness, which in turn leads to borrowing. Balanced capital resources/components are needed to achieve corporate goals more flexibly and better. However, companies prefer a weaker return on equity, as fresh loans are cheaper than equity, because of expected returns, and are tax deductible.

With regard to the dividend policy within the framework of the BBP, according to hypothesis 2, it can be stated that the legal provisions limit the possibilities. An applied strategic approach in the legal framework and a results-based approach can prevent impending hostile takeovers.

With these two design possibilities, the influence and scope for action of the company management can be strengthened. This creates the opportunity to drive product development in the long term, to focus even more on the markets, to improve the shareholder structure and to sustainably strengthen the autonomy of the company..

Whether these two measures belong to the most pressing priorities of listed companies was not answered in this paper. For reasons of simplification, two design measures have been taken which are practical and not abstract.

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In the literature, in connection with BBP, critical motives such as signaling or subsequent taxation of foreign profits are discussed. As one can see from these issues, the implementation of the BBP offers a multitude of further depths that can be used to question the motives of the corporate officers.

5 Conclusion

This paper describes two motives of a worldwide fiscal phenomenon of our time - the instrument of the share repurchase of listed companies. In the United States, the so-called BBP is one of the corporate finance strategies. In Europe, so far, legal regulations have limited these programs. Another reason was the critical attitude of investors and stakeholders towards non-transparent fiscal decisions. However, this tool, when properly implemented, has the potential to make distributions efficient and can balance the operational needs and interests of shareholders.

The motives for launching a BBP are very different but of great scope and can be differentiated according to fiscal and investor-oriented corporate decisions. While the shareholder expects higher returns on his invested capital, the managers of the companies set themselves the goal of successfully developing the company

Corporate executives of listed companies have the option of paying out surpluses to owners, taking account of the accumulation of reserves and accumulating them, or using them to finance capital reductions in the form of share repurchases. At the forefront of these decisions are the balancing of the different interest groups and the balance between the financing consideration and the distribution policy. A tension that is characterized by the knowledge advantage of the management, the desire for control by the owners (corporate governance) and the hope of the stakeholders for the survival of the company.

The result of the study shows in the first step the elaboration of the proposed hypothesis of the optimization of the capital structure. Responses were made by using current literature and an annotated analysis with four developed scenarios. Specific key figures underline the vigor of the given examples. The result of the BBP example shows an improvement of the total return on equity, the debt ratio and thus a higher return on capital employed. These are reasons that increase creditworthiness and confidence in the actions of the manager.

The danger of hostile takeovers, but also market-related inflexibility can be dispelled by leveraged, strategic BBP. The target takeover-willing company is aimed, as already mentioned, at businesses with high surpluses, combined with low reinvestment requirements and a high potential for distribution. In case of a specific and real threat, the company can react with a BBP. As the ability to repurchase shares is limited by law, the effectiveness of the program, combined with a number of monetary and structural measures, can effectively combat a potential takeover. Thus, the risk of hostile takeovers, in case of market inflexibility deployed by strategic deployed BBP.

The impact of both measures described and objectives examined confirms successful credit quality improvement and the prevention of hostile takeovers.

The subject of share repurchase includes, in addition to the different interests and motives possibilities for further studies. The dynamics of globalization require answers, new ways and more flexible thinking and action from the leaders of listed international companies. A BBP is one of the tools that, if applied correctly, can provide solutions based on its motives.

Finally, it must be noted that lengthy and complicated BBP can be dispensed with by weighing the interests of the parties concerned. High and regular surpluses can be shared through a balanced distribution policy with stable

dividends (in the interest of shareholders), adequate provision and a reduction in the risk of takeover-willing companies (in the interest of stakeholders).

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THE DOCTRINE OF APPARENT AUTHORITY AS A PRECONDITION FOR SUSTAINABLE BUSINESS

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Abstract. In the light of modern commercial relationships, the doctrine of apparent authority plays an important role in ensuring the sustainability of business. Where the business undertaking is a large and complex one, it would be difficult and inconvenient for a person or legal entity to communicate every transaction with the agent. Thus, an agent's effective powers in dealing with third parties may extend to transactions that he was not authorized to undertake by the principal. Such situations are usually characterized as *apparent authority*. The difficulty with this type of authority lies in the lack of control on the part of the principal which entails certain questions of liability of either the agent or the principal. Even though the third party has to check the agent's authority, he cannot know about all the details of the agent's internal authorization. Therefore, there is always a risk that the agent was not authorized to act. This article is deemed to provide a comprehensive analysis of the doctrine of apparent authority from a comparative perspective. A conclusion is made that the doctrine is an efficient mean of apportioning the risk of liability for agent's unauthorized act between the principal and the third party with individual factors determining who must bear liability it in every specific case.

Keywords: agent; unauthorized agency; apparent authority; manifestations of authority; estoppel doctrine; sustainable business

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1. Introduction

The common law approach is based on "*externalized*" theories, which state that agency situations should be explained from the third party's point of view. This means that common law fails to make a proper distinction between the internal relation between principal and agent and the external relation between the agent and third parties, but simply involves the contract of two persons. Undeniably, the common law theory of identity has certain problems but in the perspective of modern commercial life, "external" approach appears to be practical and more justified from the standpoint of the needs of reality, than the abstract method of separation.

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Most agency relationships arise from agreement of a certain form between the principal and the agent. In other words, the principal and agent have to "agree about the creation of the relationship" and to confer on the agent certain "powers to act on the principal's behalf in relations with third parties" (Fridman 1996). This definition should be added with the mentioning of liability, which can be created by agents in respect of their principals under tort and criminal law.

Authority in general constitutes the agent's power of a special sort to affect the principal's legal relations with third parties in such a way as if he had done the act himself. However, the notions of authority and power should be distinguished (Powell 1951). *Authority* carries the image of a paradigm justifying a legal result, whereas "power" is neutral and simply states the result regardless of the justification for it (Reynolds 2010; Finogentova et al. 2028).

In agency doctrine, actual (real) and apparent authorities are usually discussed. The major difference between apparent and actual authority lies in justification of the agent's acts in relation to the principal. In contrast to apparent authority, real authority is more than just a legal power *"looking out" (posse*) an agent, also there is a privilege *"looking in" (licere)* to the lawfulness of his conduct. The power and privilege are supported by the principal when the agent performs actions with actual authority, while, in the case of apparent authority, the agent has only an external legal power to act without corresponding internal principal's justification (Müller-Freienfels 1957).

Apparent authority describes a situation when the negotiation of an urgent issue with a principal is impossible the agent might have only the appearance of authority, but no actual authority to act on behalf of the principal. Diplock L. J. in the case Freeman & Lockyer v Buckhurst Park Properties (Mangal) Ltd (1964) rightly noted that in ordinary business dealings the contractor at the time of entering into the contract could hardly ever rely on the agent's "actual" authority. Information on the authority must flow either from the principal or from the agent, or from both, as only they know about the scope of the agent's actual authority. The contractor knows only what he is being told, which may or may not be true. Ultimately, he relies either upon the principal's representation (apparent authority) or upon the agent's representation (warranty of authority).

Therefore, apparent authority is an essential part of the unauthorized agency, since there is always a risk that the principal would not approve the agents act and it would be considered as performed without a proper authority. Nevertheless, the agent is still capable to bind the principal by a contract with a third party, if the latter entered into such contract with the agent in reliance on the principal's representation.

Also, the difference between apparent and actual authority is that actual authority arises from the principal to the agent, while apparent authority flows directly to the third party from the principal. Nevertheless, these types of authority very often overlap and cause the impossibility to decide whether parties rely on apparent or actual implied authority. Lord Denning in *Hely-Hutchinson* stated that "apparent authority…often coincides with actual authority. Thus, when the board appoints one of their members to be managing director, they grant him not only implied authority, but also with apparent authority to do everything that falls within the usual scope of that office. All others, however, are entitled to assume that he possesses usual authority of a managing director" (Hely-Hutchinson v. Brayhead Ltd 1968).

In certain circumstances, the scope of an agent's apparent authority may be equivalent to the scope of agent's actual authority, in other words, to the extent the agent reasonably believes in having the authority to act granted to him on the basis of his position or status by the principal (Restatement (Third) of Agency 2006). In addition, the extent of the agent's apparent authority created by estoppel largely depends upon the contents of the acts done by the principal to the third party who relies on representation.

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The issue of legal foundation of the doctrine of apparent authority is also marked with disparity, since the doctrine of apparent authority is comparatively new both in common and continental law. For this reason, there is no unified approach regarding it even within one legal system and long-lasting discussions of scientists from different countries are held regarding the question whether apparent authority should be based on estoppel or the objective theory of contract.

The aim of this article is to analyse the concept of apparent authority within the doctrine of agency, its constituencies and ways of treatment in different jurisdictions. Controversies regarding the basis of apparent authority are presented in the current research since even countries within one legal system hold different approaches toward the contract or estoppel basis of apparent authority. Since the issue of authority is problematic also in continental legal system, the article also provides a comparative legal research of this issue, which is particularly important in order to ensure the possibility of full realization of the agency relations.

This study is based on the qualitative methodology approach and principles. The paper is also based on methodological regulations of studies of law, matching ideas of theories of normative and case law. The main data collection method used during the study was method of conceptual analysis when analysing the existing conceptual legal framework of the doctrine of apparent authority. Taking into account the character of the study, the most important data analysis method in this paper is comparative when revealing divergences in the legal systems concerned. The reference point of this study is legal regulation of the doctrine of apparent authority in countries with continental law system and common law system. Regulation in an article established in this legal act is compared to provisions of international instruments of unification of private law (the so-called soft law) and law of civil law countries.

2. Legal foundation of the doctrine of apparent authority

It is not easy to find the legal foundation of apparent authority. There is a long-standing discussion whether apparent authority is a true authority or whether it creates a liability for the principal based on estoppel (Cook 1905). If it appears to be a class of authority, it becomes similar to actual authority, a power of an agent to bind his principal by the contract with the third party. In this case, both parties are bound and the principal does not have to authorize the agent's act.

English view on apparent authority later followed by UNIDROIT Principles (2010) differs greatly from the American-law position as the former regards the concept of estoppel as the basis (Bowstead 2014) and the latter sticks to objective theory of agency, which is directly derived from the objective theory of contract. A disparity has also marked the development of the doctrine within Europe itself. Continental leading approach is that the concept of apparent authority is based on the objective theory of agency, which is directly derived from the objective theory of contract.

The legal term *'estoppel'* means that a person, who has let another person believe that a certain state of affairs exists, is not later permitted (is estopped) to deny that if the other person has acted to his detriment in reliance on that state of affairs and the denial would cause damage (usually financial loss) to that third party (Law of Agency, 2018).

There is no special rule peculiar to this type of agency. It is just aimed to show that agency contracts are not always expressly made, but very often may be inferred from the circumstances by the court. An implied contract

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differs from an express with the promise, which is expressed, wholly or in part, by conduct rather than by words (Mechem 1952). Thus, agency is implied from special circumstances of the case.

In agency arising by estoppel, the authority of the agent is described as apparent or ostensible but not actual, as it was not actually granted to the agent by the principal to act on the latter's behalf.

Regarding the doctrine of estoppel, the Restatement, Third in § 2.05 gives two types of estoppel situations in agency. The first one is that the principal, while making no manifestation of authority, by conduct intentionally or carelessly caused belief that the agent was authorized. The second is that where, having no notice of such belief, the principal did not take any reasonable steps to notify third persons about the absence of authority (Restatement (Third) of Agency 2006).

First category can be regarded as an example of estoppel by representation. When the agent was negligent it will raise the initial question whether a duty of care is owed to the particular claimant. Usually the courts are willing to see an estoppel based on the breach of duty of care in the reasoning of the case but such situations are very rare in contract situations. The starting point is that individuals should often protect themselves in attempting to contract with others. The general argument would be rather dubious one; a person who chooses to act through others must take the risk of the ways in which those others act (Bower 2004). An interesting example of acting with a breach of duty of care can be seen in case MacAndrews & Forbes Co. v. United States (1928) where the agent left a delivery order in a drawer in a public garage instead of delivering it to the truck driver. Such agent should be considered as unauthorized, since he did not follow his principal's instructions.

Second category explains cases where there is no manifestation of authority, but the conduct of the principal clearly indicates that there had been authority at an earlier time (Reynolds 2010).

According to the general rule mentioned in the Restatement, Second of Agency (1958) "acts are to be interpreted in the light of ordinary human experience". If a principal puts an agent into (or knowingly permits him to occupy) a position in which according to the ordinary habits of persons in the locality, trade or profession, it is usual for such an agent to have a particular kind of authority, anyone dealing with him is justified in inferring that he has such authority, in the absence of reason to know otherwise. The content of such apparent authority has to be determined from the facts (Cmt. C, Restatement (Second) of Agency 2013).

Restatement (Third) of Agency (2006) and the Principles of European Contract Law (2000) (hereinafter, PECL) follow the objective theory of contact (Lando, Beale 2000). Apparent authority there allows the principal to sue the third party on the basis of apparent authority. Objective theory of agency, which is derived from the objective theory of contract, states that principal's liability in contract just like ordinary liability in contract is based on his voluntary representations to third parties concerning the scope of the agent's authority (Conant 1968). It is noteworthy that if the objective theory is taken as the basis for apparent authority, the absence of reliance on the part of the third party will not be fatal to an assertion of apparent authority (Restatement (Third) of Agency 2006). The principal's representations or conduct toward third parties create for the agent a power to contract excessing his actual authority. This view of apparent authority requires neither proof of misrepresentation nor change of position in reliance thereon, and conforms to the mutuality of obligation.

So, in American law the view that the concept of apparent authority is based on the objective theory of agency prevails, which is directly derived from the objective theory of contract.

The estoppel view, in its turn, is dominant in England and much of Commonwealth countries. However, several important facts should be noted. Firstly, in all legal systems where apparent authority is based on estoppel, it

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works against the principal because there is, in fact, no contract formed and only the principal can be held liable as the concept itself prevents the principal from denying the existence of agency to a third party.

Moreover, in case with unauthorized agency the principal may experience certain problems with holding an unauthorized agent liable for the acts performed on the principal's behalf. The concept of estoppel prevents the principal from denying the existence of agency to a third party, thus only he can be held liable for the exceeding of authority by his agent. Liability here is based on the third party's reliance and the principal's manifestations of his agent's authority. Thus, it is clear that contract and estoppel are inconsistent concepts and cannot be combined as a basis for apparent authority (Heskell v. Continental Express, Ltd. 1950).

Controversies whether the apparent authority has a contract basis or is based on estoppel are tough as in most cases elements of both contract and estoppel are present. The estoppel view is highly criticized in the United States and civilian countries, however, in practical terms, it does not matter significantly which view is preferred, as far as the principal can sue the third party both on the basis of apparent authority and ratification. Furthermore, either view must contain some manifestation of authority moving from the principal. The only practical significance is that if estoppel is the basis for apparent authority, a principal who wishes to take the benefit out of its agent's unauthorized acts must always ratify, since a cause of action cannot be found on an estoppel (Busch, Macgregor 2009 b).

Generally, whichever the view is taken, it is widely accepted that the doctrine of estoppel is one of the most useful and flexible in law and that various types of estoppel are governed by a general principle, namely that when the parties to a contract proceed on the basis of an underlying assumption engendered by the other, neither of them will be allowed to rely on the assumption when it would be unjust or unfair to do so.

The issue of determining the essence of authority still remains a bit problematic under the Ukrainian civil doctrine as there is still no unified approach developed regarding the legal nature of the agent's authority. Traditionally, authority is considered a non-material subjective right, since no actual property right or obligation of either party to the relationship corresponds to it. This, however, does not indicate the absence of a property element in the legal relations of representation in general. The agent's right to remuneration and the corresponding principal's obligation to pay it, is an element of the relationship along with the authority, but not a part of the authority itself (Tsiura 2017, 230).

Lithuania is one a few countries where the idea of apparent authority is moved to the positive law. Paragraph 9 of Article 2.133 states that where an agent acted in excess of his powers but in the manner which gave to a third person serious grounds to think that he was concluding a contract with a duly authorised agent, the contract shall be obligatory to the principal, except in cases where the other party to the contract was aware or had to be aware that an agent was exceeding his powers.

3. The elements of apparent authority

Apparent authority is described as one of the main problems of agency institution (Stoljar 1961). A good definition of the doctrine of apparent authority was presented by the Restatement Third of Agency (2006) as the power held by an agent or other actor to affect a principal's legal relations with third parties when a third party reasonably believes the actor has authority to act on the principal's behalf and that belief is traceable to the principal's manifestations.

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Therefore, the third party has to rely upon the principal's manifestation of the agent's authority, which may go beyond the authority actually communicated by the principal to the agent (Müller-Freienfels 1957).

One more excellent description of the concept was given by the court in the *AAA Tire opinion*. It was explained that the concept of apparent authority only comes into play when the agent has acted beyond his actual authority and has no permission whatsoever from his principal to act in such a manner. The principal will be bound for such actions if he has put his agent in such a position or has acted in such a manner as to give an innocent third person the reasonable belief that the agent has authority to act for the principal. The facts and circumstances of each case must be examined to determine the reasonableness of the third party's belief. One must look from the viewpoint of the third person to determine whether an apparent agency has been created. In transactions between businessmen, the nature of the business, customs and usages within the trade can be important factors to be considered (Holmes and Symeonides 1999, 26).

Denning L. J. correctly pointed out that ostensible or apparent authority is the authority of an agent as it *appears* to others (Hely-Hutchinson v. Brayhead Ltd 1968). This usually happens when the principal expressly or by any other conduct makes the third party to believe that he consents to have the act performed on his behalf by the other person. If the third party with a reasonable belief relies on these manifestations and contracts with the agent on this ground, the principal is considered to be bound.

From the definition of apparent authority, certain conditions may be traced. As Slade L. J. observed in *Rama Corporation Ltd v. Proved Tin and General Investments Ltd (1952)* that one cannot call apparent authority unless three requirements are met: 1) *a representation must have been made to the third party in order to show that the agent has authority to act on behalf of the principal*.; 2) *a reliance on the representation;* 3) *an alteration of third party's position resulting from such reliance.*

Manifestations of authority show the third party that the agent is duly authorized to act on the principal's behalf. This may be made by words (oral or written) or by conduct. Authority may be also contained in a separate written document. Even though the third party has to check all the manifestations of agent's authority, he cannot know about all the details of the agent's internal authorization. Therefore, there is always a risk that the agent was not authorized to act.

However, there is a view that private restrictions made by the principal to his agent cannot effect the third party's reliance on the manifestation of authority. This was mentioned in the case Harrison Exp. (1893) where an agent had authority to apply for the shares on a particular day, however in a separate document it was stipulated that the acceptance of an offer has to be communicated to the principal. This was not done. For the reason that the contractor was unaware of the private restriction, he could rely on the document, which was presented, and the principal was estopped from denying that the agent has unrestricted authority to act on his behalf.

Authority may be implied either from the agent's status (spouse, employee) that under normal conditions would lead to the conferral of authority, or earlier declared authorization that was revoked later internally by the principal. Representation may also be implied from the principal's conduct, especially when the agent performs acts that fall within his 'usual authority' that is inferred from the ordinary course of business. In United Bank of Kuwait Ltd v. Hammoud (1988) the court of appeal held that in each case it was a matter of deciding whether the giving of the undertaking by the agent was an act for carrying on, in the usual way, business of the kind conducted by a firm of solicitors. Moreover, it was decided that in the ordinary course of business a solicitor does not receive money or a promise from a client for giving an undertaking to a third party.

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Countries with civil law order have accepted an approach that focuses rather on the agent's appearance of authority in certain circumstances. In France and Belgium, for instance, liability was historically based on tort, depending on the proof of the principal's fault based on the doctrine *l'apparence.*

Such appearance of authority may commonly take the form of appointing the agent to the position, which implies to have certain authority. Under the conclusions made in *Freeman & Lockyer v. Buckhurst Park Properties Ltd* (1964) a corporation, being a fictitious person can act only through agents with actual authority conferred by the corporation in order to make the representation on its behalf. According to the view of the Restatement (Third) of Agency (2006) acting with an actual authority means that "at the time of taking action that leads to legal consequences for the principal, the agent reasonably believes, in accordance with the principal's manifestations to the agent, that the principal wishes the agent so to act." Such "actual" authority can be delegated to the agent/employee under the memorandum or articles of association in order to permit him or her to act in the management, and thereby to manifest having the proper authority to enter on behalf of the corporation into contracts of a kind which are authorized in the ordinary course of such business.

Consequently, in cases where the agent has no actual authority conferred by the corporation to act on its behalf, the contractor cannot rely upon such agent's representation at all. When apparent authority arises with companies, these representations are made through its properly authorized officers or through one of its bodies such as the board of directors (Freeman and Lockyer v Buckhurst Park Properties (Mangal) Ltd 1964).

Under Ukrainian legal doctrine, the issue whether employees can be considered as agents, acting on behalf of their employer, is still debatable. The main problem is that Ukrainian law does not possess such a legal category as "apparent authority", thus, different opinions are present. Some scholars are convinced that the agent may be granted an authority by appointing to a certain position which authorizes him to perform legal acts on behalf of that enterprise or institution *ex officio* without any other documents. Article 39(10) of the Law of Ukraine "On Limited liability companies"(2018) states that "the sole executive body of the company or the chairman of the collegial executive body of the company may act on behalf of the partnership without power of attorney. The Charter of the partnership may provide the possibility for each or some members of the collegial executive body to act on behalf of the partnership without a power of attorney or the possibility of all or individual members of the executive body to act on behalf of the partnership without a power of attorney exclusively together". Such an approach implies that the employment contract is the basis for the agent's authority to arise when appointing a person to a position in enterprise, institution or organization (sellers, cashiers, etc.) (Tsiura 2017, 254).

Others, however, agree that employers, acting within the scope of employment cannot be considered as agents, since they carry out activity of the legal entity itself, so the requirement that the agent and the principal have to be two independent subjects is not fulfilled in this case. In this context, Art. 1172 of the Civil Code of Ukraine (2003) (hereinafter CCU) must be considered, according to which, if the activity of the employee during the performance of his official duties caused damage to third parties, the responsibility will be borne by the legal entity (employer) as for their own actions. In this regard, an employment contract cannot be considered as the basis for the establishment of representative relations (Domanova 2006, 141). However, when the employee is duly authorized to carry out acts on behalf of a legal entity beyond the scope of his employment, he will become an agent of the legal entity. In this case, the employee will be granted authority and the relations of representation would arise.

Consequently, we can conclude that an employment contract cannot be considered as the basis for representation in civil law, since the employee acting on behalf of the company is regarded as a part of the legal entity and under the "separation theory" accepted by Ukrainian legislator, principal and agent have to be separate legal personalities.

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Thus, in order to create an agent's "apparent" authority by permitting the agent to act in the management or conduct the principal's business, the board of directors has to delegate an "actual" authority to the agent under the memorandum or articles of association in order to permit him or her to represent the corporation to third parties, enter into contracts which are authorized by the principal and are permitted in the ordinary course of such business (Freeman and Lockyer v Buckhurst Park Properties (Mangal) Ltd 1964).

A reliance on the representation means that the causal link must be established between the representation and the third party's actions. As Parker L. J. remarked in *Bedford Insurance Co Ltd v. Institutio de Resseguros Brasil* (1999): "A person relying on ostensible authority has…to show that he relied on the representation of the principal, and none of the insured or their brokers was called to testify to this effect. The documents certainly suggest that they could very well have done so, but I am not prepared to hold that they did so. The brokers concerned were few and, with one exception, were not called. The one who was called merely confirmed his proof and this contained no relevant evidence. In the circumstances of this case, where a number of documents were clearly shown to have created, and deliberately to have created, a false impression, oral evidence was, in my judgment, required".

As a result, for apparent authority to arise, it is important to establish third party's good faith when entering into a contract with the agent (Munday, 2010). Third parties acting in a good faith are entitled to rely on manifestations of agency, even if they suspect the agent of acting without authority (Müller-Freienfels 1957).

In contrast to the common law view on apparent authority, the continental legal systems have evolved less doctrinaire solutions to the discussed topic; however, all of them have something in common which is to protect those who in a good faith rely on the manifestation of authority.

Continental courts, in their turn, go further in their understanding of apparent authority and offer to make good faith the determinative factor. Such countries as France, Belgium and the Netherlands base their doctrine on the protection of the third party's *reasonable (legitimate) belief* (Banque Canadienne Nationale 1963). While assessing the legitimacy of the third party's belief, the court will look on certain circumstances of the case (such as employment, education) that would show whether the third party was more likely to fall victim to the appearance of agent's authority. In addition, agent's professional status and behavior will be assessed by the court in order to find out whether he could lead the third party to believe in the presence of authority. German law does not contain an expressly mentioned requirement of the reasonable belief, but it seems unlikely that a court would allow a third party to invoke apparent authority where the belief of the third party was not reasonable. General provision is contained in BGB (2003) that protects the good faith purchaser of movable property.

This requirement is also present in the Article 232 of the CCU (2003). To secure himself, the third party has to check whether the agent is duly authorized before concluding the contract. A representative may be mistaken as to the limits of his authority. In this case, he cannot be held liable for damages suffered by a third party. Therefore, it is of particular importance for the third party to check the agent's authority, otherwise, the third party will be considered as such that had deliberately entered into a relationship with the agent, knowing that the latter acted outside the scope of his authority or beyond the scope of warranty of authority, and, therefore, the agreement, should be considered null (Шершеневич 1907).

The alteration of position may only happen when the third party enters into the contract with the principal. Sometimes, in order to rely upon the doctrine of estoppel, the courts require the evidence that the party has acted to his detriment. As Lord Robertson declared *in George Whitechurch Ltd v. Cavanagh* (1902)*:*

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"My Lords, the case of the respondent is one of the estoppel, and it is an essential element in such cases that the person to whom the representation was made has suffered loss by acting upon it; or, to put it in different way has altered his position to his detriment by acting on the representation."

Nevertheless, there are still many courts that require only alteration. Thus, the Diplock L. J. declares in Freeman & Lockyer (1964) that: "the representation, *when acted upon by the contractor by entering into a contract with the agent, operates as an estoppel*, preventing the principal from asserting that he is not bound by the contract. It is irrelevant whether the agent had actual authority when entering into the contract or not".

After such statements, the question whether alteration is a separate requirement from reliance appears. Under the common law doctrine of apparent authority, a principal is considered to be bound under the contract when the bona fide third party has acted in reliance on agent's manifestation of authority.

Unless all conditions are met, there is a danger that the principal would be able to resile from an unauthorized contract entered into by his agent under no excuse how reasonable it was for the third party to assume that the agent acted with a due authority. In other words, the third party should always bear the risk that the agent acts without authority. Such a risk, however, must be apportioned between the principal and the third party, with the view on every individual factor in determining who must suffer consequences in a particular case, since an agent acting without authority is not personally responsible (Müller-Freienfels 1957). This compromise is the subject of the doctrine of apparent authority.

Under the doctrine of apparent authority, the third party is allowed to sue the principal. However, in case the principal is willing to sue the third party, he is not able to rely on apparent authority, since he must understand that his agent did not have enough powers to act. Also, the principal is unable to claim the benefit of any estoppel that arises from the principal´s own acts.

The question also arises whether and to what extent the agent's power to bind his principal is affected by the death of the principal (Müller-Freienfels 1957). Is it possible to speak about possibility to call for apparent authority in this case?

According to the traditional English view, revealed in the prominent case Campanari v Woodburn (1854), principal's death automatically terminates agent's powers, irrespective of whether the agent or the third party knew or should have known about such an event. The origin of the rule may be found in the provision of the "fiction of identity" concept between the principal and the agent, but today the prevailing argument is that what a dead man cannot himself do, he cannot do through another, because in this case one of the essential features necessary for concluding a contract would be missed, particularly the so-called requirement of meeting of minds (Müller-Freienfels 1957).

Speaking about soft law instruments in the field of private law, they provide certain regulation on this topic that tried to combine the most characteristic features of both legal families. These acts also contain certain provisions on the question of apparent authority. In general, UNIDROIT Principles (2010) accept the English law position in regard to the apparent authority where the agency is based on estoppel, whereas the European Principles try to enforce the continental approach.

Under the European Principles (2000), both the principal and agent are bound to each other by acts within the agent's apparent authority as much as by acts within its actual authority (Lando, Beale 2000). Apparent authority there may be invoked by the third party only in case the third party had a reasonable belief that the agent had sufficient authority.

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Under the UNIDROIT Principles (2010), if the principal wants to rely on the doctrine of apparent authority, there is a requirement to ratify the unauthorized act. Under the European Principles (2000), ratification is confined to direct representation, since indirect agency implies the agent not acting in the name of the principal at all.

The issue of unreciprocated power to hold the other party bound to the contract has also to be seen in the context of apparent authority. Under both English law and the UNIDROIT Principles (2010), the principal is bound under the contract even in case the agent's act fell outside the scope of the actual authority, provided it was performed within the scope of his apparent authority. Under the European Principles (2000), an act within the agent's apparent authority automatically binds both principal and third party so no question of speculation can arise (Bennett 2006).

Mixed legal systems have a unique requirement that the representation must have been of such nature that the principal could reasonably have expected it to be acted on (Monzali v. Smith (1929). This approach is criticized by the common law representatives as such an objective element may appear to be unjust for innocent principals.

Conclusions

The law of agency cannot be limited to cases where the agent possesses an express or implied actual authority. In order to ensure the sustainability in business, an agent always needs to have a certain degree of discretion which would allow him to act outside the scope of the actual authority. At the most common sense, apparent authority can be described as cases when the principal did not authorize or provided limited rights to the agent to act in his own name, but because of the actions by the principal or other circumstances related to him a third party reasonably and fairly believes that the agent has required authorization.

It is important to distinguish apparent authority from implied authority. Implied authority arises from the factual circumstances under which the agent is acting and is considered a part of actual authority. It means that contrary to the case of apparent authority the actions by the agent with implied authority do not mean unauthorized agency

Since the doctrine of apparent authority is an essential element of unauthorized agency, it is deemed to protect the interests of a third party who reasonably believed that the agent was duly authorized to act. Although the agent has only the appearance of authority, but no actual authority to act, he is still capable to bind the principal under the contract with third party, if the latter relied on such manifestation. Manifestations of authority sometimes may go beyond the authority actually communicated by the principal to the agent.

The legal foundation of the doctrine of apparent authority is considered to be controversial. English view that was later followed by UNIDROIT Principles regards the concept of estoppel as the basis. Continental approach sticks to the leading view that the concept of apparent authority is based on the objective theory of agency, which is directly derived from the objective theory of contract, since the English position causes certain problems with holding an unauthorized agent liable for the acts performed on the principal's behalf.

For apparent authority to arise, three conditions must be met: 1. A representation must have been made to the third party in order to show that the agent has authority to act on behalf of the principal; 2. A third party's reliance on the agent's representation; 3. An alteration of third party's position resulting from such reliance.
Unless all conditions are met, the third party should always bear the risk that the agent acts without authority and the principal would be able to resile from such a contract.

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AN OVERVIEW OF BUSINESS MODELS IN THE CZECH CHEMICAL INDUSTRY: A SUSTAINABLE MULTIPLE VALUE CREATION PERSPECTIVE*

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Abstract. The article presents results of empirical research conducted on companies in the Czech chemical industry, namely CZ NACE 20.1 manufacture of basic chemicals, fertilizers, and plastics. The main goal of the research was to describe novel business models based on sustainable multiple customer value creation. The article's objective is to present some of the findings from this research to provide an overview of utilized business model elements and characteristics of the industry within the scope of its business models. The original research design combines theoretical concepts of business models, sustainable value creation and multiple customer value to answer the later mentioned research questions. The article states the theoretical background of the research, research design and methods, results, and concludes by stating insights concerning the industry and the respective theory.

Keywords: sustainable value creation; business models; chemical industry; multiple value; research results; majority business models; minority business models

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1. Introduction

The scope of sustainability and novel value creation is connected to novel business model conception. These business models widen the very narrow focus on the economic aspect of value creation by integrating environmental, social aspects into them. Current knowledge in this area points at business model innovation as a means of gaining a competitive advantage through sustainable multiple customer value creation. This is underlined by the rise of novel competitive forces on the global market can disrupt the business models of companies that fail to adapt. In this regard, the chemical industry represents one of the largest industries in the

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Czech Republic. By nature the chemical industry has the ability to gauge its impact precisely and transform environmental and social challenges into sources for novel value creation opportunities. The article focuses on searching for novel approaches in business models of the Czech chemical industry which could promote a novel value proposition in the context of sustainability and social responsibility as a result of multiple customer value creation.

The paper's objective is to present some research results which provide some insights an overview of the utilized business models in the Czech chemical industry, specifically section 20.1 according to CZ NACE, in connection to novel business models based on sustainable multiple customer value creation. The aims of the underlying research are to provide a methodology to study an industry through the scope of its business models and utilize it on a specific industry to identify novel business models. Specifically, the research was conducted to identify the specific elements (or features) of novel business models based on sustainable multiple customer value creation within the context of the chosen industry.

The research design is based on the works of different authors. Based on these methodologies and research a questionnaire was developed to fit the specific goal. The questionnaire's relevance was tested during semi-structured interviews with 9 industry representatives from various companies belonging in the sample. The sample consists of all 38 companies falling into section 20.1 CZ NACE. These representatives evaluated the relevance of suggested business model elements from a set based on literature retrievals. The result was a questionnaire consisting of 32 questions tied to the most relevant business model elements. The questionnaire was primarily targeted at commercial directors or production directors and the elements served as a foundation to provide an overview of the business models for the selected industry.

In a capital-intensive industry, such as the chemical industry, under the spotlight of many external audits and under heavy legislation, following the issued legislation becomes a competitive advantage. The majority (Slávik, 2014) and minority business model constructs state the business model elements utilized by most of companies and vice versa. In effect the legislation and constant audits pushes companies towards more industrial safety and meeting environmental customer expectation while social expectations are being met by a smaller number of companies.

2. Theoretical background

The theoretical foundation of the research is based on two theoretical bodies. First, sustainable multiple customer value creation and new business models. By incorporating the notion of sustainability and multiple value creation into a company's strategy it is forced to change the narrative of how it creates, delivers, and captures diverse types of value, i.e. the business model changes. The following part presents a literature review to frame sustainability, novel business models and multiple customer value creation.

2.1. The scope of sustainability

The scope of sustainability is not limited just to environmental issues, but also the sustainability of economic growth and social cohesion. According to the European commission, the flexibility of sustainability's principal is exercised through social responsibility. Corporate social responsibility represents a voluntary integration of social and ecological interests into corporate strategy and into day-to-day operations and relations with stakeholders (Livre Verte, 2003; Tvaroviciene, 2018). In the future, there is only going to be more customers, employees, board members, banks, suppliers etc. monitoring corporate operations (Záležaková, 2014). In other words, the company has to ensure that achieving economic efficiency is aligned with social and environmental protection standards (Chabi, 2016; Lankauskiene, Tvaroviciene 2012). Liikanen (2004) describes this form of governance as

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such increasing the positive contribution of the company to society and also minimizing the negative impact on citizens and their environment. The company is confronted by numerous challenges, whether economic, environmental, or social which include various influences and consequences for corporate operations. The compounding of these challenges can enact a chain reaction endangering the company's business model but also serve as incentives for novel business model design. The main priority for current company management is to create institutional and cultural conditions for business model development based on corporate flexibility and learning mechanisms. In this regard, Schaltegger et al. (2012) present the term sustainable business model innovation. Sustainable innovation is viewed as key to creating a sustainable company (Girotra, Netessine, 2013). It has a significant positive impact or significantly decrease the impact on the environment and society through the change of how the company and its value network create, deliver and capture value or by changing the value proposition (Bocken, Short, Rana, Evans, 2014). This ensures the company's competitiveness in the future and cause changes in the current business model. Radical and disruptive business model innovation changs the business model in its essence and provides a significantly greater value than that of the industry's standard. At the same time, these business models share this value among the company, its customers and value network partners, i.e. the ecosystem.

2.2. Novel business models

The issue of novel business models and multiple value creation is partially mentioned by numerous authors as are Boons, Lüdeke-Freund (2013); Schaltegger, Hansen, Lüdeke-Freund (2016), and others. The interest of academia and practitioners in the field of novel business models is ever-increasing. This is testified by the numerous definitions provided in scientific journals as Journal of Cleaner production, Long Range planning, Journal of business models, Organization and the Environment, etc. Several Czech authors also deal with this issue mainly in regard to business model innovation (Chwaszcz, 2010), sustainable development and corporate social responsibility (Kašparová, 2006; Prskavcová, Maršiková, Řehoťíková, Zbránková, 2008; Zadražilová et al., 2010, 2011; Pavlík, Bělčík et al., 2010; Kunz, 2012; Dalíková, 2013; Kocmanová, Šimberová, 2014), as well as other related issues (Švejda, 2002; Basl, 2002; Koráb, Mihalisko, 2005; Jakubíková, 2008; Pilný, 2016; etc.).

The notion of a novel business model (Bocken, Short, Rana, Evans, 2014) comprises three dimensions which individually possess a different meaning:

- "business" in the sense of entrepreneurship (Sławinska, 2010; Freeman, Wicks, Parmar, 2004) means economic activity of providing good and services which includes financial, commercial, and production aspects;
- "model" as a simplified representation of a process or system (Jensen, 2013). As with other terms in social sciences, models are not physical object. They possess an abstract character and are the result of modelling, i.e. the business model is societal construct. The term model relates to the notion of a company's unique nature, i.e. the competitive strength of a system is related to the ability to innovate. Innovation in this regard is the center point for strategic changes, i. e. designing and redesigning the business model with social responsibility incorporated into its value proposition. The term "business model" infers a graphical representation of the entrepreneurial process (Léon, 2014-15; Beattie, Smith, 2013). In its simplest form, the business model is a way of generating profit. This is due to fact that the business model is a basic entrepreneurial structure of which services are provided or which goods are produced in order to generate a profit (Muelhlhausen, 2018).
- the adjective "novel" is rooted in the support of a creative approach to strategy. The term is relates to searching for other solutions than the current model (Lehman-Ortega, Misikas, Schoettl, 2007). At the same time the term underlines that the novel business model is a significant non-technological innovation, although the model provides connection between technology and corporate performance by mobilizing the company's resources and competences. It includes novel business operations or formulates novel approaches to current business operations which result into creating a different type of company. More

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and more managers believe that business model innovation will become more and more significant for corporate sustainability and development than product innovation.

Novel business models described as innovative business models (Laifi, 2012; Buchere, Eisert, Gassman, 2012). Since these business models relates to a novel system of operation (Amit, Zott, 2012) and innovative structures of creating and capturing value (Chesbrough, 2007) and alliances with partners and customer (Cortimiglia, Chezzi, Franck, 2016). Amit and Zott (2001) describe networks and alliances as basic frameworks for conception of innovative business models. Teece (2010) states that traditional business models focus merely on how to create, produce, sell a product and generate a profit from its production and sale. Novel business models resolve the same problems but in a innovative way which disrupt the seemingly undisputable business heurestics. Creating a novel business model in the widest sense does not necessarily means the development of a new product, change of processes or change of resources needed for production. The necessary effects are achievable though faster operations, customer solution provision, additional services provision, cooperation with communities, stimulating customer with pricing, breaking down barriers of access to products, new payment options or subscription, etc.

2.3. Multiple value creation

The notion of multiple value (Freeman, Wicks, Parmar, 2004) has been coined during sustainability reporting efforts (Marberg, Jonker, 2007). The theoretical framework of multiple value creation as a business foundation was formulated by McVea and Freeman in stakeholder theory (McVea, Freeman, 2005). The notion is based on the "triple bottom line" concept (Elkington, 1998). Thus, multiple customer value applies the principals of sustainable development. In this respect, assessing the choice of production technologies, production processes, and distribution channels, i.e. the business model, to promote eco-efficiency ensuring that the product/service exceeds customer expectations (Nidomolu, Prahalad, Rangaswami, 2009; Červený et al., 2013).

Multiple customer value is an incremental and differentiating part of the value proposition. It is manifested in business decision leading to the satisfaction of environmental and social expectations of both customers as well as the stakeholders partaking in the company's success. In this respect, partaking stakeholders aid the understanding of customer expectations. Sustainability in this sense underlines activities which can be repeated in the long run opposed to one-time actions. Sustainable multiple customer value, thus, supposes a long-term relationship emphasizing mainly customers and other stakeholders. The relationship is described by two trends which are heavily supported by technology (Le Vely, 2015). The first trend (push strategy) integrates sustainable multiple customer value creation in regard to market differentiation in developing and pushing products/services aiding the customer's eco-efficiency (water usage, energy storage, etc.). In the context of Industry 4.0 the exchange of information is reliant on information technologies. This sets the business model into a context described by its customer and stakeholders (the collected) and their expectations which will impact its business model configuration and thus its performance. On the other hand, a pull strategy aids the understating of customer expectations which leads to lowering opportunity costs. This relationship serves to contribute to the company's economic success, such as cost savings, competitiveness or sales increase, risk reduction, improved profitability, customer retention, reputation, etc. In conclusion the integration of sustainable multiple customer value creation into the business model presupposes that it is (Schaltegger, Lüdeke-Freund, Hansen, 2012):

- voluntarily with the intention to contribute to the solution of societal or environmental problems;
- creating a positive business effect or a positive economic contribution to corporate success which can be measured or argued for in a convincing way;
- clearly and convincingly argument that it lead to both, the intended or environmental effects, and the economic effect.

Novel business models in the context of sustainability is based on a marketing concept, i.e. the value proposition, leaning on positive environmental and social impacts in the core concept of the business model. Sustainable

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development offers space for the creation of a unique value proposition. It defines what the company can realize better than competitors and describes how the innovation serves the targeted market. It determines the customer-centric focus leading to innovation, stimulating corporate flexibility. Innovating provided value is the first phase of reevaluting the business model (Dauchy, 2013). Conception of a unique value proposition enables concentration on the main aspects of multiple value creation for the target customer. This requires defining the target market, criteria of multiple value, proposition description (Chanal, 2011). The conception of a unique value proposition has to take into account the competitive space, since it is the customer's main argument why to engage and prefer a certain company over another when searching for a solution to meet their need.
In a novel business model the criteria of multiple value are founded in three dimensions comprised in the "triple bottom line" concept, i.e. environmental, social and economic value. It is expected that a novel business model based on sustainable multiple value creation will maximize and synergize all three dimensions.

3. Methodology and research design

The presented research is based on the stated theoretical background and presupposes that the dynamic of business model development forces companies to ponder the reasons and conditions of their existence. The business model Canvas is used as a visualization tool as it is sufficiently complex, analytical, flexible and general. Thus, suitable for research of novel business models aimed at multiple value creation in any industry. Frequency of occurrence of elements in the fields of the business model canvas enables the creation of a majority and minority business model construct (Slávik et al., 2014) which represents the basis of the research.

The majority business model construct. Competitors in a certain industry operate based on shared cognitive processes and achieve a consensus in suitable and viable strategies within the industry's context (Deephouse, 1999; Rhee, Kim, Han, 2006). The consesnsus is based on the narrow relations among the members in the competitive field. This, consequentially, influences the corporate vision and business model. This way, the cognitive consensus leads companies to ignore alternative business models over the dominant business model in the sector. Thus, a strategic change often comes from a subject from another sector which results in change of policy and competitive rules.

The majority business model aims to create a representation of a complete image of the prevalent business model, i.e. the majoritarian company comprising the most frequently used business model elements within the nine fields of the business model canvas. Hence, the majority business model is a referential model to identify trend changes and business model innovation. The majority business model possesses the most prevalent features in the industry and describe the mainstream of business model based on multiple value creation.

The minority business model represents the less frequently used elements in the industry. It is an array of experimental, little-used or fringe elements. It may possess rarely implemented but very perspective sustainable innovation in the industry. In general, the elements in the minority business model are still experimented with and are not standardized for widespread use, i.e. typical for certain companies.

Based on the theoretical background the following research questions were formulated:

[1] What type of customer do companies create multiple value in the industry for?
[2] Which elements are significant for the industry in terms of multiple customer value creation?
[3] Which elements compose novel business model design within the industry's context?
[4] How are minority business model elements distributed in the sample?
[5] How related are the business models in the industry?

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To answer these questions a methodology was developed to match the theoretical background and the specific context of the industry, CZ NACE 20.1 manufacture of basic chemicals, fertilizers, and plastics. The chemical industry is among the most capital-intensive ones where business model innovations are tied to technological improvements and incremental. The choice of the mentioned industry is due to its narrow context, i.e. companies within the industry share similar, they fall under the same regulation, and notably share the same business model framework. In this case, all companies manufacture basic chemicals, fertilizers, or plastics; share common stakeholders; and are influenced by European and national regulation.

Data collection methods include content analysis, semi-structured interviews and a survey. To answer the stated research questions. Other methods include Pearson's correlation coefficient (Slávik et al, 2014), and cluster analysis. To aid comprehension, data was visualized using tables, figures, and the visualization tool Business model canvas (Osterwalder, Pigneur, 2010).

The set of 52 elements provided in the work of Chen and Chiu (2015) served as the basis for the research. In the first phase, the exact elements were used during the content analysis of websites, reports, articles, etc. of all the companies within the sample. After reviewing the results, the set was reduced to 38, due to no relevance to the industry's context.

Lastly, a questionnaire was developed to accommodate the 32 elements into 32 statements about the company to which respondents true or false. This is possible through the nature of business model elements, which represent a narrative of the company's activities. An activity is either present in the narrative or not. The survey was mainly aimed commercial or marketing directors, if not present in the company's structure, then production managers were contacted. All participants were contacted via phone for consent in participation in the survey and the questionnaire was sent via e-mail subsequently.

3.1. **Sample**

The sample consists of medium and large enterprises which belong into the CZ NACE group 20.1 manufacture of basic chemicals, fertilizers, and plastics. The companies were found using the database Amadeus and triaged based on the following criteria:

- active status;
- has headquarters or branch in the Czech republic;
- employee count greater than 75 employees;
- must belong to group 20.1 manufacture of basic chemicals, fertilizers, and plastics.

First results stated 49 companies in total, after reviewing, double entries and false entries were deleted leaving 42 companies. After, contacting each individual company during the distribution of the questionnaire commercial outlets and wholesalers were almost eliminated from the sample, leaving a final number of 38 companies. This sample of 38 companies is composed of 25 large and 13 medium-sized companies. Table 1 indicates the companies included in the research, their reference numbers, participation in the research, and business model structure. All of the 38 companies in the sample were contacted and 22 questionnaires were obtained, which represents a 57, 89% response rate (Table 1).

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Table 1. Sample structure

Reference number	Company name	Company size	Participation in research	Number of business model elements	Majority business model elements	Minority business model elements
1	Aerosol - service, a.s.	L	X	18	13	5
2	Agra group, a.s.	L	X	21	15	6
3	Agro cs, a.s.	L	X	21	15	6
4	Akzo nobel coatings cz, a.s.	L	X	17	13	4
5	Aroma praha, a.s.	L	X	18	11	7
6	Bioferm - lihovar kolín, a.s.	L		2	2	0
7	Borsodchem mchz, s.r.o.	M		5	5	0
8	Contipro, a.s.	L	X	32	16	16
9	Cs cabot, s.r.o.	L	X	28	15	13
10	Deza, a.s.	M	X	21	11	10
11	Ethanol energy, a.s.	M	X	20	14	6
12	Farmak, a.s.	M	X	20	14	6
13	Fosfa, a.s.	M		8	6	2
14	Global tungsten & powders, s.r.o.	L	X	20	15	5
15	Gs caltex czech, s.r.o.	L	X	13	10	3
16	Ing. Petr Švec - penta, s.r.o.	L	X	23	13	10
17	Jsp international, s.r.o.	L		4	4	0
18	Kordplast, s.r.o.	L	X	14	9	5
19	Linde gas, a.s.	M		13	9	4
20	Linde vítkovice a. S.	L		10	7	3
21	Lovochemie, a.s.	M	X	15	11	4
22	Lucební závody draslovka, a.s. Kolín	M	X	26	14	12
23	Lučební závody, a.s. kolín	L	X	26	14	12
24	Macco organiques, s.r.o.	L	X	19	13	6
25	Mg odra gas, s.r.o.	L	X	14	8	6
26	Norbrook, s.r.o.	L		2	2	0
27	Precheza, a.s.	L	X	21	14	7
28	Proseat Mladá Boleslav, s.r.o.	M		4	3	1
29	Shadows - šedivec, s.r.o.	L		0	0	0
30	Siad czech, s.r.o.	L	X	27	15	12
31	Silon, s.r.o.	M		6	3	3
32	Spolana, a.s.	L		3	3	0
33	Spolek pro chemickou a hutní výrobu, a.s.	M		15	12	3
34	Synthesia, a.s.	L		19	13	6
35	Synthon, s.r.o.	L		5	4	1
36	Synthos kralupy, a.s.	M		14	9	5
37	Unipetrol rpa, s.r.o.	M		18	14	4
38	Vodní sklo, a.s.	L	X	21	14	7

Source: Authors' own research

4. Research results

The following chapter states some of the findings of a larger research focused on describing novel business models based on sustainable multiple customer value creation. The research questions have been organized in a logical manner so that the answer to one question aids the answering of the following. The results provide an overview of the industry's business model structures and their characteristics in terms of sustainable multiple customer value creation.

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4.1. What type of customer do companies create multiple value in the industry for?

The first research question answers the need to identify for what kind of customer the industry creates, deliver, and capture value. Within the scope of the theoretical background, to what kind of customer do the companies in the industry gear their business models in order to meet their environmental and social expectations? Table 1 indicated the results, where the most prevalent customer for which companies create value for is a B2B customer (70.22%).

Table 1. Sample structure

Type of customer	Subsidiary	B2B customer	B2C customer
Percentage	17.56%	70.22%	12.22%

Source: Authors' own research

4.2. Which elements are significant for the industry in terms of multiple customer value creation?

Two semi-structured interviews were further conducted to test the relevance on the remaining elements. The interviews were conducted with the production and commercial direction of Synthon, AS and the general director of the research and education center of Unipetrol, AS. Both interviews lasted around 60 minutes. In result, the set of elements was modified and reduced to 32, displayed in Table 2. The resulting elements had to be formulated in a wide enough sense to cover each company's specific context and narrow enough to portray the activity and its implications in the business model's narrative.

The elements in Table 2 were distributed according to the fields of the business model canvas for improved comprehension and visualization purposes. Table 2 also states the frequency of the elements in the sample which will is relevant to the following question.

Table 2. Significant business model elements in terms of multiple customer value creation

Business model canvas field	Business model element	Absolute frequency	Frequency (%)	Minority model
Value proposition	Multiple product variants on offer	32	84.21	
	Alternatives to products on offer	17	44.74	X
	Environmentally friendly products	24	63.16	
	Related products on offer	16	42.11	X
	Individual planning	23	60.53	
	Limiting use of dangerous substances in production	23	60.53	
Key partners	Suppliers of support services	22	57.89	
	Local suppliers	16	42.11	X
	Emphasis on industrial safety	27	71.05	
	Cooperation with public and non-profit organizations	11	28.95	X
Key activities	B2B resource sharing	4	10.53	X
	Commercial support for B2B customers	21	55.26	
	Use of sustainable feedstocks	18	47.37	X
	Use of energy saving equipment	21	55.26	
Key resources	Centralized waste treatment	25	65.79	
	Take-back agreement	10	26.32	X
Stakeholder relations	Consulting	27	71.05	
	Information and report sharing	23	60.53	X
	Sharing experiences with customer and suppliers	16	42.11	X
	Research cooperation	18	47.37	
	Provision of internships	20	52.63	
Channels	Online platform	13	34.21	X

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Cost structure	Waste as an energy resource	15	39.47	X
	Centralized waste treatment	25	65.79	
	Waste recycling	23	60.53	
	Financial support and sponsorships	24	63.16	
	Education fund	5	13.16	X
Revenue streams	Rental of production facilities and equipment	7	18.42	X
	Specialized services (R&D)	21	55.26	
	Full product-service solutions	3	7.89	X
	Maintenance	24	63.16	X
	Byproducts available as energy source or resource	11	28.95	X

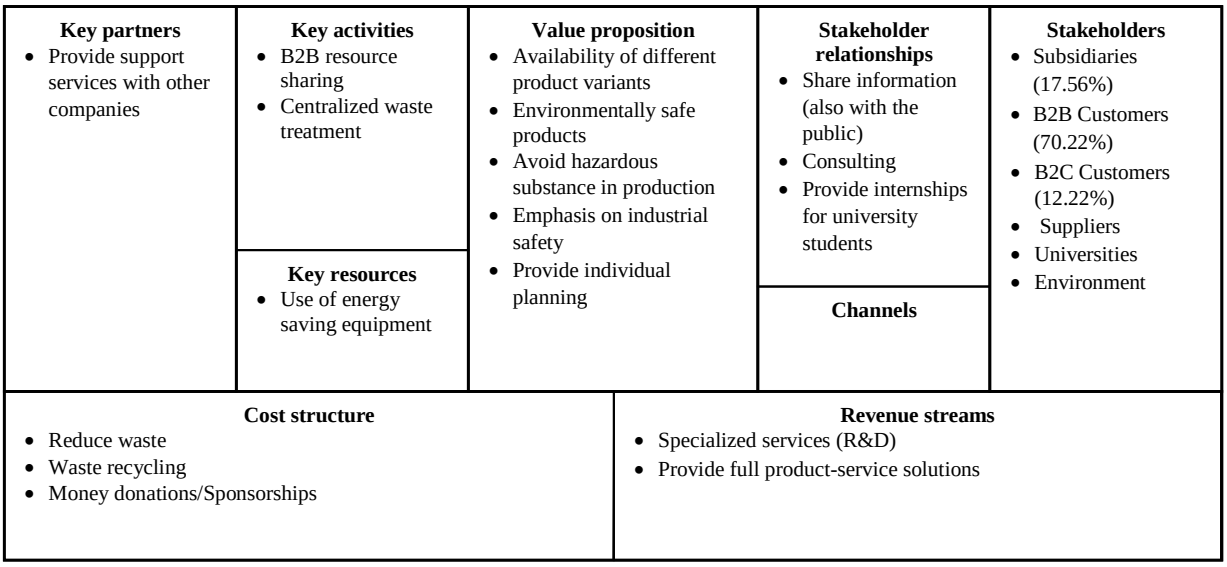
Source: Authors' own research

4.3. Which elements compose novel business model design within the industry's context?

To answer this research, question the business models, the set of significant business model elements in Table 2 must be divided into two subsets. A subset which represents elements which are not novel in the context of the industry and a subset representing the novel elements. The research bases this division on the assumption that novel business model elements will be the ones less represented in the overall set of elements. Thus, the division in this case is based on an elements frequency (Table 2) and the subsets are represented as the majority business model and the minority business model. If the frequency of an element is greater that 51% it is attributed to the majority business model and vice versa.

The majority business model construct (Fig. 1) represents the most prevalent business model elements. Thus, a business model employed by most of companies in the industry and which would be needed to follow if a new competitor entered the market. In terms of a narrative approach (Margretta, 2011), the majority business model represents the general narrative of the industry.

Figure 1. Majority business model construct



Source: Author's own research, modified according to Osterwalder et al., 2015

The minority business model construct (Fig. 2) represents, according to the definition of sustainable multiple value creation, a subset of differentiating elements which are geared towards satisfying the environmental and

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social expectations. The minority model construct displays the orientation towards a larger number of stakeholders, new income streams and opportunities to reduce opportunity costs and drive eco-efficiency. Notably, in the "channels" field where distribution is also ensured through an online platform connecting local suppliers and offering waste materials as a resource or energy source. It also shows greater openness to a larger number of stakeholders by sharing experiences with customer or suppliers, participating in academic research, and cooperation with public and non-profit organizations.

From the perspective of a narrative approach the minority model serves as a range of elements which modify the company's narrative business model. The construct, as it stands, cannot be applied to the whole industry due to its nature of being a collection of less frequently utilized elements. Companies are likely to utilize the full extent of elements of the majority model and only some from the minority model. Thus, minority model can serve as a tool to gauge whether a company engages in creating multiple customer value or not and follow the evolution of the industry through shifts of elements from and to the minority business construct.

Figure 2. Minority business model construct

<table>
<tr>
<td rowspan="2">Key partners
• Procurement from local suppliers
• Cooperation with public/non-profit organizations</td>
<td>Key activities
• B2B resource sharing
• Provide take back agreement</td>
<td rowspan="2">Value proposition
• Availability of product alternatives
• Availability of related products</td>
<td>Stakeholder relationships
• Assist/participation in academic research
• Share experiences (with customers and suppliers)</td>
<td rowspan="2">Stakeholders
• Subsidiaries (17.56%)
• B2B Customers (70.22%)
• B2C Customers (12.22%)
• Suppliers
• Local government
• Public/non-profit organizations
• Environment</td>
</tr>
<tr>
<td>Key resources
• Sustainable feedstocks</td>
<td>Channels
• Online platform for reservation</td>
</tr>
<tr>
<td colspan="2">Cost structure
• Waste to energy
• Set up education fund</td>
<td colspan="3">Revenue streams
• Provision of maintenance
• B2B Leasing
• Sale of waste materials e as a resource or energy</td>
</tr>
</table>

Source: Author's own research, modified according to Osterwalder et al., 2015

4.4. How are minority business model elements distributed in the sample?

Assuming that majority business model elements are present in every company's business model. The question aims at the distribution of minority business model elements (figure 3), whether they are distributed randomly throughout the industry's business models or are they concentrated.

To answer this question the range of companies according to the number of majority and minority business model elements (Table 1) were compared using Spearman's correlation coefficient. For the chosen significance level of $\alpha = 0{,}05$ the resulting value of the coefficient is 0.813, and the null hypothesis is rejected. Thus, there is a strong positive correlation between the range of companies according to the number of majority and minority business model elements. Hence, companies with a large number of majority business model elements in the business model also have a large number of minority business model elements.

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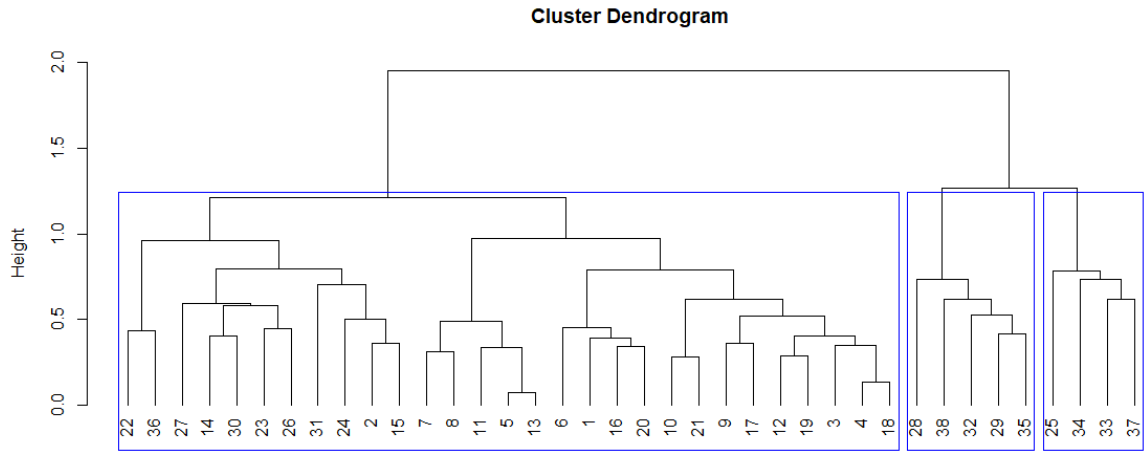
4.5. How related are the business models in the industry?

Cluster analysis of the industry's business models reveals that there are 3 major groups. The cluster dendrogram represents these groups (Figure 3). Companies are represented in figure 3 by their reference number from table 1. Cluster 1 is composed of 20 large-sized companies and 9 medium sized companies, for a total of 29. Cluster 2 is composed of 5 companies, all of which are large-sized. Finally, cluster 3 comprises 2 medium-sized companies and 2 large-sized companies. The structures of the clusters show that, although, companies are similar in terms of the business model their scale varies.

Figure 3. Results of Cluster analysis



Source: Authors' own research

Conclusions

Business model research is often limited to case studies of one or a few companies. Few works have focused on studying an industry through the lens of its business models. Moreover, few works have studied the connection of specific business model elements and sustainability multiple value creation. Due to the narrow orientation of the research the results are very specific for these companies. Based on the minority business model construct, it is visible that the contained elements point to that novel business models shift to more of an open system through a service-based logic which aims to lower environmental impact. Although, the majority and minority constructs may seem similar in some terms, it is necessary to note that they represent narratives. The majority business model represents a meta narrative for the whole industry, whereas the minority model represents a collection of odd elements which fit into specific narratives of individuals companies and represent vast effort for implementation. Results portray the industry in terms specific business model elements connected to this theoretical construct. These elements served to formulate the industry's narrative in terms of sustainable multiple customer value creation. The narrative of the industry is as follows (figure 2):

The industry's prevalent narrative in terms of sustainable multiple customer value creation is as follows: Companies provide different product variants and individual planning solutions for their customers while emphasizing environmental safety of their products, industrial safety, and avoidance of hazardous substances in their production. This is achieved by providing support services to their customer with other companies, B2B resource sharing, centralized waste treatment, and usage of energy saving equipment. To provide this value proposition companies cooperate with their customers (subsidiaries 17,56 %, B2B customers 70,22%, B2C

customers (12,22%), suppliers, universities and taking the environment into consideration also as a stakeholder. Relationships with these stakeholders are upheld via sharing information about the company's functioning, providing consulting, and providing internships for university students. The cost structure includes promoting cost savings from reducing waste and recycling it, as well as carrying the costs of a fund for money donations and sponsorships. Revenue streams include providing specialized services like research and development and full-service product solutions.

This narrative is modified by elements which serve as differentiating parts (figure 3). But, research showed that companies which employ a large number of majority business model elements also employ a large number of business model elements. Which could point at that the adoption of minority business model elements would be a function of scale, i.e., larger companies are able to differentiate more effectively due to having more resources available. But, cluster analysis showed that 2 out of 3 cluster were composed of companies of different size which support the claim that changing or adapting the business model is a significant non-technological innovation.

Future research involves the creation of specific concepts based on individual elements contained in the minority business model. These concepts can be acquired through statistical correlation of the existing data, to see exactly which elements correlate to specific elements. Other efforts will be focused on gaining access to specific performance data to pair it with the specific business models, thus providing evidence on how different configurations of elements in the business model affect social, environmental, and economic performance.

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IDENTIFICATION OF THE FACTORS OF COMPETITIVENESS OF INDUSTRIAL COMPANY BASED ON THE MODULE APPROACH

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Abstract. The purpose of the work is to present the results of studying the factors of competitiveness of the companies of transport machine building of Russia by segmentation on the basis of the module approach. The research consists in analyzing the modern developments in the sphere of managing the competitiveness of industrial companies in economic systems. Materials of the reports on global competitiveness were used. The research is based on the recent tendencies in the sphere of systematization of competitiveness factors of industrial companies. Based on the performed research, the main factors of competitiveness of industrial companies are systematized by segmentation on the basis of the module approach. Each module is assigned with blocks that determine qualitative and qualitative characteristics of their production activities, as well as indicators that allow evaluating the factors of competitiveness of companies of Russian transport machine building. Scientific significance of the received results consists in development of theoretical & methodological and practical aspects of managing the competitiveness of industrial company in the modern conditions. The research results are a certain volume of knowledge increase, which allow solving a range of scientific tasks and are a theoretica basis for further research in the sphere of increase of competitiveness of companies of transport machine building on the basis of the module approach by applying the presented scientific solutions and tools.

Keywords: company; competitiveness; factors; module approach; transport machine building; innovative activities

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JEL Classifications: L62, O32, P42

1. Introduction

Against the background of existing means and methods of managing the competitiveness of industrial companies, modern approaches are measures with development of companies and external conditions of their functioning. By now, a company has become complicated as to the structure of functions and the style of relations, as to the structure of functions, and as to the style of relations between employees of various levels of management; there's

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a tendency for growth of the number of managers, with increased requirements to competence of personnel. Active behavior of company in competitive environment destroys traditional methods and style of management. Large companies appear, and small companies function successfully.

Observing the companies that achieve success in modern Russia, it is possible to state that this is due to the fact that there's an adequate concept of management of competitiveness, which is capable of ensuring high efficiency, effectiveness, and dynamics of production. New organizational behavior is formed, which ensures flexibility of the market, and, therefore, successful functioning of the company. The general tendency of change of traditional management consists in transition from „supporting practice" of activities to „development", formation of innovations-active strategy of behavior in the market, which stimulates forecasting and quick reaction to changeability of external environment.

Very often – both in theory and practice of management of modern industrial companies – attention is paid to the level of their innovative activity. Innovative activity is seen as a direction of activities that increases the probability of successful functioning of a company. It reflects the measure of establishment of company's positions in the market and is a basis of increase of its competitiveness level (Zhu & Cheung, 2017).

In industry, innovative activity is traditionally linked to the level of implementing new product and progressive technology, which are assesses according to the special methodology, and top-priority directions of development of domestic and global science. Creation of new highly-effective technologies depends on development of fundamental research. It should be noted that the level of elaboration of the problem of managing the competitiveness of industrial companies in the conditions of market economy is insufficient: there's no comprehensive approach to determining this category, methods of its evaluation, and peculiarities of management.

2. Materials and Method

The issue of managing the competitiveness of industrial companies has remained one of the most complex issues over the recent decades. Now – in the crisis conditions – it has become the most important one. The level of development of domestic industrial companies and their competitive potential are not high enough. Such situation for industrial companies in the Russian economy is not satisfactory from the positions of large-scale plans of the country in the existing conditions of globalization. The issue of entering the leading positions is impossible without non-standard approaches to solving it.

According to the information from the Global Competitiveness Report, as of beginning of 2017 Russia was ranked 43rd among 138 positions. Planning of measures for increasing this ranking raises interest of the state to competitiveness of domestic industrial companies. Formation of the strategy of managing competitiveness consists in integration of objectively received information on potential development of organization in the short-term as activation of using the innovational tools of management in the production process.

Competitiveness is treated as a feature of the object that is characterized by the level of real or potential satisfaction of specific consumer needs as compared to similar objects that are presented in the market (Kovalenko, 2013).

It should be noted that there's no common approach to defining the notion of competitiveness (Korotkov & Eleneva, 2001; Kovalenko, 2013; Vasyaycheva, 2013):
- participants of the forum „European management forum" define competitiveness as real or potential capability of company to sell the product that are more attractive for consumers than the rivals' products;

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- according to the Japanese scholar T. Kono, competitiveness of company is defined as a capability for implementing the set goals and innovational development for conquering the largest share of the market (Rasoul, 2009);
- the Russian economist N.S. Yashina thinks that competitiveness is a potential possibility for company's adaptation to the conditions of market competition (Gaynanov & Guzairova, 2010);
- in the works (Ceptureanu, 2016; Netland & Aspelund, 2013) competitiveness is defined as company's capability to withstand competition and to make competitive actions.

The notion of competitiveness at the micro-level is viewed by economists in various aspects:
- competitiveness of company as effectiveness of its production and sales activities in a certain market (Geras'kin & Chkhartishvili, 2017);
- competitiveness of products as an essential difference from similar products for consumer choice (Abuzyarova, 2017).

It is possible to state that competitiveness of products determines competitiveness of the company – and, therefore, the sphere on the whole.

Let us view systemic characteristics of competitiveness by the example of companies of transport machine building of Russia. At the modern stage of innovational development of domestic industrial companies, the main issue is management of their competitiveness (Kc). Over the whole life cycle, the company has to remain competitive and preserve positive economic effect (Sayganov & Lensky, 2015).

For the purpose of identifying the factors Kc, the authors offer systematizing the main factors of competitiveness of industrial companies by their segmentation on the basis of the module approach (Figure 1).

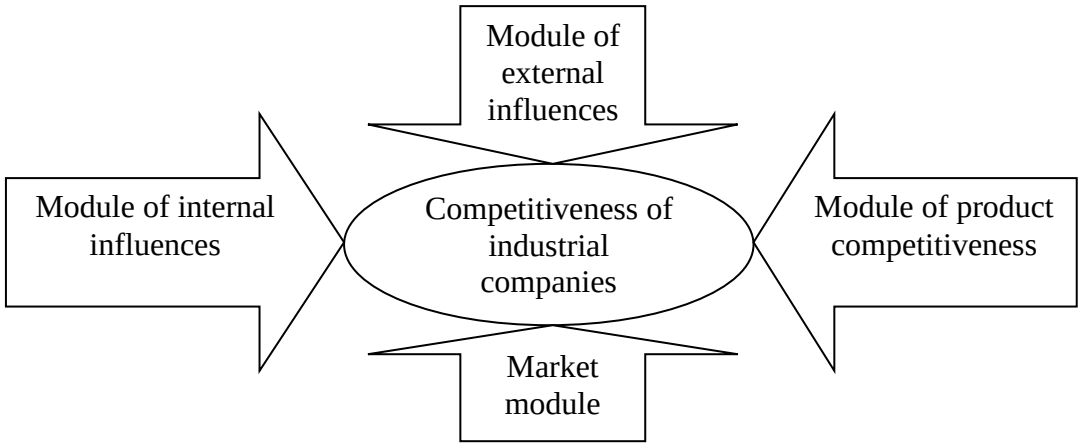

Figure 1. The module systematizaiton of factors of competitiveness of industrial companies

The module approach allows considering all deviations of the current level of competitiveness of companies from the ideal value and taking operative measures for eliminating them. The current level Kc consists of integral evaluations of the level of company's competitiveness according to these modules.

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3. Module of external influences

Evaluating the factors of influence of external environment on competitiveness of companies by analyzing the elements of the module of external influences, let us distinguish five main blocks that determine qualitative and quantitative characteristics of their production activities (Vasyaycheva, 2010):

1) territorial location of the company - ε_1;
2) industrial policy of the state - ε_2;
3) infrastructural provision of innovative activities - ε_3;
4) activities of the company in integration associations - ε_4;
5) rivals' having the innovational projects that are similar to the projects that are developed at the company - ε_5.

Territorial location of company near sources of raw materials, production of spare parts, and maintenance centers is one of the key factors that influence its Kc. Industrial policy of the state also belongs to the key factors of the module of external influences on competitiveness of companies of the basic sphere of transport machine building. It is based on the Constitution of the Russian Federation and is regulated by the Federal law "On national industrial policy in the Russian Federation" and "National complex program of development of machine building complex of Russia until 2020". The main purpose is implementation of state support for strategic integrated high-tech productions, consolidations of resources of state and business, infrastructural provision of innovative activities of science-based companies, and leveling negative social consequences, which are the results of changes in the structure of industrial production.

The mechanisms of implementing the industrial policy in the sphere of transport machine building include:
- stimulation of manufacture of industrial products that conform to the requirements of the international market (Cetindamar & Kilitcioglu, 2013);
- formation of state information and marketing structures that stimulates demand for products of the companies of transport machine building within the country and export;
- support for innovative activities of the companies of transport machine building;
- stimulating the creation of information and technological centers, business centers, and centers for supporting R&D (Feurer & Chaharbaghi, 1994);
- stimulation of reduction of time required for development and implementation of unique innovational projects (Khusainova & Ustyuzhina, 2015);
- participation in development and creation of integrated science-driven business structures and industrial associations that manufacture competitive products;
- stimulating the development of sectorial interactions.

For quantitative evaluation of the factors of the module of external influences, let us use coefficients: $K_{\varepsilon_{k\,i}}$ - evaluation of factors of k –th block ε_k of module of i-th company. The integral indicator of evaluation of factors of external environment is defined as linear dependence on $K_{\varepsilon_{k\,i}}$, i =1,2,3,4,5 of the form:

$$K_{\varepsilon} = f(K_{\varepsilon_{1i}}, K_{\varepsilon_{2i}}, K_{\varepsilon_{3i}}, K_{\varepsilon_{4i}}, K_{\varepsilon_{5i}}), \qquad (1)$$

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Evaluation of the factors of external environment is performed based on calculation of indicators that reflect the influence of industrial policy of the state (block ε_2) by determining the evaluations of the most significant factors of this block:

1) evaluation of support for innovative activities of i - th company:

$$K^1_{\varepsilon_{2i}} = \frac{V_{1i}}{V_2}, \qquad (2)$$

V_{1i} - volume of assets that are spent by the state for supporting innovative activities of i-th company; V_2 - volume of assets that are spent by the state for supporting the sphere of transport machine building;

2) evaluation of stimulating the demand for products of transport machine building:

$$K^2_{\varepsilon_2} = \frac{V_3}{V_4}, \qquad (3)$$

V_3 - volume of subsidies that are spent by the state for purchasing the products of transport machine building; V_4 - volume of assets that are spent for purchasing the products of transport machine building;

3) evaluation of tax support for the company:

$$K^3_{\varepsilon_{2i}} = \frac{V_{5i}}{V_{6i}}, \qquad (4)$$

V_{5i} - tax subsidies of i - th company; V_{6i} - total sum of taxes of i - th company;

4) integral indicator of evaluation of industrial policy of the state based on block ε_2:

$$K_{\varepsilon_{2i}} = \frac{1}{3}(K^1_{\varepsilon_{2i}} + K^2_{\varepsilon_{2i}} + K^3_{\varepsilon_{2i}}), \qquad (5)$$

The indicators of block (ε_4) that evaluate the companies activities in integration associations are supplemented by the following ones:

1) $K^1_{\varepsilon_4} = \frac{I_{int,RF}}{I_{all,RF}}$ - indicator of significance of mutual flows in the RF;

2) $K^2_{\varepsilon_4} = \frac{I_{int,CES}}{I_{all,CES}}$ - indicator of significance of mutual flows in common economic space;

3) $K^3_{\varepsilon_4} = \frac{e_x + i_m}{\text{GDP}}$ - indicator of openness in product sale,

$I_{int,RF}$ - investments into issue of products of the company of transport machine building;

$I_{all,RF}$ - investments into issue of products of companies of the sphere of transport machine building of the RF

$I_{int,CES}$ - investments into issue of products of the company of transport machine building;

$I_{all,CES}$ - investments into issue of products of companies of the sphere v e_x – volume of export of products of transport machine building in countries of the integration association of common economic space; i_m - volume of import of products of transport machine building from countries of integration association of single economic space;

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Growth of indicators means increase of the share of mutual flow – i.e., improvement of integration ties in the sphere (Nuruzzaman, 2015).

4) integral indicator based on the block of evaluation ε_4 of activities of the company in integration associations:

$$K_{\varepsilon_{4i}} = \frac{1}{3}(K^1_{\varepsilon_{4i}} + K^2_{\varepsilon_{4i}} + K^3_{\varepsilon_{4i}}), \qquad (6)$$

The indicators on the basis of the fifth block (ε_5) are as follows: $K^1_{\varepsilon_{5i}} = 0$, if the rivals have the similar projects; $K^1_{\varepsilon_{5i}} = 1$, if the rivals do not have the similar projects.

The integral indicator of the module of external influences is as follows:

$$K_\varepsilon = \frac{1}{5}(K_{\varepsilon_{1i}} + K_{\varepsilon_{2i}} + K_{\varepsilon_{3i}} + K_{\varepsilon_{4i}} + K_{\varepsilon_{5i}}), \qquad (7)$$

where $K_{\varepsilon_{1i}}$ and $K_{\varepsilon_{3i}}$ are evaluated by experts. All indicators are normed, $0 \le K_\varepsilon \le 1$.

4. Market module

In its turn, competitive market dictates the requirement of precise determination of the vector of development of economic system. Evaluating the influence of the market module on competitiveness of the company of transport machine building, let us distinguish five main blocks:

1) marketing potential of company - M_1;
2) share of company in the global market - M_2;
3) share of company in the internal market - M_3;
4) share of potential rivals in the market - M_4;
5) goodwill of company - M_5.

For calculating the indicators that characterize Кc of company based on the market module, we consider that

$$K_M = f(K_{M_{1i}}, K_{M_{2i}}, K_{M_{3i}}, K_{M_{4i}}, K_{M_{5i}}), \; 0 \le K_M \le 1. \qquad (8)$$

where $K_{M_{ki}}$ - evaluation of the factors of k-th block of module M_k of i-th company.

$K_{M_{2i}}$ - share of i – th company in the global market;

$K_{M_{3i}}$ - share of i – th company in the internal market;

$K_{M_{4i}}$ - share of rivals of i –th company in the global market;

$K'_{M_{4i}}$ - share of rivals of i –th company in the internal market;

$K_{M_{2ij}}$ - share of j-th rival of i-th company in the global market;

$K_{M_{3ij}}$ - share of j – th rival of i – th company in the internal market;

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$K_{M_{5i}}$ (HHI_{int}) - Herfindahl–Hirschman Index for the internal market;

$K'_{M_{5i}}$ ($HHIext$) - Herfindahl–Hirschman Index for the global market;

Marketing potential of the company is function on the factors of the market module

$$K_{M_{1i}} = f(K_{M_{2i}}, K_{M_{3i}}, K_{M_{4i}}, K_{M_{5i}}), \qquad (9)$$

and depends on the value of indicators of other three modules. Its evaluation is performed on the basis of the calculated coefficients.

$$K_{M_{2i}} = \frac{v_{1i}}{v_2},\ i = \overline{1,7}; \qquad K_{M_{3i}} = \frac{v_{3i}}{v_4},\ i = \overline{1,7}; \qquad K_{M_{4i}} = \sum_{j=1}^{6} K_{M_{2ij}};\ \ i = \overline{1,7};$$

$$K'_{M_{4i}} = \sum_{j=1}^{6} K_{M_{3ij}}; \qquad K_{M_{5i}} = HHI_{\text{int}} = \sum_{i=1}^{7} K^2_{M_{3i}} \cdot 100\%;$$

$$K'_{M_{5i}} = HHI_{ext} = \sum_{i=1}^{7} K^2_{M_{2i}} \cdot 100\%.$$

v_{1i} - volume of export products of i-th company;

v_2 - volume of products that are sold by the companies of the sphere in the global market;

v_{3i} - volume of products of the i-th company that are sold in the internal market;

v_4 - volume of products that are sold by the companies of the sphere in the internal market.

Herfindahl–Hirschman Index (HHI) is used for evaluating the level of monopolization of market, calculation of coefficient of concentration of the sphere's companies in it, and determination of the possibility for companies' integration. Monitoring of HHI allows the state to correct the pricing policy, determining the monopolists and preventing pricing conspiracy. The market could be divided into three categories:

1. 1,800 ≤ HHI ≤ 10,000 → high level of market monopolization which is peculiar for the companies with high level of goodwill and potential of development in the global market;
2. 1,000 ≤ HHI ≤ 1,800 → medium level of market monopolization, which is peculiar for the companies with medium level of goodwill, sufficient for effective functioning only in the market of the RF;
3. HHI ≤ 1,000 → low level of market monopolization, which is peculiar for the companies with low level of goodwill, which is insufficient for effective functioning in the conditions of competitive market.

5. Module of internal influences

The key direction in rationalization of organizational and technological structures of company is adequate evaluation of effectiveness for managing the company and development of managerial decisions for forecasting and increasing the indicators of effectiveness of functioning – primarily, economic. The following aspects are assessed (Sakhabieva, 2016):

- efficiency, which is manifested in the level of achievement of goals that are set before the company;
- skill of rational spending of material and financial resources, for full satisfaction of the needs of all structures and departments;
- achievement of optimal ratio of received economic results and costs in the process of production;
- level of influence of direct and indirect factors on the final result;
- position of the company in the market and availability of special methods of increasing the market share.

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In this aspect, the competitiveness of a company of transport machine building is influenced by internal factors:
- quality of management (economic effectiveness of management, social effectiveness of management);
- effectiveness of financial and economic activities of company (financial sustainability, profitability, business activity, liquidity);
- investment attractiveness of company (investment potential, investment risk);
- innovative activity of company (profitability of investments into innovations, science intensity of products, profitability of innovational project);
- level of informatization of company (availability of information system of the company, IT infrastructure, complexes, and information frames);
- Kc of personnel (quality and quantity of personnel, effectiveness of management) (Orlova et al., 2016).

Evaluation of effectiveness of managing the companies of transport machine building is performed based on calculation of the indicators that reflect the influence of the factors of the third block:

1. Formation of the base of these companies of transport machine building for the long period (according to annual reports and electronic sources).
2. Execution of retrospective analysis of the companies of transport machine building for determining dynamics of their functioning.
3. Evaluation of dependence between the used resources and the result of production based on analysis of multiplicated production function.
4. Evaluation of allocative effectiveness of companies of transport machine building based on application of econometric analysis in view of the cost of final product (Sakhabieva, 2016).
5. Evaluation of technical effectiveness of companies of transport machine building with the DEA (Data Envelopment Analysis).

Evaluation of company‘s competitiveness is viewed from the point of view of effectiveness of technological processes and is performed in the aspect of comparison and analysis of companies as to the completeness of fullness and adequacy of using their resource (comparison of maximum issue of products with the set list of resources) or as to the level of effectiveness of distribution of resources (comparison of minimum spending of resources with the set volume of issue of products). In the first case, following the Farrell terminology, technical effectiveness of evaluated, and in the second case – structural or allocative effectiveness is evaluated. Technical and allocative effectiveness forms economic effectiveness of the company on the whole.

For evaluating technical effectiveness, the authors use the BCC model with variable feedback from the scale. Incoming parameters are as follows:

a. x_1 – indicator of quality of company management, calculated based on the values of indicators of management effectiveness:

$$x_1 = \frac{\sum_{i=1}^{5} x_{1i}}{5}, \qquad (10)$$

$x_{11} = \frac{P_p}{E_{man}}$ - general indicator of effectiveness of management;

$x_{12} = \frac{E_{man}}{E_{gen}}$ - indicator of managerial expenditures;

$x_{13} = \frac{Nman}{N_{gen}}$ - characteristics of the number of managerial personnel;

$x_{14} = \frac{E_{man}}{Q}$ - indicator of significance of managerial expenditures;

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$x_{15} = \frac{E_{eff}}{E_{man}}$ - indicator of effectiveness of managerial expenditures;

Π_p - profit for the studied period, E_{man} - expenditures for management; $Egen$ - general expenditures of the company; N_{man} - number of managerial personnel; N_{gen} - total number of company's employees; Q - volume of issued products; E_{eff} - economic effect for the analyzed period;

b. x_2 – indicator of effectiveness of financial and economic activities of the company:

$$x_2 = \frac{\sum_{i=1}^{4} x_{2i}}{4}, \qquad (11)$$

$x_{21} = \frac{A_{own}}{A_{borr}}$ - indicator of financial sustainability of the company (sustainability is acknowledged with $x_{2i} \le 0{,}7$);

$x_{22} = \frac{NP_p}{AP_p}$ - indicator of company's profitability;

$x_{23} = \frac{NP_p}{E_{gen}}$ - indicator of company's business activity;

$x_{24} = \frac{A_{ta}}{O_{cl}}$ - liquidity of company (optimal value is $x_{24} \in [0{,}7;0{,}8]$);

A_{own} - company's own assets;

A_{borr} - company's borrowed assets;

NP_p - net profits**;**

AP_p - average profits from selling net assets for the selected period;

A_{ta} - cost of current turnover assets;

O_{cl} - cost of current liabilities.

c. For evaluating the investment attractiveness of the company, it is offered to use SPACE analysis, which allows characterizing the company's functioning as to four directions, which assess internal potential and external environment, and determining the vector and strategy of its development.

4) x_4 – indicator of innovative activity of the company is calculated as

$$x_4 = \frac{\sum_{i=1}^{5} x_{4i}}{5}, \qquad (12)$$

where $x_{41} = \frac{N_v}{N}$ - share of innovative products (N_v) in the total volume of issue (N);

$x_{42} = \frac{(R_v)_{own}}{R_v}$ - share of own innovational projects ($(R_v)_{own}$) in the total volume of innovations (R_v);

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$x_{43} = \frac{C_v}{C}$ - share of expenditures for development and implementation of the innovational project (C_v) in the total volume of production costs of the company (C);

$x_{44} = \frac{NP_p}{P_{inv}}$ - profitability of investments into innovations (P_{inv});

$x_{45} = \frac{E_{R\&D}}{Q}$ - science intensity of production, $E_{R\&D}$ - expenditures for R&D.

5) x_5 – indicator Kc and quality of personnel are calculated with the methods of actuarial mathematics based on the system of key indicators (KPI).

For evaluating the allocative effectiveness, the authors view the model of technological process of the company of transport machine building as a multiplicative reflection of the type:

$$Q = \alpha_0 \prod_{i=1}^{n} x_i^{\alpha_i} , \qquad (13)$$

where Q – volume of issued products, $\alpha_i, i = \overline{1,n}$ – parameters of the model, x_i, $i = \overline{1,n}$ – set of resources (factors) that are included into the model, n – number of factors.

Parameters of the model, its adequacy, and significance of the model and factors are determined by econometric methods according to empirical data of the specific company.

Analysis of the production function, determined by formula (13), allows, on the one hand, determining the optimal ratio between consumer resources that ensure maximum result, and, on the other hand, evaluating allocative effectiveness of usage of resources with the set prices. Effectiveness of used resources is acknowledged in case of coincidence of final products with current prices for them.

For evaluating the allocative effectiveness of modern companies of transport machine building by studying the production function (13), totality of uncorrelated indicators that influence the competitive state and that are most statistically significant as a result of econometric analysis, is determined in the following way:

$$Q = \alpha_0 \prod_{i=1}^{6} x_i^{\alpha_i} , \qquad (14)$$

Q – revenues from selling products; x_1 – labor cost at the company;

x_2 – labor payment (personnel motivation); x_3 – main production funds; x_4 – expenditures for resources; x_5 – investments into innovational projects. Parameters α_i, $i = \overline{0,6}$ are determined by known econometric methods by linearization of the model.

6. Module of product competitiveness

The products that are issued by domestic companies of transport machine building possess a range of competitive deviations, which are obstacles for its entering the international market. In order to eliminate them, it is necessary to analyze, calculate, and forecast the main indicators of the module of competitiveness of the products as to quality and reliability, pricing, uniqueness, innovativeness, correspondence to international standards, and ecological performance. Quantitative analysis in this aspect is most effective.

Calculation of the indicators of products‘ competitiveness products is based on the model that ensures the complex systemic approach to analysis of the most significant factors of this module. The model was received on the basis of application of the methods of differential calculation of the function of several variables and is a

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reflection of a lot of factors of products‘ competitiveness on quality of results of company's activities – quality of products. The indicator of competitiveness of products C_{prod} is a function of several variables

C_{prod} = f (p, u, v, q, s, e), (15)

p – price of products, u – uniqueness of products, v – innovativeness of products, q – quality and reliability of products, s- correspondence of products to international standards, e – ecological performance of products.

$$C_{prod} = f(p, u, v, q, s, e) \quad \Rightarrow \quad dK = \frac{\partial K}{\partial p}dp + \frac{\partial K}{\partial u}du + \frac{\partial K}{\partial v}dv + \frac{\partial K}{\partial q}dq + \frac{\partial K}{\partial s}ds + \frac{\partial K}{\partial e}de.$$

Or,

$$\frac{\partial K}{\partial p}dp = K_1;\ \frac{\partial K}{\partial u}du = K_2;\ \frac{\partial K}{\partial v}dv = K_3;\ \frac{\partial K}{\partial q}dq = K_4;\ \frac{\partial K}{\partial s}ds = K_5;\ \frac{\partial K}{\partial e}de = K_6, \quad \Rightarrow$$

$$\Rightarrow \quad K_{прод} = K_1 + K_2 + K_3 + K_4 + K_5 + K_6. \qquad (16)$$

K_i, $i = \overline{1,5}$ – increase of products‘ competitiveness, which depends on the corresponding factor. Considering all factors – save one – to be stable – let us study dependence of competitiveness on the variable factor.

1) $\frac{\partial K}{\partial p}$ – speed (indicator) of change of competitiveness depending on products‘ price. As growth of prices reduces competitiveness, then

$$\frac{dK_1}{dp} = -\alpha_1 \frac{1}{p} \quad \Rightarrow \quad K_1 = -\alpha_1 \ln|p| + C_1, \qquad (17)$$

where C_1 – random constant (we consider that $C_1 = 0$). Then,

$$K_1 = -\alpha_1 \ln|p|. \qquad (18)$$

Relative share of products‘ price in the market (p) is calculated as

$$p = 1 - \frac{p_{prod}}{p_{max}},$$

where p_{prod} – price of the studied type of products, p_{max} – maximum price of this type of products in the market.

Similarly:

2) $\frac{\partial K}{\partial u}$ – speed (indicator) of change of competitiveness depending on uniqueness of products. Competitiveness of products is directly related to its uniqueness, so we have:

$$\frac{dK_2}{du} = \alpha_2 u \quad \Rightarrow \quad K_2 = \alpha_2\left(\frac{u^2}{2} + C_2\right) \quad \Rightarrow \quad K_2 = \alpha_2 \frac{u^2}{2}. \qquad (18)$$

Random variable - $C_2 = 0$.

Relative share of unique products in the market (u) is calculated as

$$u = 1 - \frac{u_{prod}}{N}, \qquad (19)$$

where u_{prod} – number of types of unique products, N – total number of this type of products in the market.

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3) $\frac{\partial K}{\partial v}$ – speed (indicator) of change of competitiveness depending on innovativeness of products (direct dependence), so we have:

$$\frac{dK_3}{dv} = \alpha_3 v \quad \Rightarrow \quad K_3 = \alpha_3\left(\frac{v^2}{2} + C_3\right) \quad \Rightarrow \quad K_3 = \alpha_3 \frac{v^2}{2}. \qquad (20)$$

Random variable - $C_3 = 0$.
Relative share of innovative products in the market (v) is calculated as

$$v = 1 - \frac{v_{prod}}{N}, \qquad (21)$$

where v_{prod} – number of types of innovative products, N – total number of these products in the market.

4) $\frac{\partial K}{\partial q}$ – speed (indicator) of change of competitiveness depending on quality of products (direct dependence):

$$\frac{dK_4}{dq} = \alpha_4 q \quad \Rightarrow \quad K_4 = \alpha_4\left(\frac{q^2}{2} + C_4\right) \quad \Rightarrow \quad K_4 = \alpha_4 \frac{q^2}{2}. \qquad (22)$$

Random constant - $C_4 = 0$. Indicator of quality and reliability of products (q) is calculated as:

$$q = \frac{p_{service} n}{N}, \qquad (23)$$

where $p_{service}$ – price of service maintenance, n – total number of these products that passed service maintenance, N – total number of sold products of this type for the studied period.

5) $\frac{\partial K}{\partial s}$ – speed (indicator) of change of competitiveness depending on correspondence of products to international standards (direct dependence):

$$\frac{dK_5}{ds} = \alpha_5 s \quad \Rightarrow \quad K_5 = \alpha_5\left(\frac{s^2}{2} + C_5\right) \quad \Rightarrow \quad K_5 = \alpha_5 \frac{s^2}{2}. \qquad (24)$$

Random constant - $C_5 = 0$. Relative share of products that correspond to the international standards (s) is calculated as

$$s = 1 - \frac{s_{prod}}{N}, \qquad (25)$$

where s_{prod} – number of types of products that correspond to the international standards, N – total number of these products in the market.

6) $\frac{\partial K}{\partial e}$ – speed (indicator) of measuring competitiveness depending on ecological performance of products to the standards (direct dependence):

$$\frac{dK_6}{de} = \alpha_6 e \quad \Rightarrow \quad K_6 = \alpha_6\left(\frac{e^2}{2} + C_6\right) \quad \Rightarrow \quad K_6 = \alpha_6 \frac{e^2}{2}. \qquad (26)$$

Random constant - $C_6 = 0$. Relative share of ecological products (e) is calculated as

$$e = 1 - \frac{e_{prod}}{N}, \qquad (27)$$

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where e_{prod} – number of types of products that are potentially safe for the environment, N – total number of these products in the market.
Thus, we have:

$$C_{prod} = -\alpha_1 \ln|p| + \alpha_2 \frac{u^2}{2} + \alpha_3 \frac{v^2}{2} + \alpha_4 \frac{q^2}{2} + \alpha_5 \frac{s^2}{2} + \alpha_6 \frac{e^2}{2}, \qquad (28)$$

where α_i – coefficients of proportion, which evaluate significance of the influence of the corresponding factor on competitiveness of products, $0 \le \alpha_i \le 1$.

Value C_{prod} of a competitive company should conform to the ratio: $0 \le C_{min} \le C_{prod} \le C_{max} \le 1$, values C_{min} and C_{max} are determined as a result of analysis of the studied companies.

Calculated private indicators are normed, and their value is compared to the value of indicators of the leading company in each block, and conclusion on the direction of optimizing the company's activities is made.

Conclusion

One of the main problems of companies of the sphere is creation of sustainable and self-regulating system of management, which is aimed at effective usage of internal resources and stimulation of increase of rate of companies' development.

Crisis situations in economy led to the necessity for changing the institutional structure of industrial companies as the most important factors of innovational and organizational development of the sphere.

Identification of factors of competitiveness of industrial companies showed that a top-priority direction that allows stabilizing growth of effectiveness and increase of production quality is improvement of the existing mechanism of management of companies and its orientation at optimization of usage of the existing scientific and technical production potential.

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POPULATION IN THE SHADOW MARKET: PETTY CORRUPTION AND UNPAID TAXES

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Abstract. The subject matter of the article is a problem that is relevant for developing economies. A legal foundation for economy operation development is consolidated slowly; instead, an illegal flow of money and corruption the population gets actively involved into are expanding. According to official records, the number of unaccounted employees who avoid taxation has exceeded 15 million in Russia. When studying this phenomenon, researchers mainly refer to shadow economy whose scale and financial damage inflicted on the country are known. Population masses involved in the illegal flow of money operate in the shadows, since the latency of corruption processes makes it difficult to explore this phenomenon and invokes sociological methods along with economic methods. The purpose of the article is to show the structure of Russian population's involvement in the illegal cash flow turnover in terms of three aspects: presence in the shadow economy, involvement in corrupt practices, and concealment of a fraction of income aiming to non-payment of taxes. When solving these problems, the authors were to use the method of applied sociology with a subsequent transformation of aggregated information into empirical indicators by economic methods. Based on the research, the authors have explored the structure and motivation of the population to participate in the illegal flow of money, calculated the aggregate economic damage from all types of population incomes that are not undocumented by revenue authorities. By revealing the latent structure of the illegal cash flow, the research findings enable to more accurately plan priority directions of efforts to be made by fiscal bodies to neutralize the population participation in illegal economic and financial activities.

Keywords: corruption; shadow market; public services; bribe; public opinion

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JEL Classifications: D84, G4, H24, H26

1. Introduction

The article considers the problem of corruption and illegal cash flow in relation to a Russian population using a single index, which is money out of fiscal accounting. It means the earnings of labor released from tax control. Under any conditions, this is a violation of criminal or administrative law. For integral analysis of population's corruption forms, which manifests in relations with organizations rendering public services to the population and other service organizations, the article introduces the concept of 'petty corruption'.

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For the research, a hypothesis was formulated that the Russian population's involvement in shadow economy is three-pronged: wide-scale illegal economic activity; tax evasion by being paid part of a salary in cash 'under the counter'; and participation in corrupt payment practices when receiving services from public servants.

In the course of the research, the hypothesis was validated. The authors to use standardized (percentage) values in combination with absolute demographic data available from government statistics and applied the economic index method to calculate the overall volume of money unaccounted by the revenue authorities and circulating among individuals. This method also enabled the authors to categorize the illegal flow of money based on social and age population groups and by the types of their withdrawal 'into the shadow economy'.

These calculations allowed the authors to determine an average value of the overall volume of potential fiscal charges that the state loses on an annual basis.

2. Literature review

The shadow economy problem has existed since the period of permanent spread of markets and fiscal system consolidation as the basis for state budget formation to strengthen the state's defensive and social functions. However, in the 20th century, the shadow economy problem drew researchers' attention with regard to a sharp increase in the capital circulating therein. In a number of cases, it became comparable to individual state budgets. In 1983, the first international conference on the shadow economy was held in Belefeld; in 1991, a conference of European statisticians on hidden and informal economy was held in Geneva (Dallago, 1994).

In May 1996, the problem of shadow economy scale estimation was considered, along with other issues, at a joint meeting on national accounting held by the United Nations Economic Commission for Europe (UNECE) (Eurostat) and the Organisation for Economic Co-operation and Development (OECD). Eurostat has also established a special working group on the hidden economy (Dibirdeev, 2015: 109).

In Russia, interest in the shadow economy problem came into sharp focus in the 1980s in the fields of science and economics (Shokhin, 1989).

In addition to these international events, to date, researchers have focused on the shadow economy as an economic activity that is unregistered legally and can damage official businesses in related industries, as well as a government's budget in the form of unpaid taxes. According to this concept, the shadow economy includes: a) activities for the production, exchange, and use of goods and services prohibited by law; and b) activities for the production and exchange of goods and services permitted by law, but intentionally concealed to defraud revenues and avoiding remitting taxes and other mandatory payments under current regulatory enactments. The shadow economy involves creating a system of informal links between economic actors, often based on their personal relationships and direct contacts and supplementing the formal procedure for organizing economic ties (Yeliseeva & Burova, 2001; Kordík, Kurilovská, 2017; Luzgina, 2017).

Over the last several years, the shadow economy problem has increased in Russia. Moreover, in addition to the economic consequences, government officials and researchers have begun to raise the issue of the social consequences created by the population's involvement in the shadow economy (RBC, 2010; 5-tv.ru, 2016).

In economic terms, studies analyzing the illegal flow of money can be divided into three groups: those exploring the causes and mechanisms of the shadow economy operation; those analyzing the structure and social causes of corruption; and those studying tax concealment tools. Entrepreneurial activity is a primary focus of all three

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areas of research. In particular, the economic causes and consequences of the shadow economy expansion and its inhibitory influence on civil economy development have been studied (Matsievsky, 2015; Saunoris, 2018). A number of studies have dealt with the nature of shadow financial flows and the factors related to their formation in a modern economy (Slepov & Chekmarev, 2016), the formation of a shadow economic activity subculture (Pokida & Zybunovskaya, 2017; Akhmeduev, 2015), and the financial content of shadow capital (Tanyushcheva, 2015; Acosta-González et al., 2014).

A number of studies have analyzed the structure and of the shadow economy and its impact on an interstate scale in the European Union (Achim et al., 2018), in the Eurasian Economic Union (EAEU) member states (Krylov, 2017), and in the countries of Central and Eastern Europe (Bayar, 2016).

Corruption is another important topic of research. The major focus in these studies is on the social implications of public involvement in corruption (Abbink & Wu, 2017) and ways of combating corruption (Banerjee & Mitra, 2018; Rose-Ackerman & Lagunes, 2015).

In recent years, researchers have increasingly begun to investigate a population's involvement in the shadow economy. This problem is especially urgent for countries with developing economies, and it primarily relates to the sphere of income tax non-payment on illegal (not registered legally) economic activity (Abdixhiku et al., 2018; Abdixhiku et al., 2017; Addison & Mueller, 2015). Studies on a population's involvement in the shadow economy are especially urgent in Russia, including all types of tax evasion, such as shadow payroll (Boikov, 2014; Volovskaya et al., 2016). While it has been shown that tax evasion contributes to an increase in the scale of the shadow economy, the methodology for calculating the values has raised doubts about its validity, and, therefore, about the accuracy of the empirical values that are reported (Fedotov & Orlova, 2015; Kostin, 2014).

This article considers a different sphere of shadow monetary movement (petty corruption) concealed from fiscal accounting involving the general public, including both the employed population and pensioners. This entails officially unaccounted wages and taxes unpaid by individuals.

Petty corruption is a practice generated by the interactions between ordinary citizens and governmental officials. It includes various gifts and services rendered by citizens to an official and that official's family members. Petty corruption covers the area of routine interactions between citizens and authorities (health, education, legal proceedings, various types of registration, military conscription, and personal security). It can manifest as provocation (Bezverkhov, 2016) and extortion of a bribe (Khilyuta, 2012).

3. Methods of assessment

To collect source information, methods of applied sociology were used to 'probe' the latent sphere of population's economic activity unaccounted by the revenue authorities. Considering the illegal nature of the economic activity being investigated, the respondent interviews were anonymous, while the questions were asked straight. Respondents had the option to evade a direct answer, although not as a denial of the behavior revealed, but rather as a reference to 'forgetfulness'. In addition, indirect assessment questions were used formulated so that they could subsequently project responses onto the respondent's behavior. Some problems were also identified by applying correlation calculations and multidimensional factor analysis.

The initial sociological information was integrated into empirical measures though the economic method of multidimensional index analysis, which allowed for calculation of the values for Russia as a whole with a sufficiently high degree of confidence (estimated error is less than ± 10%).

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The study was carried out by the Institute of Socio-Political Studies of the Russian Academy of Sciences with the participation of the authors in July-August 2016 for a multistage area-specific sample with first stage segmentation in the territorial-economic areas of the Russian Federation (in total 11 regions and 2 metropolises – Moscow and St. Petersburg), quota selection of respondents at the last stage, and personal interviews. In total, the sample includes 22 of the most typical Russian Federation (RF) entities with a coverage of 116 settlements, including 2 metropolises, 20 administrative centers of the Russian Federation entities, 36 district centers, 20 urban-type settlements and 38 villages. The sample size is 2200 people aged 18 and over representing all major social and age population groups.

4. Results and discussion

A) Petty corruption

The frequency index of 'petty corruption' – the share of employed population having paid a bribe at least once – cited by the Global Corruption Barometer (26%) seems to be reliable, since in a study conducted in August 2016 with the authors' participation, the index was 27.4 %. However, according to the authors, the actual rate appears to be higher today if considering the 14.8% of respondents who answered a direct question about personal involvement in bribery (the survey question was formulated as follows: "Have you had to face a situation where you had to remunerate for a service with illicit cash?") with 'I do not remember' as having paid a bribe at least once (maybe not even regarding it as such). Reckoning those 'forgotten' whether they had paid a bribe as those who had paid it (from their own account) was justified, among other reasons, by the fact that when answering a question about the average one-time bribe amount, the majority in this group of respondents were able to name its value. Therefore, the total number of those having paid bribes within a year should be taken as 42.2%, that is, 49 million people aged 18 years and over. It includes 13.9% (16.1 million people) within a year who have paid a bribe once, and 28.3% (32.9 million people) of those who have done it on several occasions (an average of 6 times). The average frequency of bribery for services is 3.2 times within a year.

In 2016, bribes were paid by 44.1% of men and 40.6% of women. This is referred to the overall population aged 18 years and over. According to Rosstat (2018: 71), referring to the indicators in absolute terms, they are 23.1 million (the number of men aged 18 and over is 52.4 million people and 25.9 million (the number of women aged 18 and over is 63.7 million people), respectively.

The respondents were asked euphemistically: 'From your own practice or from the practice of your relatives, friends, and acquaintances, please list representatives of organizations you have to pay fees to for services with unofficial money, and what is the approximate amount of a one-time fee.' The answers are quite complete. Taking into account the selected indicator, 42.2% of those who have bribed and the organizations (their representatives) who have accepted a bribe are arranged as follows (see Table 1).Table 1 (last row) shows that individuals (population) have paid 3 trillion 461 billion 236.4 million rubles of bribes to various organizations over the past year, or 54 billion 940.3 million USD. This is the minimum indicator based on the respondents' own admission. The actual bribe amount is even higher. The above do not include 'bureaucratic remuneration' for grants and tenders or bribes of business organizations, whereby the flow of money concealed from the revenue authorities would increase dramatically.

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Table 1. Organizations whose representatives took bribes and the share of population aged 18 and over who paid bribes over the past year

Individuals and organizations	Share against the respondents who have paid a bribe, as %	Share against the population at large aged 18 and over, as %	Number of those having paid bribes, *thousand people*	One-time bribe amount, *RUB*	Total bribe amount, *RUB million**	The total bribe amount within a year, *USD million **
Medical officers	41.2	17.4	20,201.4	4,990	322,576.0	5,120.3
General administration for traffic safety	33.4	14.1	16,370.1	4,570	239,396.3	3,799.9
Education authorities	12.1	5.1	5,921.1	7,930	150,253.8	2,385.0
Police	8.8	3.7	4,295.7	10,170	139,799.3	2,219.0
Pre-school	7.6	3.2	3,715.2	11,960	142,188.1	2,257.0
Housing and communal services	7.3	3.1	3,599.1	5,030	57,931.1	919.5
Ministerial officers and other bureaucratic officials	5.0	2.1	2,438.1	48,400	377,612.9	5,993.9
Junior medical staff	3.2	1.4	1,625.4	1,680	8,738.2	138.7
Local authorities	3.2	1.4	1,625.4	226,920	1,180,274.5	18,734.5
Military registration and enlistment office	1.8	0.8	928.8	80,660	239,734.4	3,805.3
Court	1.3	0.5	580.5	157,680	292,906.4	4,649.3
Revenue service	1.2	0.5	580.5	16,160	30,018.8	476.5
Sanitary and epidemiological inspection service	1.2	0.5	580.5	21,720	40,347.1	640.4
Customs	1.2	0.5	580.5	24,930	46,310.0	735.1
Fire service	1.0	0.4	464.4	12,540	18,635.4	295.8
Insurance companies	0.8	0.3	348.3	16,160	18,011.3	285.9
Notary office	0.7	0.3	348.3	5,760	6,419.9	101.9
Pension fund	0.7	0.3	348.3	10,930	12,182.1	193.4
Federal service for supervision of consumer rights protection and human well-being	0.7	0.3	348.3	21,720	24,208.2	384.3
Employment fund	0.6	0.3	348.3	3,020	3,366.0	53.4
Child protection services	0.3	0.1	116.1	23,930	8,890.5	141.1
Disability review board	0.3	0.1	116.1	25,600	9,510.9	151.0
Prosecutor's office	0.2	0.1	116.1	206,690	76,789.5	1,218.9
Bailiffs	0.2	0.1	116.1	31,600	11,740.0	186.3
Other bribe types	0.5	0.2	232.2	4,570	3,395.7	53.9
'Kickbacks' for granting project or work contracts	0.8	0.3	348.3	*On average, 17.4% of the total cost of project of grant works*	n/a	n/a
Total					**3,461,236.4**	**54,940.3**

Note: **When calculating the total bribe amount, the correction factor k = 3.2 was used, that is, the average frequency of bribery over the past year.*

***on the average the exchange rate of 2015 and the first half of 2016: $ 1 = 63 RUB*

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To determine the share of each organization in the total annual aggregate bribe amount, they should be grouped according to the following principle: 1) health care (doctors, junior medical staff); 2) police, including general administration for traffic safety; 3) education authorities, including preschool education; 4) housing and communal services; 5) executive and legislative government bodies (ministerial officers and other bureaucratic officials, local authorities); 6) military registration and enlistment office; 7) judicial and legal authorities (courts, prosecutor's offices, bailiffs); 8) community relations and service bodies (tax service, Sanepidemnadzor (sanitary and epidemiological inspection service), customs, fire service, insurance companies, notary office, pension fund, Rospotrebnadzor (the federal service for supervision of consumer rights protection and human well-being), employment fund, child protection services, disability review board).

The share of bureaucratic services in the total annual bribe amount is almost half – 45%, or 24 billion 728.4 million USD in monetary terms (Figures 1 and 2).

These services are followed by representatives of judicial, legal, law enforcement and health authorities, 31.5% together, or 17 billion 332.4 million USD in monetary terms.

Education, tax surveillance and public services, military registration and enlistment office are at the third place with 21.7% in aggregate, or 11 billion 906.1 million USD.
Housing and communal services is the last with 1.8% and 973.4 million USD.

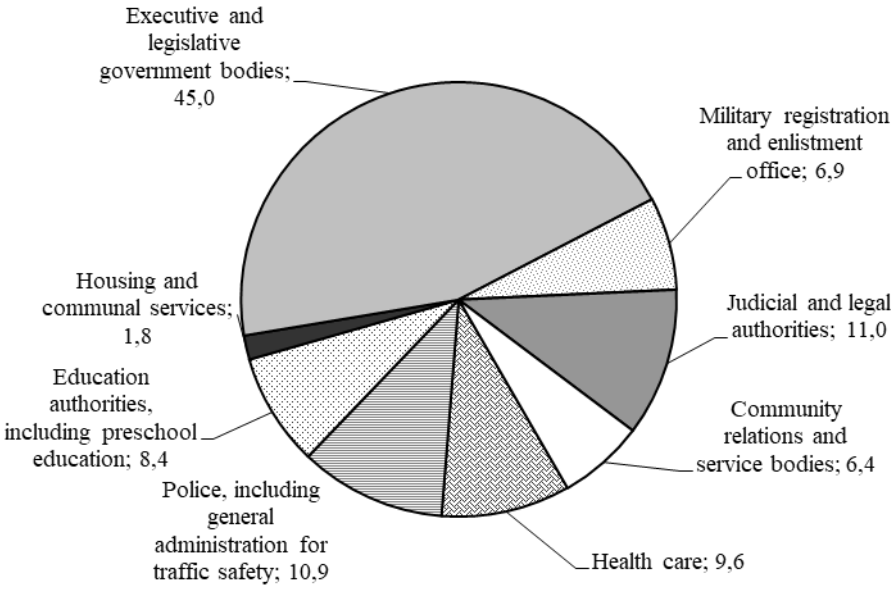

Figure 1. Share of different organizations in the total bribe amount paid by the population within a year, as %

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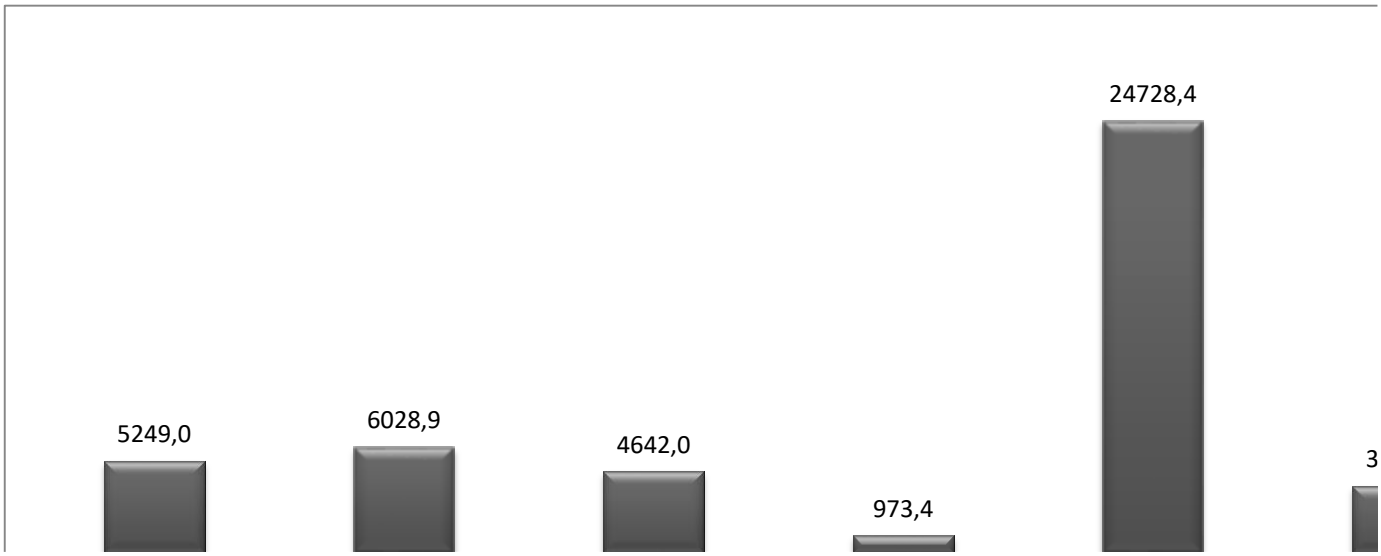

Figure 2. Total bribe amount paid by the population to different organizations within a year, *USD million*

The average amount of a one-time bribe reported by various demographic and social groups indicates a significant variation among the organizations whose representatives have taken bribes. The bribe amount varies according to the complexity of a problem to be solved whereby citizens appeal to different organizations. Both men and women incur the highest unofficial expenses when attending courts, prosecutor's offices, and local authorities. This conclusion applies to different age groups. Citizens start to encounter problems with local authorities mainly at the age of 25 and older, whereas problems with the military registration and enlistment office start at the age of18-20.

Those who have the most unofficial relations with courts, prosecutor's offices, and local government officials are mainly company employees; those who are informed of the amount of bribes to these authorities are also law enforcement officers and pensioners, that is, former officers. Bribes in military registration and enlistment offices affect representatives of all social groups, but it appears that the bribe amount varies according to the nature of the problem to be solved.

Bribes in child protection service are high but one-time and, most likely, are related either to adoption or to obtaining a housing sale permit. Similarly, bribes paid to Sanepidemnadzor and to the disability review board are also one-time.

For metropolises, large amounts of bribes are not typical at the population level, although they occur in all organizations. On a larger scale and with larger amounts, bribes are common in regional cities, towns and villages.

B) Officially unaccounted wages and unpaid individual taxes

The problem of the population to find auxiliary income sources is connected in many respects with the difficulty to repay debt service obligations on bank loans. This conclusion reliability is confirmed by results of the survey conducted by the authors.

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The survey findings show that the average amount of a bank indebtness of 26.1% (30.3 million) people aged 18 and over per debtor is 378,530 RUB on average, or 11 trillion 469.5 billion RUB as the total amount of all debtors, which is equivalent to 182.1 billion USD. The average amount of private debts of 10.9% (12.7 million) people aged 18 and over per debtor is 46,580 RUB on average, or 591.6 billion RUB as the total amount of all debtors, which is equivalent to 9.4 billion USD. Thus, the total (apparently minimal) amount of the population's debt is 12 trillion 61.1 billion RUB, or 191.4 billion USD.

The probability that debts can be paid in due time is estimated by the respondents at 90%. According to them, it will take them an average of 2 years 9 months.
The debt bulk falls on the shoulders of young and middle-aged generation aged 25-50 (Fig.3), mainly in metropolises (Fig.4).

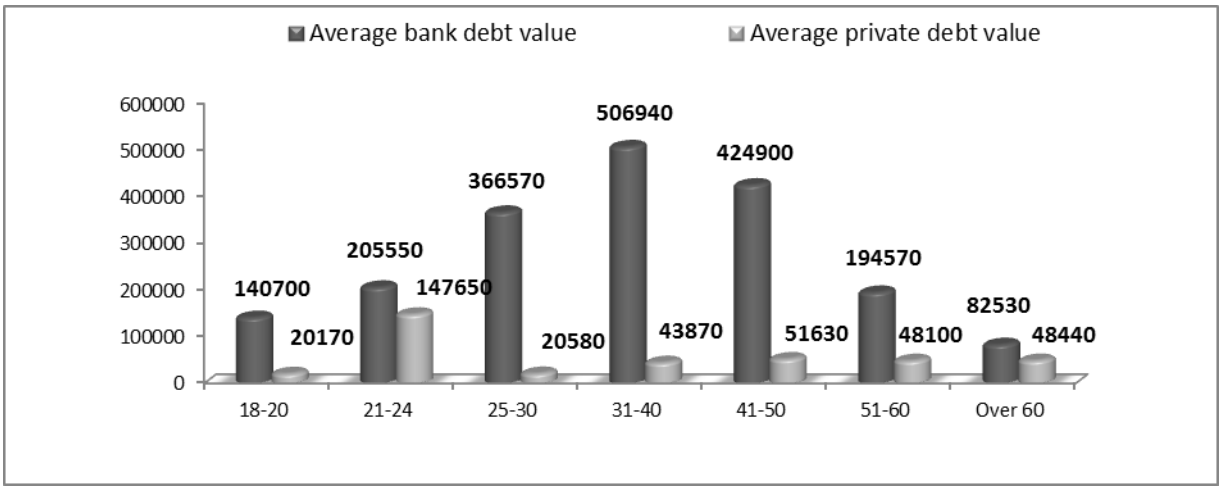

Figure 3. Average bank and private debt value of different age group representatives, *RUB*

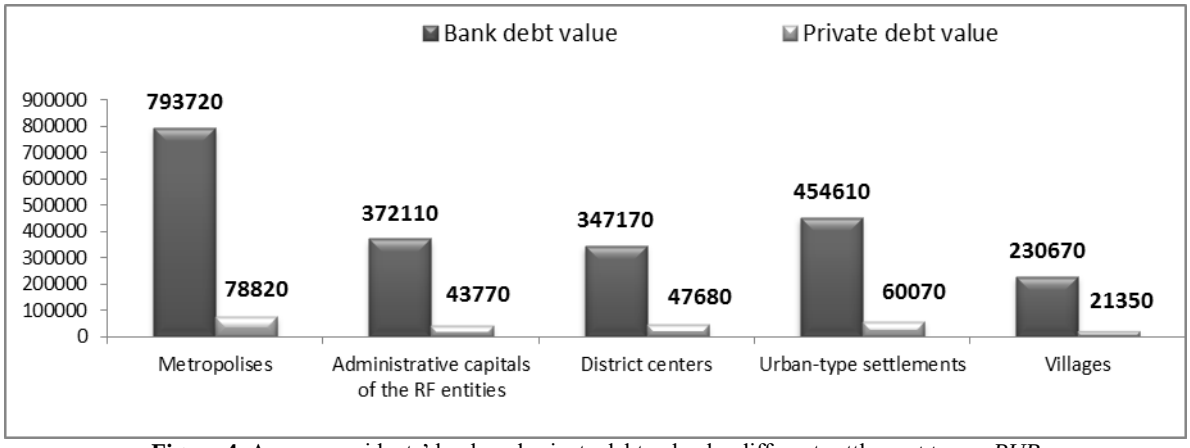

Figure 4. Average residents' bank and private debt value by different settlement types, *RUB*

The population's demand for operational 'consumer' loans that are nominally small have generated new forms of lending organizations (semi-financial–semi-rentier) – microfinancing lending institutions. A microlending institution is a swiftly operating financial institution of rentier type that is not quite convenient for people over a high interest it charges. However, a small lending amount gives the appearance of small losses when the interest is 'projected' onto a small denomination. According to the research, microfinancing institutions are not popular

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with the general public. In general, 10.6% (8.7% in 2015, 10% in 2013) of the population aged 18 and over, that is, 12.3 million people use the services of microfinancing institutions. The largest share of those applying for a loan to microfinancing institutions falls on the representatives of 21-50 age group (Fig.5).

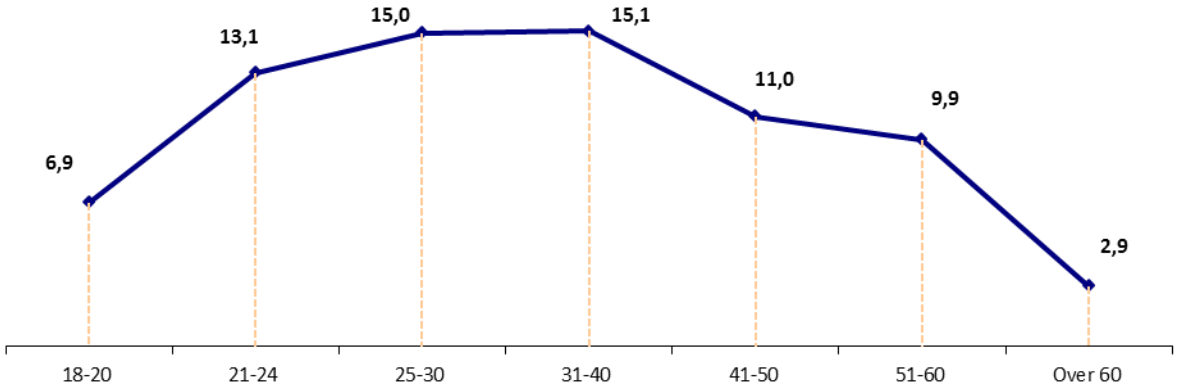

Figure 5. Share of different age group representatives applying for a loan to a microfinancing institution in 2016, as %

The main reasons why people resort to microfinancing institutions are the following two: the rapidness of a loan provision for 65.1% (70.7% in 2015, 58.6% in 2013) and ready availability of loans for 64.7% (65.7% in 2015, 53.5% in 2013) (Fig. 6 and 7).

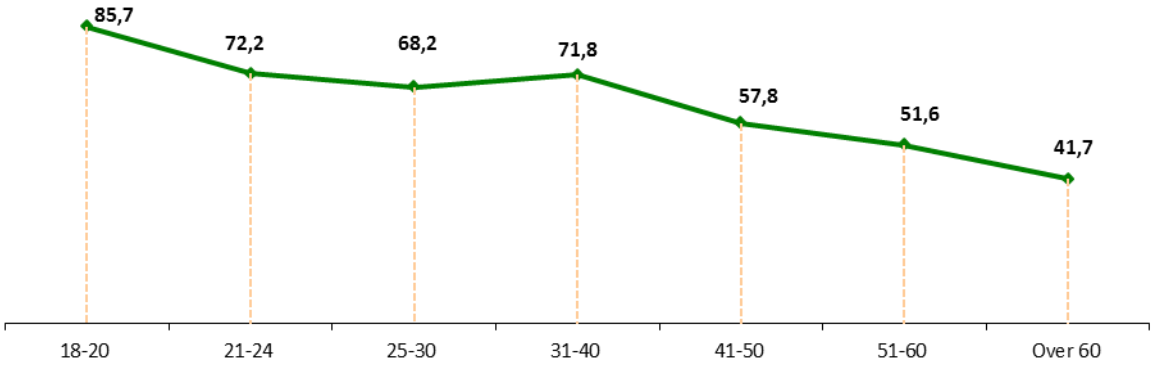

Figure 6. Application of different age group representatives for a loan to microfinancing institutions due to ready availability of loans in 2016, as %

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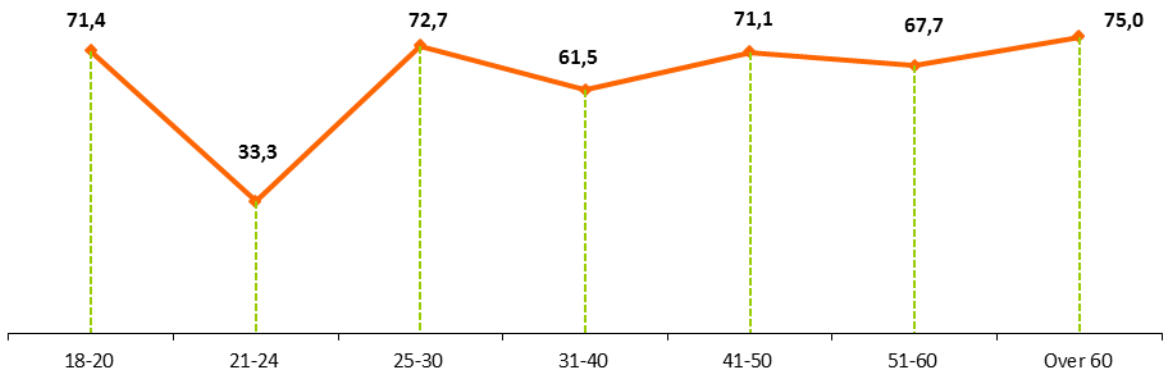

Figure 7. Application of representatives of different age population groups for a loan to microfinancing institutions due to a rapid loan provision in 2016, as %

Debt bondage encourages entities and individuals to search for any funds to settle outstanding debts. Hence, another type of infringement on the budget interest is born – tax avoidance through payment of salaries with unaccounted cash. 32.8% of the interviewees indicated this practice at enterprises and institutions. In their opinion, the share of 'envelope' salary averages 44.7% (almost half of a salary). Envelope salary or, as it is often referred to, 'black' or 'gray' salary is a payroll whereby an entrepreneur does not pay payroll taxes to the government. The lower the actual wages of an employee are, the less money the government will receive. In 2010, the Government advanced the struggle against hidden wages and entrusted 'gray salary' legalization commissions affiliated to the revenue services with supervising artificial reduction of wages by entrepreneurs. Envelope salary is an offense punishable by the law. In case the fact of salary payment in addition to the official pay slip is ascertained, the infringing entrepreneur is subject to administrative or criminal penalty. The employee in this case can also answer in law if they were aware about the 'gray salary' and agreed with this situation, and there is evidence to support this fact.

With regard to persistence of salary payment in the form of monetary allowances not accounted by the revenue authorities, this is largely conditioned by the fact that according to Article 5.27 of the Code of Administrative Offenses of the Russian Federation 'Violation of labor and labor protection legislation', such violation entails imposition of an administrative fine on executive officers at the amount of one to five thousand rubles; on persons engaged in entrepreneurial activities without forming a legal entity – from one to five thousand rubles or administrative suspension of operations for up to ninety days; on legal entities – from thirty to fifty thousand rubles or administrative suspension of operations for up to ninety days. This is not an onerous punishment for entrepreneurs and individuals. The gain from avoiding taxation is much higher than the loss from punishment (Urist-edu.ru, 2013)

Based on the research, it is possible to estimate the approximate amount of budget losses. It is legitimate to assume that unaccounted official salary is allocated from the cash amount; therefore, it is legitimate to assume a loss of VAT that is 15% of the total cashed amount. Another budget loss of revenue is a unified social tax of 30.2% and an income tax of 13%. The amount lost by the budget is determined by the equation:

$W = S1+S2+S3$
where:
S is a basic amount of payroll calculation.

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S1 = S/100 x15
S2 = (S-S1)x30/100
S3 = (S-S2)x13/100

According to Rosstat (the Federal State Statistics Service), the average salary in Russia was 36.2 thousand RUB in 2016; the number of economically active (employed) population, exclusive of the unemployed, was 7.1 million people.

Taking these data into account, the total monthly payroll value, including income tax (13%), is 257 billion 20 million RUB; 334 billion 126 million RUB including the unified social tax, and 393 billion 089.4 million RUB including VAT.

The calculated values are as follows:
S = 393 billion 089.4 million RUB.
S1 = 58 billion 963.4 million RUB.
S2 = 77 billion 106 million RUB.
S3 = 33 billion 412.6 million RUB.

The total tax amount is: W = S1+S2+S3 = 58963.4 + 77106 + 33412.6 = 169 billion 482 million RUB. 32.8% of the respondents admitted that they received envelope salaries not registered officially; they account for 55 billion 590.1 million RUB out of these taxes.

With the envelope salary index taken as 44.7%, which was used as the basis by the respondents, the tax loss makes: δ = 55590.1x44.7/100 = 24 billion 848.8 million RUB per month or 298 billion 185.6 million RUB per year, which is equivalent to 4 billion 733.1 million USD.

In addition to unaccounted official salaries, according to 14.4% of the respondents, the population manages to save an average of 31.5% of obligatory taxes over a year. In this case, the amount of budget losses can be calculated only highly approximately. According to the research findings, the average monthly income per family member is 17,415 RUB. The average Russian family structure is 3 people, whereby the average monthly family income is 52,245 RUB, and 626,940 rubles on average over a year.

The number of Russian households is about 2.4 million. The number of families that save on taxes is 345,600 and their total annual budget is 216 billion 670.5 million RUB. Suppose that the amount of 13% income tax is saved, which makes 28 billion 167.2 million RUB. 44.7% of this amount is concealed, that is, 12 billion 590.7 million RUB, or 199.9 million USD.

Now, the shadow flow of money circulating among the population (including in relations with organizations and institutions) within a year can be calculated as follows:

Q = bribes + taxes from unaccounted salaries + personal income taxes saved by the population = 54 billion 940.3 USD + 4 billion 733.1 million USD + 199.9 million USD = 59 billion 873.3 million, or 3 trillion 772 billion 17.9 million RUB.

This is the minimum value and it refers only to the employed population of the Russian Federation aged 18 and over. It does not take into account ‘kickbacks’ in tenders and grants, the relationship of large and medium-sized businesses with organizations and institutions, a criminal flow of money (drugs, undocumented alcohol, other counterfeit products, smuggling, etc.).

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Persistence of the indicators these calculations are based on is evidenced by the degree of the respondents' competence that, as reflected by the survey data, should be considered quite high, since 70% of those who indicated the amount of a one-time bribe paid it themselves by their own admission, and only 30%, apparently, primarily law enforcement officials, based their assessments on the accounts of relatives or acquaintances who had had such experience. To illustrate the respondents' competence level criterion when estimating the amount of a one-time bribe, the authors give a description of the respondents who answered the bribe amount question (Table 2).

Table 2. The share of respondents who estimated the amount of remuneration for services with illicit cash, as %

Organizations	Personal involvement of respondents in payment for the service with illicit cash		
	Have paid a bribe once or more, including those who 'do not remember it'	Including	
		Have not been personally involved in bribery but heard about its amount from relatives or acquaintances	Total number of those having paid bribes
General administration for traffic safety	42.6	17.9	24.7
Police	9.4	3.5	5.9
Court	2.6	1.3	1.3
Prosecutor's office	1.4	0.6	0.8
Bailiffs	1.4	0.2	1.2
Fire service	3.1	0.9	2.2
Customs	1.5	0.9	0.6
Military enlistment and registration office	7.5	4.2	3.3
Notary office	1.7	0.4	1.3
Housing and communal services	7.3	2.0	5.3
Local authorities	3.1	1.5	1.6
Child protection services	0.4	0.2	0.2
Pension fund	0.6	0.2	0.4
Employment fund	0.8	0.5	0.3
Revenue service	2.0	0.7	1.3
Sanitary and epidemiological inspection service	4.5	1.4	3.1
School	13.6	5.0	8.6
University	9.4	3.8	5.6
School, lyceum	3.4	1.5	1.9
Pre-school	14.1	6.1	8
Medical officials	38.4	10.2	28.2
Junior medical staff	20.8	4.5	16.3
Disability review board	4.6	1.0	3.6
Ministerial officers and other bureaucratic officials	1.9	0.3	1.6
'Kickbacks' for granting project or work contracts	7.3	2.2	5.1
Other types of unofficial payment	2.0	0.2	1.8
The share of respondents	*73.8*	*28.2*	*45.6*

The share of envelope (off the books) salaries equally affects all demographic and social group representatives. Thus, male respondents indicated that the envelope salary is approximately 44.2% of the total payroll. For female respondents, this indicator is 45.2%.

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Different age group representatives pointed to the following 'unaccounted' shares in the composition of their salaries (Fig.8).

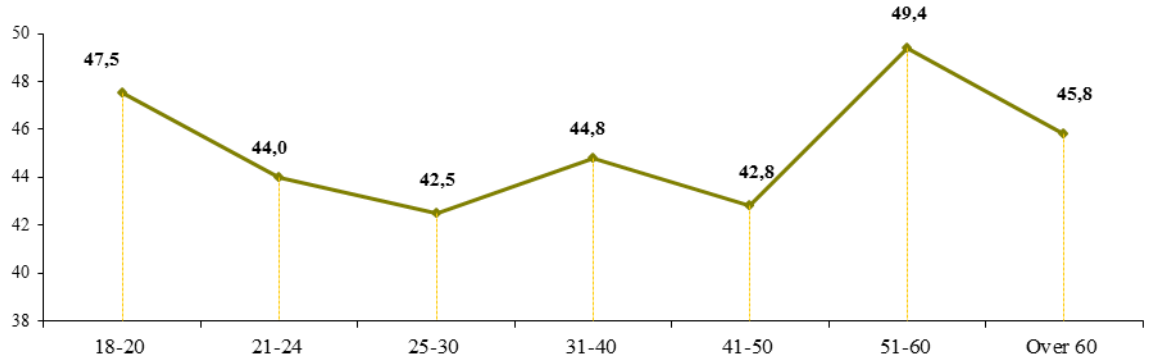

Figure 8. Opinion of different age group representatives on what percentage of their salary is unaccounted, as %

Unaccounted salaries occur in settlements of all types. The rate is highest in district centers and rural areas (Fig.9).

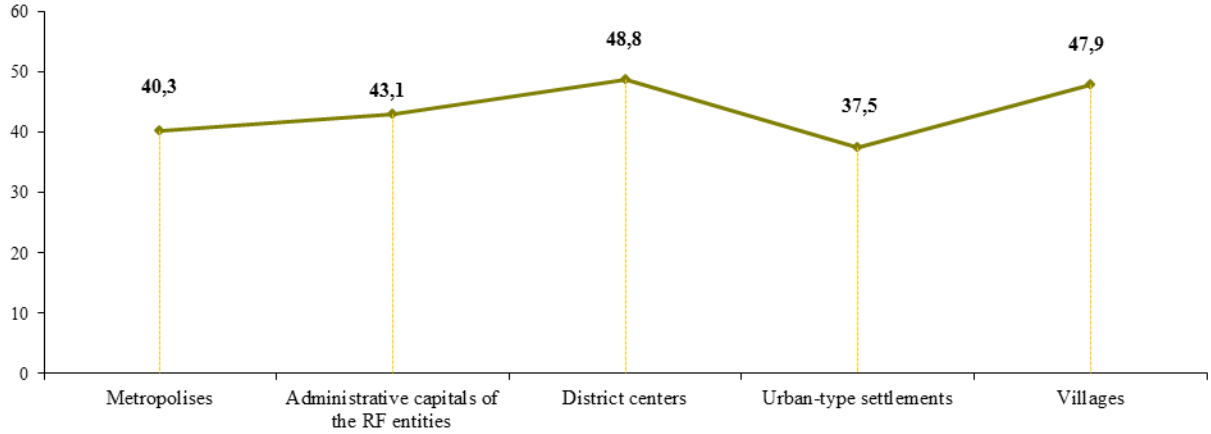

Figure 9. Opinion of residents of different types of settlements on what share of their salaries is unaccounted, as %

The unaccounted salary share is highest in material production and service industry, including financial and insurance companies; it affects urban employed pensioners to a large extent (see Fig.10).

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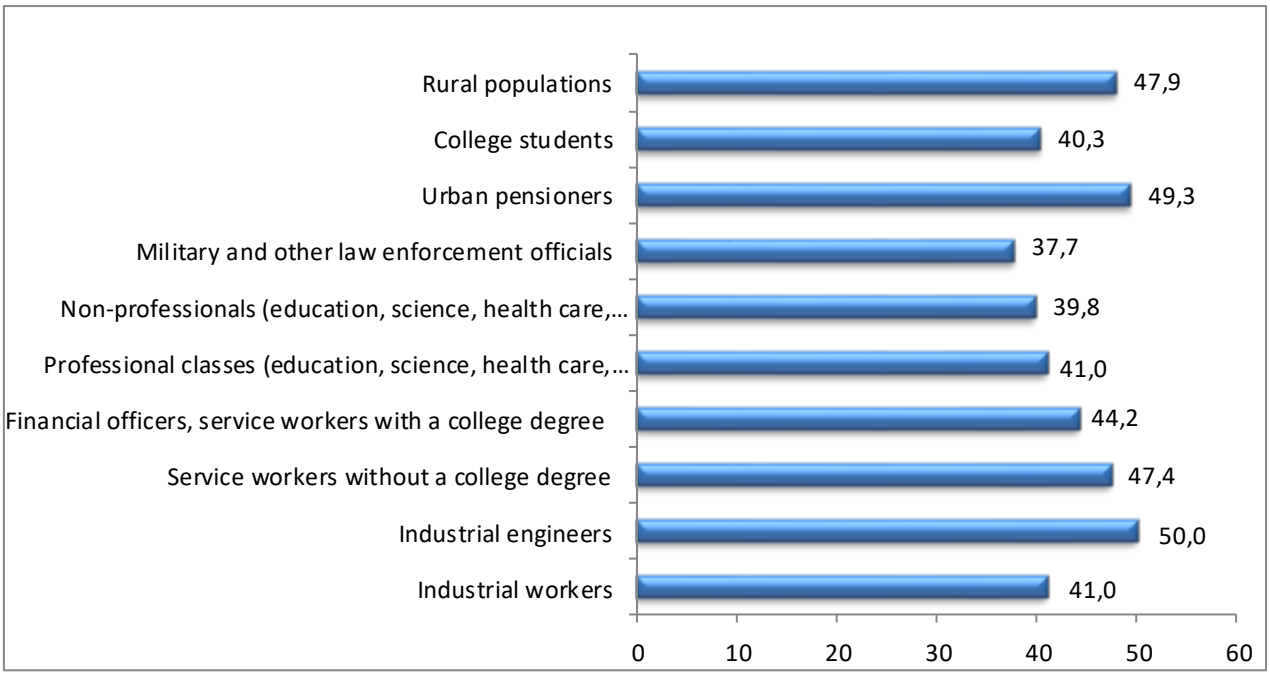

Figure 10. Opinion of different social group representatives about what percentage of their salary is unaccounted, as %

The situation is similar in terms of the respondents' estimation of approximate amount of excess profit taxes not paid by the population within a year, which is 31.5%, according to the respondents. According to male respondents, this figure averages 30.5%, while female respondents estimate it as 32.6%.

The opinions of different age group representatives on this issue do not vary enormously (Fig.11).

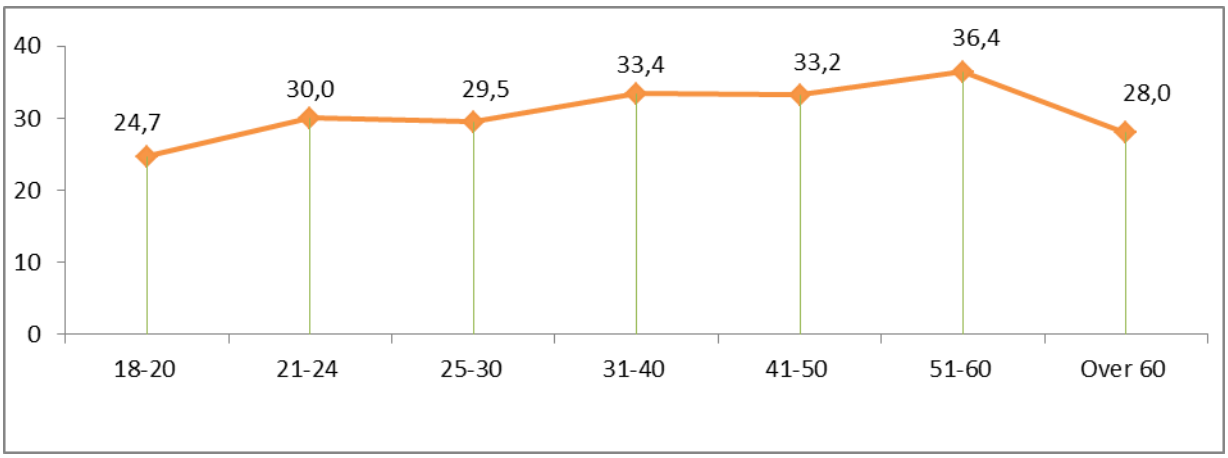

Figure 11. Opinion of different age group representatives on what share is the unpaid tax amount, as %

The population fails to pay excess profit taxes on the auxiliary income within a year in settlements of all types and approximately in equal shares, except for urban-type settlements, where this figure is twice as low as its average value (see Fig.12).

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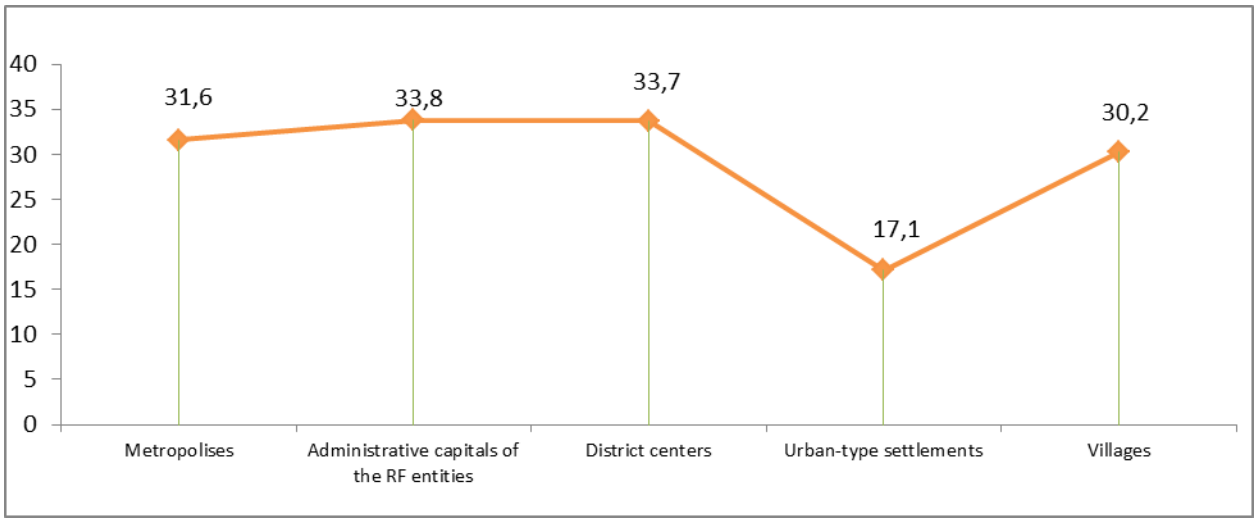

Figure 12. Opinion of the residents of different settlement types on what share is the unpaid tax amount, as %

Concealment of taxes is least typical of law enforcement officials and most typical in finance, insurance, trade and other service sectors, as well as in management (see Fig.13).

For non-payment of taxes by individuals in Russia, a fine of 5% of the amount of tax payable is imposed from the day established for filing an income tax, which is not a grave punishment for an individual (Law03.ru, 2018). As a result, the loss of revenue by the state budget is enormous.

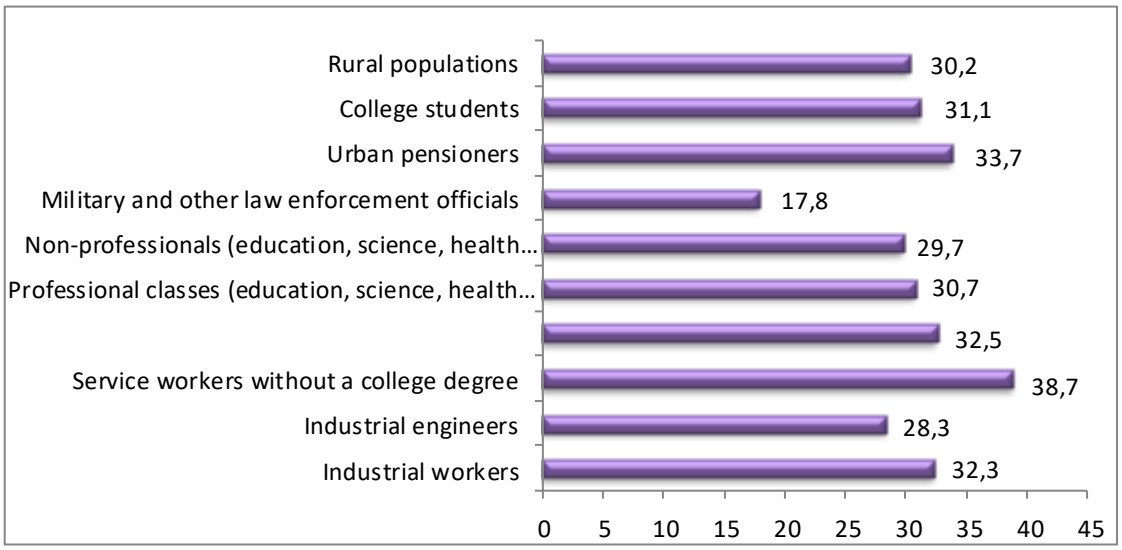

Figure 13. Opinion of different social group representatives on what share is the unpaid tax amount, as %

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Conclusions

1. In public opinion, corruption is most often associated with relations between business and government supervisory bodies, but the survey findings indicate that remuneration for public services that representatives of different organizations are most often supposed to provide free of charge are encumbered with 'cash grabs'. This encumbrance can be notionally named 'petty corruption', which, however, is not harmless in moral terms, given that it reaches a total of 60 billion USD a year.

2. Regrettably, those who are primarily involved in the extensive 'petty corruption' network are government organizations meant to consolidate the state and the population supported by social security insurance. These organizations are funded by taxpayers to be able operate; however, they subject them to an additional 'toll'.
3. One of the main reasons for 'petty corruption' is a weak competition environment and, in share terms, underrepresentation of private companies in many public service sectors where the state monopoly (in particular, in education, health care, and housing services) has remained intact.

4. To solve the 'petty corruption' problem, extensive educational measures aimed at the population and general public legal consciousness formation are suitable, but the key role therein can be only played by widespread private sector development in the industries involved in public service but so far standing as state monopolies.

5. The problem of enterprises and institutions (especially in the service sector) paying a portion of salaries to their employees illegally is a consequence of a severe economic crisis and the desire of business participants to attenuate their financial expenses by saving on social taxes and reducing the legalized payroll budget amounts. At the same time, the income tax amount is unlikely to be saved, since this share (13%) is most probably spent as a 'fee' for cashing in; however, it is criminally punishable and therefore also makes up the state budget costs.

6. In the context of market development and immaturity of public economic consciousness, most people fall into a position of dependence on credit institutions and rentiers, being unable to assess risks and propelled into debt bondage. This population segment is quite large and is in the debt bondage of credit institutions and rentiers for an average of 3 years.

7. Debt commitments encourage a segment of the population to intensify their labor, while another segment is urged to unreported self-employment, which brings them additional income. However, at least a third of the able-bodied population tries to conceal these income taxes, which is unambiguously a loss of revenue to the state budget.

8. The problem of illegal salaries and non-payment of taxes based on self-employment of individuals can be solved only by introducing tax incentives.

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INTELLECTUAL INPUT OF DEVELOPMENT BY KNOWLEDGE-BASED ECONOMY: PROBLEMS OF MEASURING IN COUNTRIES WITH DEVELOPING MARKETS

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Abstract. Over the past 20 years, sales volumes in the knowledge-intensive sectors of the developed world grew about 2 times faster than in the manufacturing industry. It is no coincidence that the share of knowledge-intensive sectors of the manufacturing industry and the service sector today accounts for an average of more than half the GDP of the leading industrial countries. A new, knowledge-based economy creates new resources that effectively replace natural resources and human intellect. A high-end economy is the creation of new, artificial energy and artificial intelligence and their use in all sectors of the economy. In addition, a knowledge-intensive economy is a large-scale use of scientific developments, a new content of labor and the attitude of all its participants to it. A high-tech economy is born and is able to develop in a social environment with a sufficient level of intellectual development of society. The creation of such an economy requires not only a high level of development and implementation of new resource-creating and resource-saving technologies, but also a mass knowledge of new technologies, skills to use in production and everyday life. A high-tech economy is formed in conditions of sufficient intellectual security. With all this, the urgency of finding answers to the questions is growing: what conditions are necessary for the creation and functioning of a knowledge-based economy. In this regard, firstly, the article compares the level of development of human resources in the Republic of Kazakhstan with other countries of the world, which allows us to conclude that in terms of quantitative indicators (coverage of primary, secondary, vocational and higher education, life expectancy), our country has average positions in the world ranking. Secondly, in order to identify the relationship between a number of indicators of the method of assessing intellectual security in Kazakhstan, a correlation analysis for 2004-2017 was conducted. This article expands the knowledge on methods of assessing intellectual security for the development of a knowledge-based economy in developing countries.

Keywords: knowledge-based economy, intellectual potential, evaluation of intellectual potential, intellectual provision

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1. Introduction

Humanity entered the 21st century, reconstructing all spheres of life under the influence of the requirements of the new technological order - Industry 4.0. The use of high-tech industries and artificial intelligence allows not only qualitatively changing the economic system, but also creating new resources that replace natural, changing the way of life of society and the competitiveness of states.

As is known, civilizational technological transformation historically and logically occurred under the influence of new knowledge used in the economy. At the same time, on the whole, the technological progress and personal development of Man took place in a dialectical unity, forming the corresponding model of the economy: from the traditional (based on primitive means of production and manual labor) to the modern - science intensive. In turn, the changing modes of production and social development respectively developed the person: his knowledge, way of thinking, type and character of behavior.

A characteristic feature of the modern knowledge-based economy is not only the creation and use in all spheres of society of new resources with specified properties and effectively replacing natural resources, but also the replacement of certain functions of the human brain with artificial intelligence. In addition, a knowledge-intensive economy is an expanded reproduction of scientific developments, a new content of labor and the attitude of all its participants to it. A high-tech economy is born and is able to develop in a social environment with a sufficient level of intellectual development of society, since it requires a mass knowledge of new technologies, the ability to use them in production and everyday life. Thus, a knowledge-based economy is formed in conditions of sufficient intellectual security. In this regard, the urgency of finding answers to the questions is growing: "What and in what quantity are intellectual resources needed for the creation and functioning of a knowledge-based economy in Kazakhstan that is striving to move away from the catch-up development model?", "What methods of measuring intellectual potential and intellectual capital can be used for national the economy of Kazakhstan in the context of the transition to a knowledge-based economy?".

2. Literature review

Intellectual potential and the effectiveness of its use - are the main drivers of economic development of a new type. The development of methodological approaches for determining the quantitative and qualitative parameters of the intellectual provision of a knowledge-based economy presupposes the specification of the principles and criteria for selecting indicators that characterize the degree of development of intellectual potential and intellectual capital necessary and sufficient for a knowledge-based economy.

In the literature, there are many methodological approaches to identifying quantitative and qualitative characteristics of intellectual capital, capable of ensuring the progressive development of a knowledge-based economy. The authors specify and supplement them depending on the level of the economic hierarchy (macro-, meso-, and microlevels), the level of development of national economies, the favorable socio-economic context, the agglomeration of economic activity, the availability of technological infrastructure, etc.

The toolkit for measuring intellectual potential and intellectual capital is so diverse that obviously it makes sense to focus only on the most famous.

Before, to determine how it is necessary to evaluate intellectual security, let's define the concept of intellectual potential. So according to the definition (Bontis, 2004) intellectual potential is defined as the ability of people to engage in and carry out activities that are important for regional economic and social development. It represents the intellectual wealth of all people from a certain region. The intellectual potential of the region is determined not

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by the educational achievement of its inhabitants, but by the extent to which it is able to preserve and develop this human potential and use it for economic growth.

Ilyashenko S.N. (2004) notes that intellectual potential is singled out as a separate component in the structure of innovation potential along with personnel, market, technological, information, interface, and research. In his opinion, intellectual potential should determine the possibilities of generation and perception of ideas and ideas of innovations and bringing them to the level of new technologies, designs, organizational and managerial decisions.
Balatsky OF (2004), in turn, notes that the main carriers of innovation potential are information resources in the form of scientific and technical information, in the form of the results of fundamental research, scientific discoveries, inventions, scientific and developmental developments. Here the innovative potential is called upon to create conditions for the most complete development of labor, production, investment, natural resource and institutional capacities.

To the very first works on the evaluation of intellectual potential can be attributed the works of the scientist P. Dryuker (1992). His evaluation methodology included three indicators:
- Evaluation of the institutional regime that facilitates efficient mobilization and allocation of resources, stimulation of creativity and motivation for the creation, dissemination and use of new knowledge;
- the availability of educated and skilled workers who can continuously improve and adapt their skills for the effective creation and use of new knowledge;
- the effectiveness of the innovation system of firms, research centers, universities.
Since the company's intrinsic value as such does not create value or does not generate growth, but can be developed and brings success only in a specific context or through optimal management, Lev and Daum (2004) supplemented the methodology by assessing the effectiveness of managing intellectual capital.
Skirme (Skyrme, 2007) believes that the evaluation of intellectual potential should be carried out using the number of publications. In his opinion, it is the commercialization of innovations that makes it possible to distinguish innovative companies. Bek (Bec, 2014) also believes that the evaluation of results in the form of publications and patents is very important, in addition he suggested including in the evaluation the effectiveness of financing R & D.

Lin Yeh-yun and Edvinsson (Lin Yeh-Yun and Edvinsson 2010) proposed a more thorough method for evaluating the intellectual potential. In his opinion, the intellectual potential of the region consists of five components: human capital, market capital, organizational and technological capital, material capital and financial capital.
International organizations involved in researching the problems of the development of innovative activities also attach considerable importance to methods for assessing intellectual potential. The most known techniques are discussed in Table 1.

Table 1. Review of methodologies for evaluating the intellectual potential of international organizations

The name of the organization	The content of the methodology and the criteria used
UNDP, (1998)	- - the development of the information society is led by rapid innovations in science, communications and computing technologies; - - technological progress in the field of information and communication technologies (ICT) - the number of Internet users; - - the ability to accumulate human intelligence and information technology.
The World Bank (1999)	- - providing an attractive, competitive solution to the needs of international clients in comparison with other countries; - - Investments and the country's achievements in the field of external relations, combined with the export of quality products and services constitute a significant component in the development of market capital, which is rich in intangible assets; - - social intelligence, created by elements such as laws, market institutions and social networks.

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IFAC (1998)	- - the effectiveness of the legal environment; - - number of patents, licenses, copyrights and others; - - the spread of the Internet and information technology; - - the influence of intellectual capital.
European Commission (2013)	- - number of patents, publications; - - the existence of community projects and licensing and patent revenues from abroad; - - expenditure on innovation, not related to R & D.
OECD (1999)	- availability of skilled labor; - degree of education of employees; - the degree of literacy; - degree of admission to higher education institutions; - government spending on science and education, etc.
Romilio Labra, M., & Paloma Sánchez, 2013	- an estimation of the intellectual capital of the nation, which includes 4 components of the evaluation of human capital, technological capital, renewable capital and market capital.

Thus, a review of the existing methodological approaches to assessing intellectual potential and intellectual capital allows us to conclude that the variety of existing methods for measuring them is determined by three main factors:
- the complexity of measuring the creative abilities of a person;
- the difficulty in measuring the contribution of new knowledge to the economy;
- specifics of the national socio-economic context;
- the degree of use of modern information technology.

It should be recognized that the quantitative parameters of intellectual support for the development of a knowledge-based economy do not always coincide with qualitative parameters. It is no secret that the presence of a certain number of scientific personnel or innovative projects that they implement, does not always bring the result, from the point of view of increasing the science intensity of production, necessary. In our opinion, the quality of intellectual support can be checked by the effectiveness of using intellectual capital. This is a real generation of new useful ideas, the number of which does not always depend on the number of workers employed in the scientific sector.

3. The place of Kazakhstan in the world supply with the intellectual resources of a knowledge-based economy

Experience shows that many developed countries of the world, without their own raw materials, nevertheless successfully develop their economies and ensure a high standard of living for the population. A typical example here is Japan. In Japan, the technological orientation of the economy dominates and the intellectual resources of the nation are effectively used, which, in addition, compensates for the lack of own raw materials. A similar situation is observed today in South Korea, Taiwan, Singapore and in many other countries of the world, which relied on the strategy of technological development.

Let us examine in more detail the dependence of the country's economic development on the provision of intellectual resources.

To analyze the dependence of the level of economic development of some countries of the world on the level of qualification of their workforce, let us consider in the table below the data on the distribution of the world's skilled labor (CBC) resources between some countries (Table 2). The composition of the cattle here includes specialists with a higher and secondary special education. These data are obtained from various sources and therefore give only a general idea of the concentration of highly educated personnel in different countries of the

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world in 2016. Nevertheless, their study allows us to draw some fundamentally important conclusions about the intellectual potential of these countries and the effectiveness of its use.

Table 2. Dependence of the economic development of some countries of the world on the level of skill of their workforce

№	country	Population size (million people)	GDP (billions of dollars)	Share of the world resource of skilled labor,%	Level of qualification of the workforce,%
1	USA	329,1	18 624,45	11,5	80,5
7	China	1398	11221,8	6,7	11,0
3	Japan	126,1	4 949,3	5,3	96,4
4	Russia	146,5	1 281,3	3,5	56,0
2	Germany	81,4	3479,2	3,1	86,5
5	Kazakhstan	18,4	134	0,4	66,0
6	Belarus	9,5	48,1	0,1	26,0

For example, Japan has only slightly more than 5.3% of the world's cattle resource, compared to 3.5% in Russia, but at the same time it provides a four times higher level of GDP compared to Russia, what speaks about fundamentally different sources of economic growth in these countries. If we consider Kazakhstan, then by the size of the population, both by the level of qualification of the labor force, and by the size of GDP, there is a significant lag.

Meanwhile, the share of the population with higher and secondary special education in Kazakhstan, although lagging behind the level of technologically developed countries, is 66%, slightly more than in Russia, which indicates the availability of intellectual potential for forming the foundations of a technologically oriented economy. And this resource is important to use effectively for GDP growth, because today, under the influence of globalization, modern IT technologies and the Fourth Industrial Revolution, the approaches to the productivity and nature of human work are changing. Observed over the past decades in economically developed countries, the transition to a knowledge-based high-tech economy is changing the direction towards increasing human sustainability and well-being.

In the structure of a knowledge-based economy as a dominant resource, science was transformed into a direct productive force, the main factor of production. In connection with these, we will analyze the personnel supply of the scientific sector of the Republic of Kazakhstan.

Scientific personnel are specialists of the highest degree of preparation who are directly involved in the process of reproducing scientific knowledge and preparing scientific results for practical use (commercialization). The differentiation of the personnel structure is determined by the specifics of the tasks of the knowledge economy, as well as by the specific nature of scientific and scientific and technical work. It consists of scientists and engineers, management personnel, workers in pilot production, support and maintenance personnel. They are called upon to form "quality" and "prospects" for the further development of the economy and the state. In the opinion of Glazyev (2014), without a quantitative and qualitative staffing of knowledge-intensive sectors - locomotives of economic growth - the transition to both a knowledge-based economy and a new VI technological order is unrealistic.

The staffing of science in the Republic of Kazakhstan not only lags far behind the personnel potential of developed countries, which can be seen from the data in Table 3, but also runs counter to the main world trends, as it decreases year by year.

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Table 3. The main indicators of the human resources potential of developed countries and Kazakhstan in 2016

№	Country	Number of scientific researchers per 1 million people.	Number of researchers	Share of global resource,%
1	China	1177	2069650	21,2%
2	EU 28	3485	1880000	19,3%
3	USA	5709	1392751	14,3%
4	Japan	5231	917725	9,4%
5	India	216	817426	8,4%
6	Germany	4431	586030	6,0%
7	South Korea	7087	460769	4,7%
8	France	5878	383843	3,9%
9	Russia	3131	370379	3,8%
10	Canada	4599	170640	1,8%
11	Israel	8300	70419	0,7%
12	Kazakhstan	18	22000	0,2%

It should be noted that the highest proportion of scientists in the world over the past 5 years is observed in Israel. So in 2017, there were 135 employees of the scientific sphere for 10,000 people, whereas in the USA - 85 people. In Kazakhstan, this figure is 12 people. In fact, the country's scientific sector not only has a shortage of scientific personnel, but also experiences its deepening. There are several reasons:
- natural aging of scientific personnel of the country;
- unattractiveness of the scientific sector for scientists;
- outflow of young scientists into business and abroad;

Despite the measures taken by the state to increase the state order for the preparation of PhD masters and doctors, as well as the continuation of the international Bolashak program, the scope of scientific activity continues to be unattractive for most young people due to weak material and social incentives. A significant problem for the country remains the "brain drain" abroad, where there are more attractive material conditions for doing scientific work. Regions of Kazakhstan are experiencing an even greater deficit, as qualified personnel leave for the capital as well. Obviously, a complex of institutional measures will be required, not only stimulating academic activities, but contributing to the attraction of scientific personnel from abroad.

The demand for research and intellectual knowledge in the knowledge economy is constantly increasing. In highly developed countries, this is expressed in the constant increase in the financing of science and the wages of scientists compared with the average for the economy. However, in Kazakhstan, the overall trend of investment in science is somewhat different from the global trend. In general, the dynamics of the share of expenditure on R & D in relation to the GDP of developed countries and Kazakhstan is shown in Figure 1.

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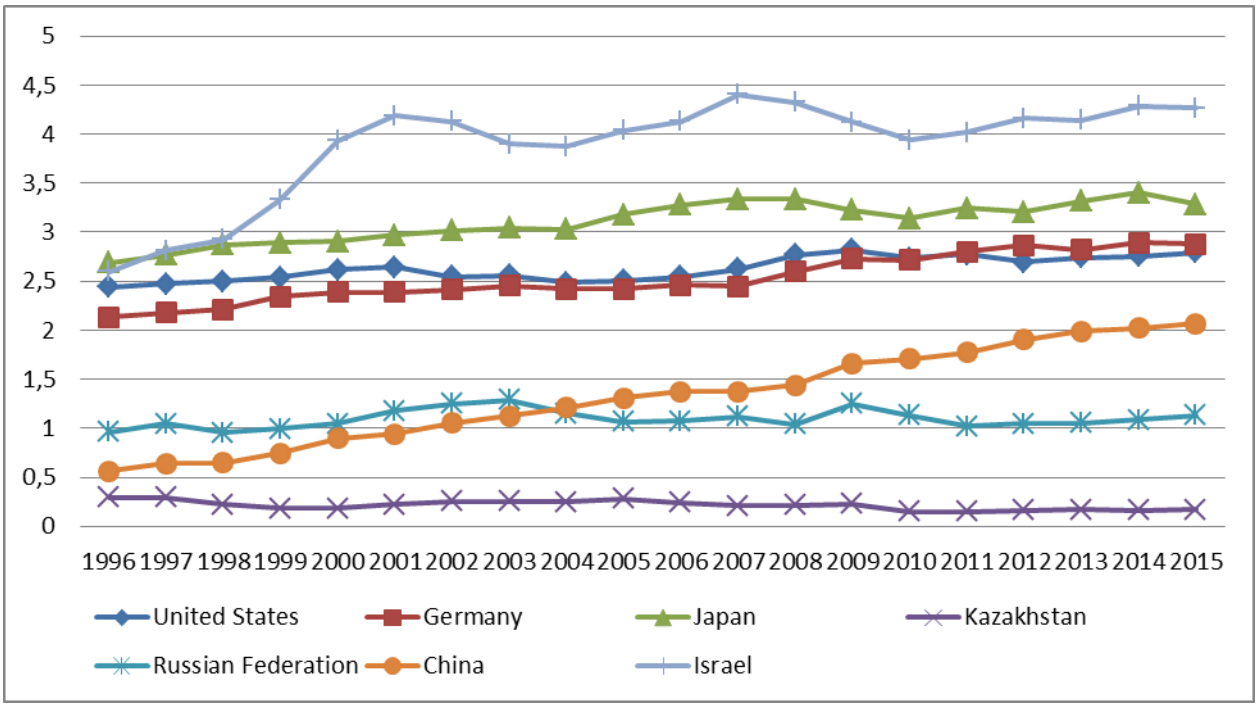

Figure 1. Dynamics of the share of expenditure on R & D relative to GDP for 1996-2015

In the period from 1996 to 2015, there is a fairly significant increase in the share of spending on R & D in GDP in China: from 0.5% to 2.1%. Nevertheless, Israel remains the leader in spending on R & D. If in absolute terms R & D expenditure in Kazakhstan increased by 500%, then the share of R & D expenditure in GDP in 20 years practically did not change and is less than 0.2%.

Expenditure indicators per capita, according to 2016, also confirm the statistics of a catastrophically low level of funding. This indicator in Kazakhstan is almost ten times less than in the USA, Finland, Sweden, and Japan. It is also interesting to compare the internal costs of research and development per researcher, the values of which are presented in Table 4.

Table 4. Internal costs of research and development per researcher in 2016, thousands of dollars.

Country	R&D Expenditures	Number of researchers	Expenses for nir for 1 employee, in thousands of US dollars
USA	540,2	1392751	387,8
EU 28	354,2	1880000	188,4
Germany	105,9	586030	180,7
Japan	159,8	917725	174,1
Canada	28,6	170640	167,6
France	57,6	383843	150,0
South Korea	64,7	460769	140,5
Israel	15,0	112428	133,2
China	253,3	2069650	122,4

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Russia	17,8	370379	48,1
India	16,4	817426	20,0
Kazakhstan	0,3	22000	12,3

As a result, it turns out that Kazakhstan spends 12.3 thousand dollars per person engaged in scientific research and development. From the analysis of the given data, one can see that a huge gap in the level of funding for science, which unambiguously condemns Kazakhstan in the near and medium-term outlook for the overtaking type of development. The transformation of science in the conditions of the knowledge economy into the most important factor of production determines the growth of capital investments in this sector. So, in the US in 2016, science expenditures accounted for more than one-third of total global expenditure - 30%. This is more than in the EU's 28 countries combined - 20%, in China - 14% (table 5).

Table 5. Gross domestic product and total spending on science of the world's largest economies in 2016.

Country	GDP		Expenditure on R & D in GDP,%	Total expenditure on science	
	billion dollars.	in% of the world value		billion dollars.	in% of the world value
USA	19361	24,0%	2,79	540,2	30%
Japan	4872,1	6,0%	3,28	159,8	9%
Germany	3677,4	4,6%	2,88	105,9	6%
South Korea	1530,7	1,9%	4,23	64,7	4%
Israel	350,8	0,4%	4,27	14,9	1%
France	2582,5	3,2%	2,23	57,6	3%
Canada	1653,0	2,0%	1,73	28,6	2%
Russia	1577,5	2,0%	1,13	17,8	1%
EU 28	17278	21,4%	2,05	354,2	20%
China	12238,0	15,2%	2,07	253,3	14%
India	2597,4	3,2%	0,63	16,4	1%
Kazakhstan	159,4	0,2%	0,17	0,3	0%
Total in the world	80684,0		2,23	1796,8	

We note that the development paradigm of Industry 4.0, based on its economic nature based on high technologies, determines new requirements for the resource base, which is ensured by the quality and efficiency of the use of intellectual capital. This fact objectively limits further economic growth of Kazakhstan at the expense of extraction and export of natural resources and actualizes the necessity of financing science on a leading principle.
As a specific result of intellectual work is information about the results of previous research, development and development of innovations. Its carriers are thematic maps of the research begun, reports on completed research and development, publications and dissertations containing new theories, hypotheses, recommendations, descriptions, formulas, schemes, drawings, etc.

The state of the information component of the scientific potential can be judged in particular by the dynamics of publications of Russian scientists in the world's leading journals and databases, and by the number of references to their works. Data on published articles in G7, BRIC and Kazakhstan are given in Table 6.

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Table 6. Distribution of the flow of articles in G7, BRIC and Kazakhstan in 2016,%

Country	Number of articles	Share in%
USA	715297	31,9%
China	440070	19,6%
United Kingdom	183657	8,2%
Germany	170126	7,6%
Japan	126208	5,6%
India	126154	5,6%
France	116418	5,2%
Italy	113135	5,0%
Canada	110044	4,9%
Brazil	70692	3,2%
Russia	68906	3,1%
Kazakhstan	2511	0,1%

It should be noted that in the period from 2012 to 2016 the number of publications of articles of domestic scientists has tripled. In 2012, 754 articles, abstracts and other conference materials were published, and in 2016 - 2241. It is noteworthy that the increase in the publication activity of Kazakhstani scientists was the result of the requirements for writing doctoral dissertations and for the implementation of research projects implemented at the expense of state funding. At the same time, a number of humanitarian publications tended to fall into fake scientific journals. Thus, there was a need for additional institutional measures to stimulate the increase in the effectiveness of scientific workers and limiting low-quality publications.

Despite the fact that the volume of knowledge and information has increased exponentially in recent years, an extremely modest role is played in the developed information space in the Republic of Kazakhstan. She owns only about 0.1% of the global distribution of the flow of articles. It is significant that the United States owns about 1/3, or 31.9% of all indexed materials, which determines the status of the country-leader in the modern information society.

The reasons for the poor publication activity and citation of Kazakh scientists are related to the relatively low quality of scientific research, as well as ignorance of the English language. So, according to some information, only 10% of native scientists speak English and can study documents in the original on English-language sites. This circumstance forces domestic scientists to post their materials only in national editions. As a result, published articles are largely unclaimed. All this makes Kazakhstan only a recipient of scientific products and contributes to the inevitable degradation of the information potential of the country.

Patents for inventions reflect the effectiveness, scientific novelty of ongoing research and development. Patents act as objects of sale and purchase in the knowledge market, generate rental incomes for both individual organizations and the country as a whole. As statistical studies show, despite the rather high dynamics of the publication and patent activity of scientists of the country over the past three years, in general, it continues to noticeably lag behind the results of the leading countries. According to various sources, the revenues of the budgets from the sale of science-intensive products make up $ 700 billion in the US, $ 530 billion in Germany, and $ 400 billion in Japan. The receipt of applications and the issuance of patents in the RK is 0.07% of the

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production of high technology products in the world.The dynamics of the number of issued patents in the country profile is given in Table 7.

Table 7. Number of patents received in the country by 2016 1

№	Country	Number of patents	Share of total patents in the world,%
1	China	1257439	59,05%
2	USA	521802	24,50%
3	Japan	456467	21,43%
4	South Korea	233786	10,98%
5	Germany	177073	8,32%
6	France	71486	3,36%
7	United Kingdom	52909	2,48%
8	Switzerland	47000	2,21%
9	Netherlands	39058	1,83%
10	Russia	31815	1,49%
11	Canada	24653	1,16%
12	Sweden	23453	1,10%
13	Spain	10807	0,51%
14	Kazakhstan	1527	0,07%
15	Finland	1256	0,06%
	Total in the world	2129552	

The increment in the number of issued patents for inventions in Kazakhstan is ten times lower than the similar figures for the number of patents issued in other countries. Low patent activity of domestic scientists and inventors in comparison with their foreign colleagues characterizes the emerging level of innovative and intellectual development of Kazakhstan and fairly objectively reflects the place that our country occupies in the global intellectual products market. In Kazakhstan, thus, they prefer to engage in servicing activities, rather than creative and creative, as researchers around the world. This, of course, is due primarily to the level of pay for intellectual workers, which is incommensurably low, than abroad, and also with low prestige in the society of the profession of the scientist.

According to some experts, it is with the change of technological structures that there is a rare opportunity to enter a new way with minimal costs in lagging countries, which inspires some optimism about Kazakhstan, which actively promotes the development of a knowledge-based economy.

Thus, summarizing the comparative analysis of the development of a knowledge-based economy in Kazakhstan, it can be concluded that in spite of innovative state initiatives and systematic government policy to increase the training of scientific personnel, there continues to be a shortage of intellectual resources, a low level of generating new ideas and the volumes of science financing remain minimal.

For an adequate response to the challenges of Industry 4.0, Kazakhstan will not only increase intellectual resources, but also take care of their quality. At this stage, scientists are needed that can not only work in the context of the sixth technological order, but also generate new ideas for new industries, obtaining patents, commercializing innovations.

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At this stage, with relatively low levels of science intensity of industries operating in the country, as well as insignificant volumes of innovative products, it is important to clarify: "What is the real contribution of intellectual resources that exist in the country to the growth of innovative production of the national economy?"

4. Research Methodology

Specificity of the national economy, caused by the above factors, determines the need to develop special criteria to measure the intellectual capital of the regions, which should be consolidated and effectively used to solve the priority tasks of the new technological order. Since at this stage we can only talk about the formation of a knowledge-based economy in the regions of the country, the methodology for measuring intellectual security of the high-tech development of Kazakhstan should, in our opinion, take into account both the negative and positive "contribution" of this or that factor to the innovative component of the gross national product . In this regard, we proposed a multifactor model that makes it possible to use both quantitative and qualitative parameters of intellectual provision of the knowledge-based economy of regions and the country as a whole, assessing the availability, intensity and effectiveness of the use of intellectual resources.
Our methodology for assessing intellectual property at the regional and national levels includes the following quantitative indicators:
1. The availability of intellectual potential for a knowledge-based economy:
- percentage of population with higher education;
- the share of workers in the scientific sector in the total population;
- The share of PPP in the total population;
- the share of employees employed in high-tech industries;
- share of wages of scientific workers in the total wage fund;
- share of salaries of PPP workers in the total wage fund;
- share of small (innovative) enterprises in the total number of enterprises;
- share of enterprises using the Internet to the total number of enterprises.
To assess the quality of intellectual security, we suggest using indicators that enable us to assess the extent and results of using intellectual capital in the regions:
2. Intensity of the use of intellectual capital:
- The share of patents and articles received with the impact factor in the total share of scientific research;
- share of enterprises using foreign technologies in the total number of enterprises;
- share of enterprises using new technologies in the total number of enterprises;
- share of R & D costs in the gross regional product.
3. Results of the use of intellectual capital:
- The share of patents per worker in the scientific sector;
- share of commercialized patents in the total number of patents received;
- The share of innovative products in the gross regional product.

The hypothesis of our research is that there are indicators that have the greatest impact on the volume of innovative products. Since the end product of knowledge-based production is an innovative product with the maximum added value through the use of new knowledge, a hypothesis has been proposed that the volume of innovative products in the Republic of Kazakhstan is affected by a number of variables that are indicators of the availability and intensity of the use of intellectual capital. Further analysis will show whether it is possible to predict the values of the dependent variable depending on the value of one or more independent variables.
Define the main indicators of our future model in Table 8.

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Table 8. Intellectual Property Assessment Scenarios

Index	Decoding of the indicator
X1	Proportion of population with higher education;
X2	The share of workers in the scientific sector in the total population;
X3	The share of PPP in the total population;
X4	Share of workers employed in high-tech industries;
X5	The share of wages of scientific workers in the total wage fund;
X6	Share of salaries of PPP workers in the total wage fund;
X7	The share of small (innovative) enterprises in the total number of enterprises;
X8	Share of enterprises using the Internet to the total number of enterprises;
X9	The share of patents and articles received with the impact factor in the total share of scientific research;
X10	The share of R & D costs in the gross regional product
X11	Share of enterprises using new technologies in the total number of enterprises;
X12	Share of enterprises using foreign technology in the total number of enterprises;
X13	The share of patents per worker in the scientific sector;
X14	Share of commercialized patents in the total number of patents received;
У	The share of innovative products in the gross regional product

Next, using regression analysis, we construct a model. The main feature of regression analysis: with its help, you can get specific information about the form and nature of the relationship between the variables studied.

5. Model building and analysis of results

To assess the reliability of the proposed indicators, a study was made of the statistical relationships between the proposed indicators using the SPSS program. The analysis of the influence of a number of variables on the volume of innovative products in the Republic of Kazakhstan is carried out. A total of 14 annual observations were used. The initial data is given in Appendix 1.

We will perform a regression analysis of independent variables to determine the indicators that have the greatest impact on the share of innovative products in GNP. We construct the first correlation model with 14 independent variables using the specialized program for econometric analysis of SPSS. The analysis showed the following results (Table 9).

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Table 9. Regression analysis using the SPSS econometric analysis program

Coefficients						
Model		Non-standardized coefficients		Standardized coefficients	t	Value.
		B	Std. Error	Beta		
1	(Constant)	-,008	,007		-1,190	,257
	X2	16,133	5,628	,637	2,866	,014
2	(Constant)	-,037	,008		-4,825	,001
	X2	16,977	3,479	,671	4,879	,000
	X1	,052	,011	,622	4,527	,001
3	(Constant)	-,038	,005		-8,304	,000
	X2	20,426	2,222	,807	9,191	,000
	X1	,053	,007	,635	7,692	,000
	X9	-,040	,009	-,397	-4,532	,001
a. Dependent variable: Y						

The program in three steps selected indicators that affect the share of innovative products in GDP. The indicators are reflected by the degree of dependence:
1. The share of workers in the scientific sector in the total population.
2. Proportion of population with higher education.
3. The share of patents and articles received with the impact factor in the total share of scientific research.
Let's check this model with Excel. For this, it is necessary to perform a correlation analysis and to find the relationship between the quantities. The obtained correlation coefficients showed the dependence of the variable Y on the indices X1, X2, X9 (Table 10).

Table 10. Interrelation of the variables Y with the indices X1, X2, X9

t	Y	X1	X2	X9
2004	0,0127	0,5560	0,0011	0,0389
2005	0,0159	0,5716	0,0013	0,0345
2006	0,0153	0,5575	0,0013	0,0351
2007	0,0119	0,5250	0,0012	0,0531
2008	0,0069	0,4933	0,0010	0,0729
2009	0,0049	0,4960	0,0010	0,0881
2010	0,0065	0,4950	0,0011	0,0858
2011	0,0084	0,5314	0,0011	0,0888
2012	0,0122	0,5339	0,0012	0,0985
2013	0,0161	0,5090	0,0014	0,0974
2014	0,0146	0,4837	0,0015	0,1060
2015	0,0092	0,4844	0,0014	0,1367
2016	0,0095	0,5114	0,0013	0,1425
2017	0,0163	0,6600	0,0012	0,1549

Next, we perform a regression analysis that will allow us to estimate the degree of coupling between the variables by calculating the expected value of the variable based on several known values.
First, consider the upper part of the calculations presented in Table 11 - regression statistics.

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Table 11. Regression statistics

Regression statistics	
Multiple R	0,965459
R-square	0,932111
The normalized R-square	0,911744
Standard Error	0,001158
Observations	14

The value of the R-square, also called a measure of certainty, characterizes the quality of the regression line obtained. In our model, the measure of certainty is 0.932111, which indicates a very good fit of the regression line to the original data.

The multiple R is equal to the Pearson correlation coefficient (0.965459). Multiple R - coefficient of multiple correlation R - expresses the degree of dependence of independent variables (X) and the dependent variable (Y) (Table 12).

Table 12. Coefficients of regression

	Coefficients	*Standard error*	*t-statistics*	*P-Value*	*Lower 95%*	*The top 95%*	*Lower 95.0%*	*The top 95.0%*
Y-intersection	-0,03778	0,00455	-8,3036	8,48E-06	-0,04792	-0,02764	-0,04792	-0,02764
Variable X 1	0,052554	0,006832	7,692224	1,66E-05	0,037331	0,067777	0,037331	0,067777
Variable X 2	20,42558	2,222445	9,190592	3,43E-06	15,47367	25,3775	15,47367	25,3775
Variable X 3	-0,03964	0,008746	-4,5323	0,001088	-0,05912	-0,02015	-0,05912	-0,02015

Thus, our correlation model, calculated using Excel, as well as in SPSS, looks like this:
Y = -0.038 + 20.426 * Proportion of employees in the scientific sector in the total population + 0.053 * Proportion of population with higher education - 0.040 * Proportion of patents and articles with impact factor in the total share of scientific research.
Due to the fact that the variable X3 is negative for the regression coefficient, the relationship of the given dependent variable with the independent variable is negative (inverse). The relationship with the remaining variables is positive.
Table 13 shows the results of the derivation of the residues.

Table 13. Residuals

Observation	*Predicted Y*	*Remains*
1	0,012731	-2,5E-06
2	0,016515	-0,00065
3	0,016381	-0,0011
4	0,011286	0,000582
5	0,006642	0,000306
6	0,004977	-0,00012
7	0,00629	0,000226

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8	0,008995	-0,00064
9	0,01137	0,00085
10	0,013751	0,002313
11	0,014138	0,00049
12	0,011267	-0,00204
13	0,010017	-0,00053
14	0,015936	0,000319

With this part of the report, we can see the deviations of each point from the constructed regression line. The greatest absolute value of the remainder in our case is 0.016515, the smallest is 0.004977. For a better interpretation of these data, we use the graph of the original data and the constructed regression line, shown in Figure 2. As you can see, the regression line is accurately "matched" to the values of the original data.

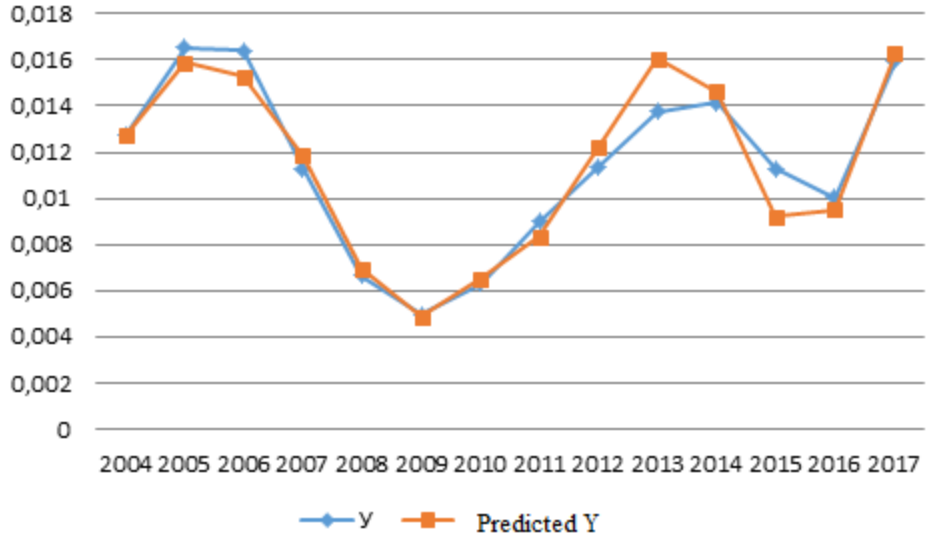

Figure 2. Initial data and regression line

Consider an estimate of the unknown future values of the dependent variable based on known values of the independent variable, that is, we solve the prediction problem.

Having the regression equation, the prediction problem reduces to solving an equation with known values of x. The results of forecasting the dependent variable Y six steps forward are presented in Table 14. The analysis showed that the forecast figure should increase by 6.3%.

Table 14. Results of predicting the variable Y

Observation	*Predicted Y*	*e*	*%*
1	0,012731	-2,5E-06	0,02%
2	0,016515	-0,00065	4,11%
3	0,016381	-0,0011	7,22%
4	0,011286	0,000582	4,90%
5	0,006642	0,000306	4,40%

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6	0,004977	-0,00012	2,48%
7	0,00629	0,000226	3,47%
8	0,008995	-0,00064	7,66%
9	0,01137	0,00085	6,96%
10	0,013751	0,002313	14,40%
11	0,014138	0,00049	3,35%
12	0,011267	-0,00204	22,12%
13	0,010017	-0,00053	5,55%
14	0,015936	0,000319	1,96%
The predicted value of the variable Y			6,3%

Republic of Karelia on real statistical data, a correlation-regression analysis was carried out, which can predict the volume of innovative products. During the work on regression analysis, it was possible to construct a multiple regression model, with the help of which it is possible to correctly explain the behavior of the dependent variable with an accuracy of 99%.

Conclusions

Thus, the analysis of the innovative development of the Kazakh economy in comparison with the world's leading economies, answering the first question "What and in what quantity are intellectual resources needed for the creation and functioning of a knowledge-based economy in Kazakhstan that is striving to move away from the catch-up development model?", : "Intellectual potential has small quantitative values for virtually all regions of the country, and its use in the form of intellectual capital is neeffe in the context of the development of a knowledge-based economy. "

Causes:
- low quality of higher education, which, with a broad population coverage, does not realize the mission of development of the research component in the industry development trend 4.0
- a small number of people engaged in the scientific sector and the low quality of personnel selection in this field;
- insufficient level of dissemination of modern knowledge-intensive and information technologies;
- low level of financing of research activities;
- low rates of generation and commercialization of new knowledge;
- Ineffective public funding for ongoing research;
- Inconsistent implementation of innovative projects;
- low innovative activity of enterprises and the share of innovative products in the gross regional product.

Answering the second question of the study: "What methods of measuring intellectual potential and intellectual capital can be used for the national economy of Kazakhstan in the context of the transition to a knowledge-based economy?", It should be concluded that the proposed calculations allow determining that the increase in the innovative component of the gross national product in Kazakhstan The greatest influence is exerted by the share of scientific personnel in the total population, the proportion of people with higher education in the total population, and the number of patents and articles with impact factor in the total number of scientific studies. The obtained results allow drawing a conclusion about the need to increase the share of workers in the scientific sector, the number of people with higher education and to improve the quality of ongoing scientific research.

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LOW-LOW (LL) HIGH HUMAN CAPITAL CLUSTERS IN PUBLIC ADMINISTRATION EMPLOYMENT - PREDICTOR FOR DIGITAL INFRASTRUCTURE PUBLIC INVESTMENT PRIORITY - ROMANIA CASE STUDY*

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Abstract. Disruptive innovations generated by digital technologies push the public services to digital transformation in order to become not only a problems solver for community, but a real social, economic and environmental development engine. With all significant progress, the use of e-Government services in Romania remains the lowest in the EU; high quality services are not available in a significant part of rural areas. The paper highlighted the spatial heterogeneities of the broadband infrastructure at level of NUTS – 5 expansion correlated to Low-Low (LL) high human capital clusters in public administration and marginalized rural areas. Using data from World Bank studies, provided in the ArcGis Cloud, from Romanian broadband investment prioritization and micro data provided by INS census, we developed a spatial cluster analysis by the means of ESDA method. In public administration the high human capital is clustered in a few innovative

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hubs which in the absence of a functional and interconnected national administration IT system makes difficult the public administration modernization, especially in the context of regional decentralization. At the county level is visible the pattern of center periphery, where the center is usually the county residence and the LL clusters are the frontier of the counties. Usually, at this frontier are located marginalized rural areas where are provided poor public services. As a recommendation, the future e-government development must be spatial harmonized with the high human capital in order to assure a valuable public service, everywhere, whether it is the smallest village or a big city, to reconnect the public to the state and the state to the public in an inclusive and intelligent manner.

Keywords: resilience; rural broadband; digital inclusion; digital public policies; human resources management

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JEL Classifications: C54, M54, O47

Additional disciplines: administrative sciences; informatics

1. Introduction

Disruptive innovations generated by digital technologies push the public services in a new era. Digital public services becomes an innovation services based on technological progress and innovation for implementing real solutions to complex social, economic and environmental problems.

Minges (2015) points that broadband penetration has a complex impact on economic growth, playing the role of technology factor, influencing also the employment and productivity "as well as other dimensions of broadband (e.g., business penetration, speed etc.)". Kelly and Rossotto (2012) founds that "the impact of broadband on employment finding gains of between 2.5 and 4.0 additional jobs for each broadband job".

Philip et al. (2017) observed in the case of Great Britain telecommunications that even if the urban –rural digital divide is widely acknowledged the detailed accounts of the spatial patterns of digital communications infrastructure are rarely reported". The authors concludes that the urban-rural "digital divide is largely due to inadequate infrastructure" fact that request "to ensure that any public sector market interventions in broadband infrastructure developments are as effective as possible in addressing territorial digital divides".

- *Typologies of connectivity solutions for spatial heterogeneities balance - digital innovation engines for changes*

Urban-rural divide is a universal "law" generating diversified solutions "**to bring connectivity** to the 'final few' and to improve connectivity for the underserved. These, we suggest, will include some or all of the following**: non fixed connection via satellite or wireless**, particularly for the especially 'hard-to-reach' or 'final few' users; **community-led initiatives** which should be considered more systematically in public policy, especially in terms of financial and technical models most suited to local geographies and the socio-technical capacities of individual communities; and **re-scoping potential models for collaboration between commercial service providers and the public sector** (through public finance and/or provision of in-kind expertise) (Philip et al., 2017).

"There are significant issues with the inclusion of mobile broadband. First, the ability to use **mobile broadband** is dependent on the device and coverage. A mobile broadband subscription using a dongle and laptop would likely have different economic implications than using mobile broadband with a handset or smartphone. Second, there are problems with identifying active users versus those with the theoretical ability to use mobile broadband.13 Third, it is not clear whether broadband should be looked at overall—combining fixed and mobile

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subscriptions—or each mode should be examined separately. Existing studies always treat mobile and fixed broadband as separate variables" (Minges, 2015).

On the background of increases of spatial unbalances the emergence of an industrial revolution could bring personalized solutions for different location, increasing the access to prosperity in an inclusive manner. Digital innovation could offer complementary „bridges" to work, information and social relations for all members of the society regardless the age, sex, level of education, disabilities, location, etc. On this background the public services assumes the role of source of development, based on inclusiveness, resilience and information (SDG 9) (2017 HLFP Thematic Review of SDG-9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation).

- *Digital innovations in public services*

Public services digitalization is the back bone of the socio-economic system, especially thorough investment in digital infrastructure, desirable to cover the full territory. In literature, the broadband connection is a measure of connectivity:

Brown (2015) presents the case of UK's Digital Inclusion Strategy, strategy that aims to remove hurdles from e-Administration. This initiative is implemented in an innovative way. The main innovations points the transitions from universal solutions to unique ones based on the local data, from a finalized version towards beta versions developed in the open, focused on easy use and universal accessibility (including person with disability or without digital skills). Also, it is a new focus, from website to services tailored to solve the beneficiary's problems.

Roberts et.al. (2017) critically examine the digital-rural policy in the community resilience framework bringing together the rural development and digital policy-related literature. Rural areas are community resilience, digital divides, digital inclusion, and rural information and communication technologies (ICTs). Whilst community broadband initiatives have been linked to resilience (Plunkett-Carnegie, 2012; Heesen et al., 2013) digital inclusion and engagement with new digital technologies more broadly, have not.

- *Connectivity solutions and digital innovations in public services and their contribution to digitization of public services in rural area*

Malecki (2003) points that "the concept of universal service is extended to encompass broadband connections, rural areas will need to demonstrate that they have adequate demand for digital communications", competing with urban areas. Broadband brings Internet and facilitate interaction among entreprenuers local and remote, connecting beyond communication in global economic chains the community. The emergence of modern type of bussines will keep and even attract youth in the rural community, optimist scenario to fill the barriers raised by the shortages of human capital.

The tremendous importance of overcoming the rural digital divide, solved with the state intervention, in emerging countries is illustrated by Shenglin et.al. (2017) with China's "Villages Connected" Programme. This Programme has a result "all villages now have some form or another of broadband internet access such as fixed, mobile or satellite".

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2. Romania's development of the broadband infrastructure

- *Romania's general Performance in transition towards Digital Economy and Society*

Countries such as Romania, which could leapfrog generations of networking technology and roll out fiber networks that support high speeds. *(*ITU 2017/I, p.112, see details in Annex1. Table B.)

The Digital Economy and Society Index (DESI, 2017), "Romania ranks 28th in DESI 2017. Romanians benefit from coverage of fast broadband connections in urban areas, which translates into the second highest share of subscriptions in the EU. The take-up of mobile broadband is also accelerating. However, the rate of digitization of the economy, including for public services, and the levels of digital skills are still low."

"Digital Public Services: Romania made significant progress in the availability of Open Data but the supply and use of e-Government services remain low." (DESI, 2017)

Europe's Digital Progress Report (EDPR, 2017, p.8) "In the Digital Public Services dimension, Romania's performance is below the EU average but with some progress. Romania has advanced mainly on the supply side by increasing the number of services which can be completed online and by automatically pre-filling forms for citizens."

Europe's Digital Progress Report – Telecom chapter (EDPR, 2017) "Romania is slowly progressing in terms of connectivity. The Romanian market is characterized by infrastructure-based competition, providing high-speed connections at affordable prices for the benefit of end-users in urban areas. However, high quality services are not available in a significant part of rural areas. In areas of market failure, European structural and investment funds remain the main drivers for the deployment of **next generation** network (NGN) infrastructure."

- *National Policy framework*

"The National Strategy for the Romanian Digital Agenda 2020 (approved by Government Decision nr. 245/7 April 2015) illustrates the government efforts in this regard. Special emphasis is placed on broadband development in rural and disadvantaged areas." *(*ITU 2017/II, p.152, see details in Annex1. Table C)

The 2020 Digital Agenda assumes among the 4 main actions domains the e-Government in the first domain (e-Governance, Interoperability, Cyber Security, Cloud Computing and Social Media - an area that aims to increase efficiency and reduce the costs of the public sector in Romania by modernizing the administration) and Broadband and services for digital infrastructure in the third domain (Broadband and digital infrastructure services - an area aimed at ensuring access to ICT and Internet equipment, increasing digital literacy).

In line with European targets, Romania aims at achieving 100 per cent households with fixed-broadband coverage by 2020, 80 per cent households with over 30 Mbit/s broadband coverage and 45 per cent households with over 100 Mbit/s coverage." *(*ITU 2017/II, p.152, see details in Annex1. Table C).

- *National methodology to classify the broadband infrastructure and conceptual terminology*

The report of the World Bank (2015) has an objective the MSI support for operationalizing the **National Plan regarding the infrastructure for new generation access and new generation networks (NGA & NGN),** approved in June 2015 through the HG 414**.** The scope of this investment plan is to develop the network distribution (backhaul) and to develop the transport network (backbone) already existent according to the new generation standards with ultra-fast NGA connections (figure 1).

The National Plan regarding the infrastructure for NGA&NGN uses a terminology and typologies based on the European Commission framework described by the studies:

- Study on Broadband and Infrastructure Mapping (2014)
- Guide to High-Speed Broadband Investment, Version 1.1 (2014).

The methodology uses geospatial analysis of the socio-economic at village level conditions in relation with the communication market in view to prioritize the zones eligible for the stat interventions in NGA&NGN.

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- "**Backbone Network**" means large-capacity high-capacity networks with a national coverage area with high reliability and low latency and high resilience;
- "**Backhaul Network**" /"**the connection point Backbone**" means the connection between Backbone and the local access points of the distribution network; Backhaul operators represent an intermediate link between the backbone and the local loop. Their networks extend the services provided by backbone operators to areas that are not covered, but are of interest to local loop operators.
- **Local Broadband Access Point** (PLABL) are technical spaces in buildings and / or separate buildings and related technical and utilities. Each administrative-territorial unit (LAU2) may have PLABL;
- **the distribution network** is the functional assembly of the transport elements and the associated terminal equipment, which is located in the perimeter of the white areas and is located between the backbone networks and the local access networks In the area of intervention of this project, the distribution network has different topologies in function the geographic location of users and the location conditions of the physical elements of the distribution network;
- "**local loop (last mile)**" means the physical circuit or its equivalent linking the client's premises to the distribution network's physical distribution network; (Ro-NET Project Presentation, p. 8).

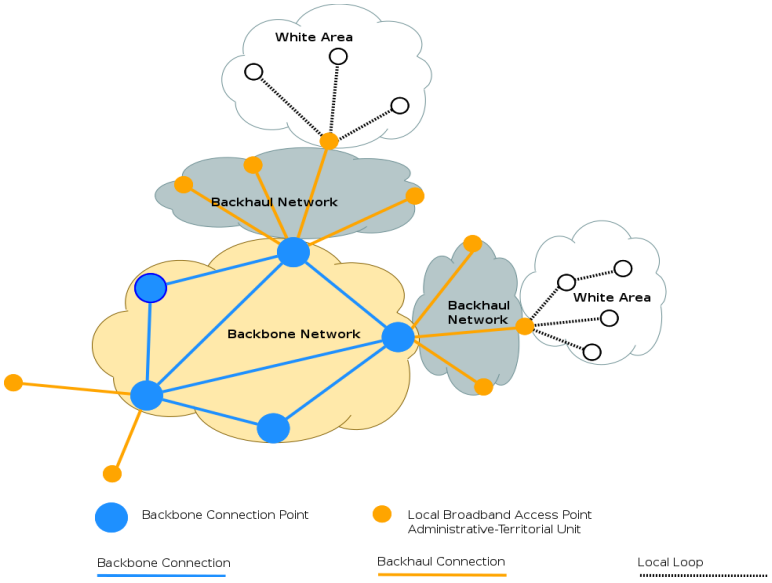

Fig. 1. The indicative broadband infrastructure used model in Ro-Net program

Source: Ro-NET Project Documentation, Despre RoNET, p.8
available at https://www.comunicatii.gov.ro/proiecte-in-implementare/proiectul-ro-net/

- *Typology of broadband solutions adopted in Romania*

In Romania, the "official" broadband infrastructure includes in its definition both typologies: mobile service and fixed services. **Mobile-cellular and mobile-broadband** penetration "are high and close to the European average and prices for both services are very affordable", with a good population coverage in a relatively good market diversity (there are 4 mobile operators on the market)". (ITU 2017/II, p.152) **Fixed services**, are the traditional solution but with high quality/complexity of the activities allowed "is relatively low compared to the European average and neighboring countries. Romania's national broadband plan identifies several reasons for this: the late market liberalization (2003) and launch of DSL services (2005), limited use of personal computers, high mobile-broadband take-up and low incomes, especially in rural areas." (ITU 2017/II, p.152)

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- *Romania's level of development and perspective of the broadband infrastructure*

The National Authority for Administration and Regulation in Communications (ANCOM) conducted an inventory of electronic communications networks in 2015. Were identified areas which at the end of December 2014 did not have a local loop and / or a backhaul network at a speed of 30 Mbps or over and were not involved in broadband projects funded by public funds (by MADR, Measure 322, or by MSI through the Ro-NET project). (World Bank 2015, p15) see table

According to ANCOM.v1 (2015) study, at 31 December 2014, in Romania, from the total of 13.755 villages /neighborhoods (SIRUTA units) from urban and rural zones, were registered the following broadband infrastructure state of development status:

- there were 6.457 villages (47%) without local loop (last mile) networks for broadband communications at speeds of 30 Mbps or above and not involved in broadband projects funded by public funds;
- 6.610 villages (48%) without backhaul connections for broadband communications at 30 Mbps or above and not involved in public broadband projects (World Bank, 2015, p.16)

World Bank (2015) study makes a synthesis of villages and LAU2 by priority of broadband investment by the main National Programs, from which we present only the rural selection (Table 1).

Table 1. Villages and LAU2 by priority of broadband investment by the main National Programs

	Candidate for support from MSI (Ro-NET)	Members in a GAL or GALP Measure 322 MDRAP	Total
At Villages (SIRUTA units) level			
Rural	4546	7827	12373
Support for fixed broadband deployment & demand boosting in **white villages** in **white communities**	68	59	127
Support only for the broadband infrastructure development	175	436	611
Support for broadband infrastructure development & demand stimulation	309	598	907
Demand stimulation (only)	1113	1824	2937
No state intervention	2881	4910	7791
At the level of local administrative unit (LAU2/SIRSUP)			
Rural	995	1866	2861
Support for fixed broadband deployment & demand boosting in white villages in white communities	9	10	19
Support only for the broadband infrastructure development	35	70	105
Support for broadband infrastructure development & demand stimulation	119	259	378
Demand stimulation (only)	376	680	1056
No state intervention	456	847	1303

Source: selection from World Bank (2015, p.73) World Bank calculations 2015. Local Action groups (GALs) and Grupuri de Acţiune Locală pentru Pescuit (GALPs) at the end of 2014, MADR – Ministry of Regional Development and Public Administration. Note: http://madr.ro/docs/dezvoltare-rurala/rndr/buletine-tematice/PT30.pdf

The technological characteristics follows the European Commission terminology as well as the concepts used by World Bank and MDRAP, with reference to the following definitions:

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- **'White zones NGN'** refers to SIRUTA villages in rural and urban areas of Romania that do not have either local loop or backhaul broadband connections with a download speed of 30 Mbps or above and are not involved in broadband projects funded by public funds in progress (either MADR or MSI). NGN white areas refers to the 2020 target of 80% coverage of broadband households at a speed of 30 Mbps or above set by the National NGN Infrastructure Development Plan;
- „**NGN white areas** and **'white' areas (without networks and without operators)** with basic broadband infrastructure. As defined by the European Commission, typical "white" areas refer to areas where broadband infrastructure does not exist and is unlikely to be implemented in the near future. By contrast, in some 'NGN' white areas, there is likely to be some infrastructure, but of a quality inferior to what is needed to achieve the Digital Agenda for Europe 2020 development goals." (World Bank, 2015)
- **Project RO-NET** is a major project (over 85.5 million Euro) initiated by the Communication Ministry since 2016 and is funded as Sectorial Operational Program "Increasing Economic Competitiveness" "Investing for Your Future!" "**RO - NET** Building a National Broadband Infrastructure in Disadvantaged Areas by Using Structural Funds" - a project co-financed by the European Regional Development Fund.

Vasilache (2017) cites the MIC Communicate from 6th October 2017 as response to **HotNews.ro** that the level of RO-NET implementation is:

- in October 2017 there **were finalized high speed broadband implementation in 361 localities** from the total of 783 marginalized localities targeted. MCSI has completed the reception in the territory, according to the provisions of HG 273/1994 (modified by HG 343/2017) and HG 51/1996 for a number of 150 localities.
- There are no financial corrections applied to the RO-NET project. In relation to the commitments assumed by the EC, the project runs according to the timetable approved by the project phase, the implementation of this project being eligible for the financial year 2014-2020.
- So far 62,639 thousand lei have been paid from the European Regional Development Fund (ERDF) and 30,180 thousand lei from the state budget.
- The expected completion deadline for the RO-NET project is the end of August 2018."

These recent assessments of the high speed broadband penetration into territory do not take in consideration the penetration of digital competences and the Internet increasing using.
As we mention before, we focus on the high human capital employee into the – Act. 84 Public administration and defense; compulsory social security, containing on division, as a proxy for the public administration human resource involved in e governing digital services providing.

3. E-Government services and public administration consolidation in Romania

Another important target in *Digital Agenda 2020* is that in 2020 at least 35% from all State Members citizens should use the e-Government systems. On this background the **use of e-Government services remains the lowest in the EU**. The official data of Eurostat emphasize the precarity of e-government in Romania in the areas where individuals are living in sparsely populated area (less than 100 inhabitants/Km²). Example given, related to the user satisfaction about e-government websites, in 2013, only 1% of individuals getting satisfaction on the ease of using services on websites, compared to 27% of individuals in EU average.

Europe's Digital Progress Report (EDPR, 2017, p.8 "A series of measures taken by the Romanian Government targeted the **reinforcement of governance and coordination of the implementation of e-government solutions.** The position of coordinator of information technology, coordinated by a Secretary of State, was established. In addition an innovative initiative (GOVITHUB programme http://ithub.gov.ro/) *managed to attract a high number of ICT experts to improve the quality of the public administration and open an entire*

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innovation, digital and start-up ecosystem. **The national administration IT system is fragmented**, adding to the administrative burden for citizens and businesses. In the current competitive environment, **Romanian public administrations have difficulties in attracting and retaining ICT specialists but programs like GovITHub have shown that public sector innovation is possible and ICT specialists can be found."**

Strategy for Strengthening Public Administration 2014-2020 states as:
General Objective III: De-bureaucratization and Simplification for Citizens, Business and Administration
Specific objective III.1: Reducing bureaucracy for citizens Analyzing needs and objectives in terms of simplifying and rationalizing administrative procedures for citizens

This strategic approach requires, as a first step, to identify and analyze the real needs of public, simplifying and rationalizing the administrative procedures applicable to citizens, including a series of concrete measures relating to:

- **inventory of areas of activity** with major impact on citizens, with an emphasis on the main "life events". In order to highlight the main "life events", ministries and other competent central authorities will analyze, based on a methodology agreed by the National Committee for Coordination of Strategy Implementation and in line with the provisions of the National Digital Agenda for Romania, at least the following areas: persons and civil status documents, vehicle registration***, labor and social benefits***, health, education, payment of taxes and dues, housing and their collateral aspects etc., p.54.

The Revenue Administration Modernization Project RAMP (P130202) (91 million dollars based on a loan) has a slower than expected implementation, executed only 23.5% only for consultancy from 2013 until 2018, with a dead line in 31 March 2021. World Bank (2018), states that RAMP has managed to improve ANAF's business processes and provide **training to over 500 managers** but failed to centralize its tax payer information and introduce a sophisticated risk analysis system to support anti-fraud efforts. Finally, regardless the RAMP project evolution, ANAF needs to "upgrade its mission critical IT systems including urgently addressing IT **maintenance, licensing, hardware needs, data security and staffing issues"**. (http://projects.worldbank.org/P130202/romania-tax-modernization-project?lang=en)

In 30 October 2017, through the Government Emergency Ordinance 77/2017, was established the National Centre for Financial Information NCFI *(a structure without legal personality organized at the level of general management by reorganizing the General Directorate of Information Technology and taking over the activity in the field of information and communication technology, as well as the number of posts and personnel related to this activity from the central office of the National Agency for Fiscal Administration, from the General Tax Administration, from the National Agency for Public Procurement and from the National Commission for Prognosis.).* NCFI's mission is to implement **a Unique Management System for Information and Communication Technology Issues at the Public Finance System Managed by the Ministry of Public Finance and its subordinate units.** The former Finance Minister, Ionut Misa (2017) had a press declaration mentioning that the Unique fiscal system has to join together, in a unique vision the whole information from 322 different data bases (from different programs).

- ***Human capital from Public administration***

Employees are the main asset of public organizations. As a whole, the weight of the human capital employed in public administration, in 2016, in Romania represented 14.1% of total persons with tertiary education (ISCED) from 25 to 64 years compared to 9,5% of total employment in EU average. On the other side, in same year, Romania recorded only 5.1% from total employment in knowledge-intensive services compared to 7% from total employment in knowledge-intensive services in EU average. Regarding the level of development of e-

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government, we observe that Romania needs more scientists and engineers in public administration, they representing 3.1% from total employment in this area; the gap is 1.6 percentage points to reach the level of E.U.28 scientists and engineers in public administration (from 25 to 65 years) in 2016. Another relevant indicator for the lack of infrastructure development of digital public services across the country is the number of technicians and associate professionals. In the Figure 2 we can observe the occupations distribution profile compared to E.U.28, the underrepresentation of technicians detrimental to professionals and other occupations.

A digital infrastructure for e-government needs engineers, scientists and technicians to be developed, maintained or to create and to sustain digital innovative public services. The statistical data highlight a distribution of human resources related to the level of actual public services development: insufficient institutional development which is not able to offer to all citizens a qualitative public service.

Employees from public services in the perspective of innovative digital services need to think beyond legislation, to be open to experimentations in order to achieve desired policy outcomes. (European Commission, 2017) To produce public value the management should know how to use better its employees, their capabilities, their professional and soft skills in an organizational environment appropriate to innovative digital public services, ready to „anticipate societal challenges and address them proactively in order to reduce shocks for citizens and business." (European Commission, 2017)

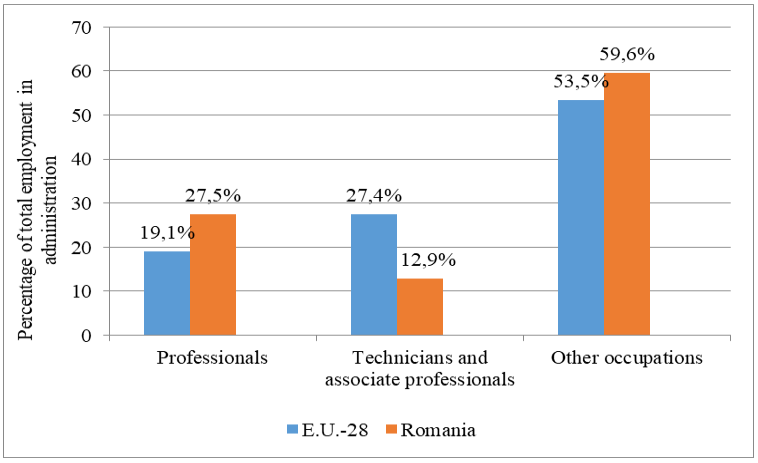

Fig.2. Employees distribution in Romanian public administration

Source: Eurostat data ([htec_emp_nisco2]), authors representation

The importance of specialized human capital is reflected by the continuous monitoring the indicator: Share of the public-sector staff with basic digital competences from all public staff in the central public administration (M&E Manual, 2017), action in the Ministry of Regional Development and Public Administration MDARAP responsibility according to the 2020 Digital Agenda.

In this paper we analyze the spatial challenges related to modernization of public services, using the spatial human capital development as a proxy for institutional development and the broadband investment prioritization expansion. Gatman (2011) points that e-Government success in Romania is conditioned by equally important and complementary three dimensions: financial (as a prerequisite for technology – our comment), human resources and policy. We use data for the **High human capital, tertiary salaried persons with activities in "**Public administration and defense; compulsory social security" coded as division 84 /ISIC Rev.4 by LAU2 level (in short

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Act 84). This is the highest granularity in terms of statistics both in economic activity and space description, allow us to apply lattice data model and explore it with ESDA spatial analysis tools.

4. Data, indicators and feature layers

Our main data is the indicator **High human capital – total and tertiary employees by sex, age and level of education** from Act 84, at NUTS 5 level /LAU 2 level using Population Census Data 2011 (RPL 2011) micro data provided by INS. Following the spatial analysis we create a **Feature Layer 1** which describes the clusters HH and LL of this population.

We consider useful to comment the high complexity and huge diversity of the activities included under the statistic umbrella of Act 84. Annex 1 Table A illustrate the large spectrum of activities, including: Administration of the State and the economic and social policy of the community, Provision of services to the community as a whole and compulsory social security activities. In theoretical terms, the public services should implement the economic and social policy of tech community through **general activities** (focused on budget administration, tax collection, planning and statistical services), **activities to increase personal well-being** (health, education, culture, sport, recreation, environment, housing, social services) and **Regulation of and contribution to more efficient operation of businesses** (public administration and regulation, including subsidy allocation, administration of R&D policies and associated funds to improve economic performance, administration of general labor affairs, implementation of regional development policy measures etc.). These economic activities are structured in mutually exclusive categories; each of these categories reflects continuous needs for each local community, with more or less services, according to its level of development. Urban areas presents lager services pallet while rural areas presents diminished access to few services, while the needs are increasing.

Among the important advantages of the GIS analysis are the multilevel analyses overlapping different standardized maps. While the best image of Romania's broadband infrastructure is public in Arc GIS Cloud other 5 **Feature layers,** owned by World Bank, at the highest granularity – village we use the following:

Feature Layer 2: Romania Broadband Investment Prioritization regarding broadband and Next Generation Networks (NGN) investment interventions. (created in January 11, 2017) with Credit to National Agency of Cadaster and Land Registration, National Authority for Management and Regulation in Communications, Ministry of Information Technology and Communications. This Feature Layer "represents the degree of priority investments in broadband depending on the areas correlation with the development needs and economic potential of the villages.

Feature Layer 3: Romania Marginalized Rural Areas regarding broadband and Next Generation Networks (NGN) investment interventions. (created in January 11th, 2017) with Credit to National Agency of Cadaster and Land Registration, National Institute of Statistics, Census of Population and Dwellings 2011. This Feature Layer represents "the proportion of population living in marginalized rural areas disadvantaged in human capital, formal employment, and housing conditions."

Feature Layer 4: Marginalized areas are compact territories within localities (neighborhoods, villages, hamlets, etc.) where extremely poor people, such as ghettos or slums. Thus, the proportion of the population living in marginalized areas offers an extremely unacceptable multidimensional property that tends to become chronic and transmitted from one generation to the next. At national level, 6.2% of the rural population, 5.3% of households and 5.2% of households are located in marginalized rural areas. The data used are based on the 2011 Population and Housing Census in two previous World Bank studies (2014 and 2015).

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Feature Layer 5: Marginal rural areas, according to World Bank (2015b), are scenes with severe deficiencies that bring together people who have attained lower secondary education, earn their livelihood in the informal sector (especially agriculture) and live in precarious conditions even for the rural context that generally has low access to infrastructure and basic utilities (living in overcrowded housing and / or without access to running water or electricity). These marginalized areas are recognized as 'problematic', especially due to the combination of a low income household's concentration, low levels of education and relevant skills in the labor market, a preponderance of single mothers, high numbers of children and a high rate of minor offenses. Even more than other rural communities, marginalized areas have poor physical accessibility, unpaved roads, inadequate housing, are exposed to environmental risks (floods, landslides, etc.) and their public services are absent or of poor quality.

Feature Layer 6: Marginalized areas (or census sectors) were defined by World Bank (2015c) as those that were disadvantaged in all three respects (i) human capital; (ii) formal employment of the workforce; and (iii) housing conditions. The analysis was carried out at the level of the census sectors.

5. Research Methodology and Model

Krugman, Venables and Fujita (1999) in New Economy of Geography - the production is heterogeneously distributed in space, reflecting the tendency of agglomeration in highly populated locations. The success of local economies is generated by the presence of the new in both tradable and non-marketable sectors. The sectors adopting and using the new and innovation are sectors that generate new jobs in the region / location indirectly and in other sectors. In other words, high human capital agglomerations generate spillover effects called positive externalities. Moretti & Thulin (2013) found that this "multiplier effect is particularly large for jobs with high levels of human capital and for high technology industries". In other words, "the impact on a local labor market of attracting a high-technology employer to a city is three times larger than the impact of attracting a low-technology employer of similar size", (Moretti, Thulin, 2013).

Pelinescu highlighted the human capital as essential factor in „ensuring economic growth expressed as gross domestic product per capita" (Pelinescu, 2015) "of competitiveness in knowledge society" (Pelinescu, 2016) which strongly influences the innovation level of knowledge society as well as their efficiency". (Pelinescu et.al, 2014) Stroe & Cojanu (2017) warns for Romania the phenomenon of increasing the in work poverty importance, fact that put in difficulty the functionality of innovation as the engine of the modern economy stress in the absence of an adequate wage policy, able to "restoring the wage-productivity correlations destroyed during the period of transition" (Pelinescu et. al., 2011).

Digital transformation for public administration reason its transtition from the base economy public administration supply into location services consumed local. In this perspective, this sector should act as non-base sector, but providing best environment for base sectors, sectors that produce for external location consumption, in global competitive parameters. This theoretical model, is adaptated, kipping in mind the specific of the Romanian country in regard the profile, structure and spatial distribution of the five feature layers, equivalent of a multivariate visual analyse tool. These layers intersect in spatial profile the: public administration's tertiary employees, the Digital Infrastructure Public Investment Priority (feature layers 2-5) based on poverty profile at the village scale level. An important share of the public services represents activities of a governmental nature, normally carried out by the public administration, coded in NACE Rev.2 statistics as Section: O - Public administration and defense; compulsory social security, containing on division Act. 84 with the same name. This section is divided into the following Groups: 841 - *Administration of the State and the economic and social policy of the community*; 842 - *Provision of services to the community as a whole* and 843 - *Compulsory social security activities.*

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In Annex 1 are presented results of the model we applied: ESDA – LISA analysis for spatial distribution of the high human capital using the indicator employees with tertiary education in Act 84. We identified the spatial clusters/ agglomerations identification HH and LL type focus on at NUTS 5 level /LAU 2 level using RPL 2011 micro data provided by INS.
Maps overlay in view to identify spatial patterns in Arc Gis Desktop.

6. Research results

The spatial analysis (Anselin 2003, 2005, 2016) reveals for Romania a pronounced agglomeration tendency of high skilled employees from Act.26 at NUTS 5/LAU2 level, synthetically presented in Figure 3. Under the Null Hypothesis NH: complete spatial randomness (CSR), in condition Queen contiguity spatial weight rule for weighting of 1st order by SIRUTA for a number of permutation = 999, p value 0.05 with a 90% confidence level we reject NH and make the decision of clustering tendency, there is no spatial randomness. Applying Univariate Local Moran's, calculated in GeoDa 1.10.0.8 we obtain the following results: the Moran's I is 0.0094, higher than theoretical value of -0.0003, with a pseudo p value 0.05, sd of 0.0047, z-value 2.0996>1.65.

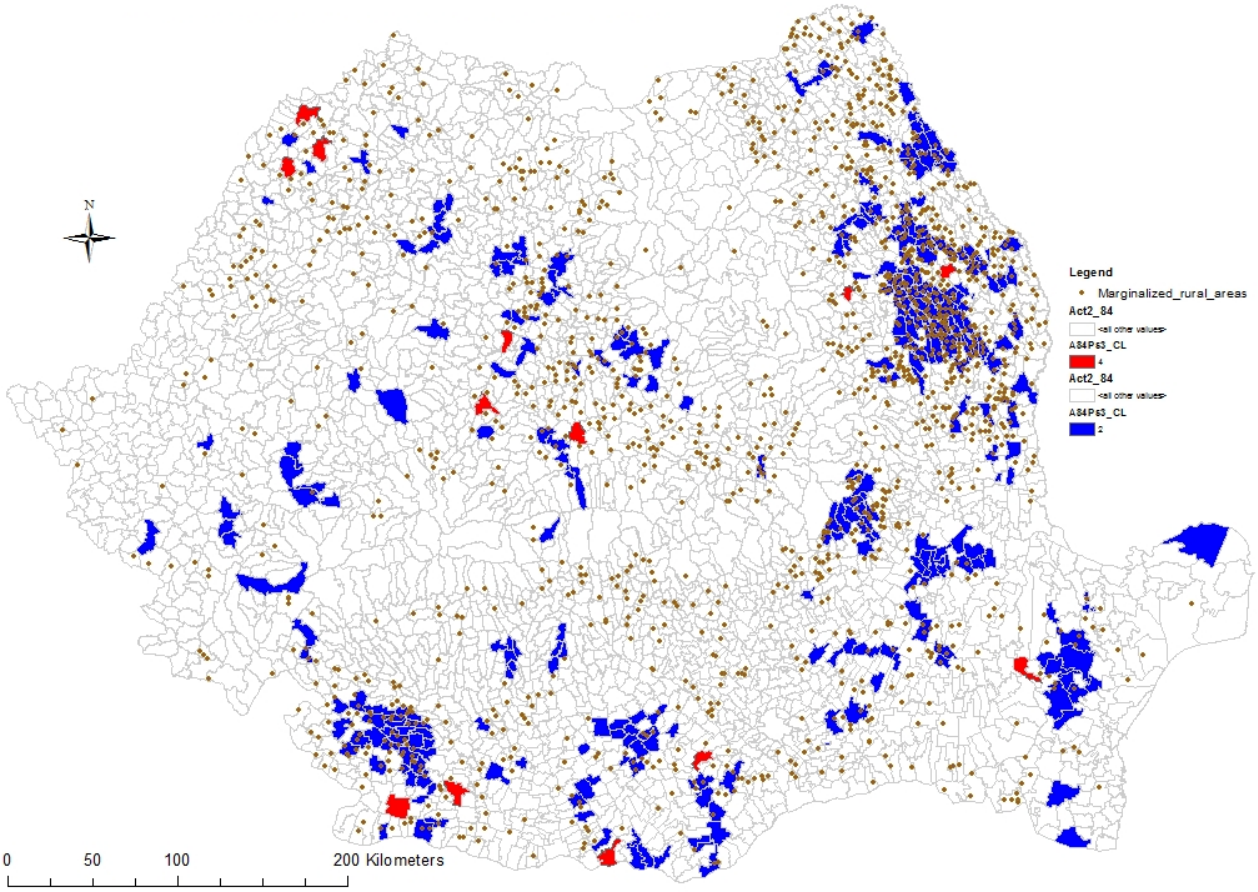

Fig. 3. Map1. The HH and LL clusters for the tertiary employees in Act 84 in 2011 (RPL data INS) and Marginalized rural areas (World Bank 2017 Feature Layer, Territorial Observatory, MDRAP) at Lau2 level and villages

Source: Map realized by authors in Arc GIS, using data from Arc Cloud, NUTS5/LAU2 shape file ESRI Romania

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The result of spatial analysis for all 3189 LAU2, indicates a spatial clusters tendency for both employees and high human capital (Figure 3 Map 1), registering positive spatial autocorrelation with agglomeration tendency in two types of clusters: Innovative hubs (HH locations with high level of number of employees having in neighborhood locations with high level of employees, counting 13 locations) and Black holes (LL locations with low level of number of employees having in neighborhood locations with low level of employees, counting 294 locations).

Maps that illustrates the spatial correlation between LL high human capital cluster and marginalized villages and broadband expansion priorities, in the MCI framework.

Table 2 (presents detailed statistics for Figure 3) emphasize as the main gap between rural and urban areas the agglomeration of low skilled employed person in public administration in rural area as well as high concentration of youth and aged employees, compared to urban areas. The share of rural population in Romania is around 44.8% but the coverage in public administration employees is only 25%.

Table 2: General statistics regarding employment in public administration in rural, urban and average LAU2 units in 2011 by sex, level of education and group age

number of persons

			rural						urban						total						
sex	level of education	age group [years]	Mean	Std. Error of Mean	Sum	Max	Std. Deviation	Variance	Mean	Std. Error of Mean	Sum	Max	Std. Deviation	Variance	Mean	Std. Error of Mean	Sum	Max	Std. Deviation	Variance	Share Sum rural/ Sum total
total	total	total	**38,04**	,669	**109368**	532	35,893	1288,334	**1064,28**	254,190	**334183**	76037	4504,250	20288263,824	**139,09**	25,579	**443551**	76037	1444,505	2086593,630	25
males	total	total	**22,93**	,404	**65929**	309	21,680	470,022	**593,13**	129,076	**186243**	38185	2287,237	5231454,657	**79,08**	13,048	**252172**	38185	736,832	542921,517	26
females	total	total	**15,11**	,291	**43439**	237	15,621	244,002	**471,15**	125,393	**147940**	37852	2221,978	4937185,141	**60,01**	12,564	**191379**	37852	709,523	503423,109	23
total	low	total	**4,33**	,168	**12439**	306	8,995	80,918	**34,78**	8,193	**10920**	2524	145,173	21075,171	**7,32**	,835	**23359**	2524	47,164	2224,457	53
total	medium	total	**18,38**	,286	**52837**	163	15,313	234,500	**346,88**	73,510	**108919**	21991	1302,602	1696772,735	**50,72**	7,437	**161756**	21991	419,981	176383,771	33
total	high	total	**15,34**	,368	**44092**	392	19,750	390,051	**682,62**	172,808	**214344**	51522	3062,158	9376814,497	**81,04**	17,355	**258436**	51522	980,057	960512,218	17
total	total	15-24	**1,80**	,045	**5168**	32	2,406	5,789	**35,09**	8,011	**11019**	2404	141,958	20151,982	**5,08**	,808	**16187**	2404	45,631	2082,188	32
total	total	25-54	**31,93**	,592	**91800**	491	31,718	1006,036	**931,40**	221,391	**292459**	66109	3923,053	15390343,582	**120,50**	22,285	**384259**	66109	1258,484	1583781,215	24
total	total	55+	**4,31**	,070	**12400**	59	3,735	13,953	**97,79**	24,885	**30705**	7524	440,955	194441,529	**13,52**	2,497	**43105**	7524	140,992	19878,821	29
males	low	15-24	**,15**	,016	**426**	23	,882	,778	**,74**	,130	**232**	35	2,295	5,267	**,21**	,020	**658**	35	1,118	1,249	65
	low	25-54	**1,56**	,086	**4484**	184	4,622	21,365	**9,70**	1,992	**3046**	613	35,306	1246,504	**2,36**	,215	**7530**	613	12,146	147,528	60
	low	55+	**,45**	,022	**1302**	33	1,168	1,365	**3,14**	,709	**986**	217	12,560	157,763	**,72**	,074	**2288**	217	4,167	17,361	57
	medium	15-24	**,71**	,023	**2034**	24	1,242	1,543	**12,24**	2,152	**3842**	606	38,125	1453,510	**1,84**	,221	**5876**	606	12,486	155,899	35
	medium	25-54	**10,50**	,181	**30189**	108	9,684	93,775	**193,24**	35,973	**60678**	10526	637,437	406325,762	**28,49**	3,670	**90867**	10526	207,227	42943,180	33
	medium	55+	**1,44**	,027	**4153**	14	1,454	2,115	**19,98**	4,631	**6275**	1407	82,061	6733,933	**3,27**	,466	**10428**	1407	26,336	693,569	40
	high	15-24	**,31**	,012	**890**	6	,666	,444	**9,30**	2,410	**2921**	728	42,699	1823,183	**1,20**	,242	**3811**	728	13,660	186,583	23
	high	25-54	**6,80**	,181	**19551**	199	9,686	93,817	**311,57**	73,592	**97833**	21704	1304,059	1700568,648	**36,81**	7,414	**117384**	21704	418,683	175295,362	17
	high	55+	**1,01**	,024	**2900**	14	1,281	1,640	**33,22**	7,928	**10430**	2349	140,491	19737,787	**4,18**	,798	**13330**	2349	45,072	2031,460	22
females	low	15-24	**,09**	,007	**255**	7	,388	,150	**,72**	,195	**225**	58	3,454	11,929	**,15**	,021	**480**	58	1,158	1,342	53
	low	25-54	**1,68**	,051	**4833**	53	2,733	7,471	**16,12**	4,186	**5062**	1289	74,168	5500,899	**3,10**	,421	**9895**	1289	23,777	565,332	49
	low	55+	**,40**	,016	**1139**	17	,842	,710	**4,36**	1,043	**1369**	312	18,481	341,541	**,79**	,106	**2508**	312	5,964	35,568	45
	medium	15-24	**,23**	,010	**652**	4	,513	,263	**4,23**	,876	**1327**	260	15,531	241,217	**,62**	,089	**1979**	260	5,034	25,340	33
	medium	25-54	**4,86**	,093	**13972**	60	4,977	24,771	**99,78**	25,590	**31330**	7789	453,451	205618,033	**14,21**	2,567	**45302**	7789	144,948	21010,040	31
	medium	55+	**,64**	,018	**1837**	9	,944	,890	**17,41**	4,635	**5467**	1403	82,130	6745,310	**2,29**	,464	**7304**	1403	26,231	688,040	25
	high	15-24	**,32**	,012	**911**	8	,660	,435	**7,87**	2,354	**2472**	717	41,719	1740,463	**1,06**	,235	**3383**	717	13,279	176,341	27
	high	25-54	**6,53**	,168	**18771**	174	8,992	80,862	**300,99**	80,677	**94510**	24188	1429,592	2043734,422	**35,52**	8,084	**113281**	24188	456,538	208427,264	17
	high	55+	**,37**	,014	**1069**	9	,734	,539	**19,68**	6,041	**6178**	1836	107,041	11457,709	**2,27**	,603	**7247**	1836	34,037	1158,499	15
																					%
share males			**60,7**	,2230		100,0	11,9550	142,923	**59,9**	,4369		79,2	7,7421	59,940	**60,6**	,2056		100,0	11,6094	134,778	
share females			**39,1**	,2194		76,2	11,7652	138,419	**39,7**	,4127		59,5	7,3131	53,481	**39,2**	,2020		76,2	11,4049	130,071	
	share low level education		**11,4**	,1817		84,6	9,7440	94,945	**6,4**	,2871		45,1	5,0874	25,882	**10,9**	,1683		84,6	9,5030	90,308	
	share medium level education		**49,9**	,2427		100,0	13,0133	169,347	**41,4**	,4956		68,4	8,7824	77,130	**49,1**	,2285		100,0	12,9055	166,553	
	share high level education		**38,6**	,2563		100,0	13,7406	188,804	**51,8**	,6080		77,8	10,7734	116,065	**39,9**	,2487		100,0	14,0441	197,238	
		share youth	**4,6**	,0902		46,2	4,8355	23,382	**4,1**	,1394		29,9	2,4693	6,098	**4,5**	,0825		46,2	4,6585	21,702	
		share adult	**82,3**	,1816		100,0	9,7372	94,813	**86,0**	,3570		97,3	6,3268	40,029	**82,7**	,1685		100,0	9,5180	90,592	
		share aged	**12,9**	,1556		60,0	8,3421	69,590	**9,6**	,1964		27,0	3,4800	12,111	**12,5**	,1426		60,0	8,0536	64,861	

number of LAU2 rural 2875, LAu2 urban 314, total LAU2 analysed 3189 min values - 0 share of urabna population: circa 55,20% [66] Share of rural population: circa 44,80%

Source: data calculated by authors using Census Population 2011 micro data provided by INS

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Gasik (2016) founds that is a "greater complexity of managing public projects than of managing projects in other sectors", where "the most complicated public projects management areas are stakeholder management, procurement management, and communications management".

Seri & Zanfei (2013) establishes that there are "complementarities between ICT, human capital and organizational change" are most important.

Our starting point analysis is based on the Seri & Zanfei (2013) conclusion that "ICT alone does not significantly impact on PA (public administration) performance, while it does when combined with human capital and organizational change". On these postulates, based on the Figure 3 and Table 2 looks that Romania, is trapped in a vicious circle. This circle starts from the shortage of high human capital especially in locations with low economico&social performance, locations where is a high demand for public interventions, put at risk the ICT as an essential step towards organizational change of PA.

7. Romania Case study

As a result of overlapping all the Feature layers we present the Figure 4. Map 2 with version A and B and with the Figure 5. Detail 1 Vaslui and surroundings and Figure 6. Detail 2 Mehedinți and surroundings. In Figure 4. Map 2 A. is visible that LL locations with high human capital in public administration are disjoint with the area with market potential, location: Locations with No State intervention in Broadband investment.

In Map 2 B are presented the typologies of Broadband investments by action type, Marginalized rural areas and the LL locations with high human capital in public administration, as follows:

- The Action type "**Support for fixed broadband deployment & demand boosting in white villages in white communities**". This is the ***case of small, declining, isolated, peripheral locations LAU2 with low market potential*** for sure not digital covered at the minimum > = 30Mbps. The Model applied in isolated and marginalized areas cover Western counties mostly, especialy: Poiana Iancului, Buzeștii de Sus, Alba, Ploscos, Hunedoara, Mehedinți (Poroina Mare, Padina, Corlatel), Vrancea, Buzău, Neamț. Also these areas are LL areas with public administration employee's fact that indicates a low access to public administration services;
- The Action type "**Support only for the broadband infrastructure development" This is the case of LAU2** without MADR or Ro-NET projects was identified in 1,111 SIRUTA units (of which only 4 are urban areas), but only 55% (611) of which **are poor or very poor rural areas** that are eligible for support from the state. (World Bank, 2015) In these marginalized areas is possible the support / stimulation for the implementation of high-speed broadband (30+ Mbps) **in at least one village in the commune** in a sustainable manner**.** The spatial distribution is heterogeneously with many dense areas Iași/ Bacău/ Vaslui/ Galați, Botoșani, Vrancea& Buzău, also with dispersed dense areas Satu Mare, Marmureș, Sălaj, Bistrița Năsăud, Hunedoara, Mehedinți, Teleorman, Giurgiu, Centre of Transylvania. This type of action reflects the Model applied especially in eastern marginalized areas, areas which are also with a high probability LL location types by the public administration employees. It is confirmed the low access to public administration services, regardless the high level of needs;
- The Action type "**Support for broadband infrastructure development & demand stimulation".** This is the case of LAU2 locations that have the "need for public intervention to support the development of broadband infrastructure along with demand-side needs are found in 1,512 SIRUTA units (of which only 5 of urban areas). Of these villages, white villages belonging to white communes (127) have a maximum economic potential of medium, so they are all eligible for state support. Other **907 poor or very poor** villages are also eligible for state support. In addition, all other 478 ineligible villages for support in

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broadband deployment can benefit from demand-boosting measures". (World Bank, 2015) There are agglomeration at the counties frontiers: Mehedinți & Dolj, Alba& Hunedoara, Mureș, Vrancea, Neamț. This action model is applied especially in Western marginalized areas, areas of LL type with low level of public administration employees. It is confirmed the low access to public administration services, regardless the high level of needs;

- The Action type "**Demand stimulation (only) - Stimulating the demand for (broadband) Internet services and the use of the Internet"**. This is the case of locations where is increased only the service offer, "in particular by developing services such as e-commerce, e-health, e-education and e-government, in 4,102 villages (131 urban), of which about 40% have medium economic potential to high" (World Bank, 2015). This action model is applied especially in western isolated and some marginalized areas but also in no marginalized areas, at counties frontiers: Bistrița/ Cluj, Nord-Vest Mureș, N-V Alba, Mehedinți, S Vâlcea, N Olt, V Argeș, N Teleorman, Buzău, Vrancea, Iași/ Bacău/ Vaslui/ Galați, Tulcea. In marginalized locations this action is coupled with other action types presented before in neighborhood locations, highly correlated with the presence of LL locations of public administration high capital employees. There are compact areas with this action only, location with good economic potential outside the LL areas!
- The Action type „**No state intervention"** is applied in "black areas the market is expected to be developed without state intervention. If MADR projects support implementation of both backhaul and local loop, the Ro-NET project only finances backhaul implementation with a contract through which a local loop will be developed by private investors in the near future". (World Bank, 2015) These areas that are not included in marginalized areas and are also outside the LL locations.

As a conclusion, we could affirm that Low-Low (LL) High Human Capital Clusters in Public Administration Employment is a good Predictor for Digital Infrastructure Public Investment Priority.

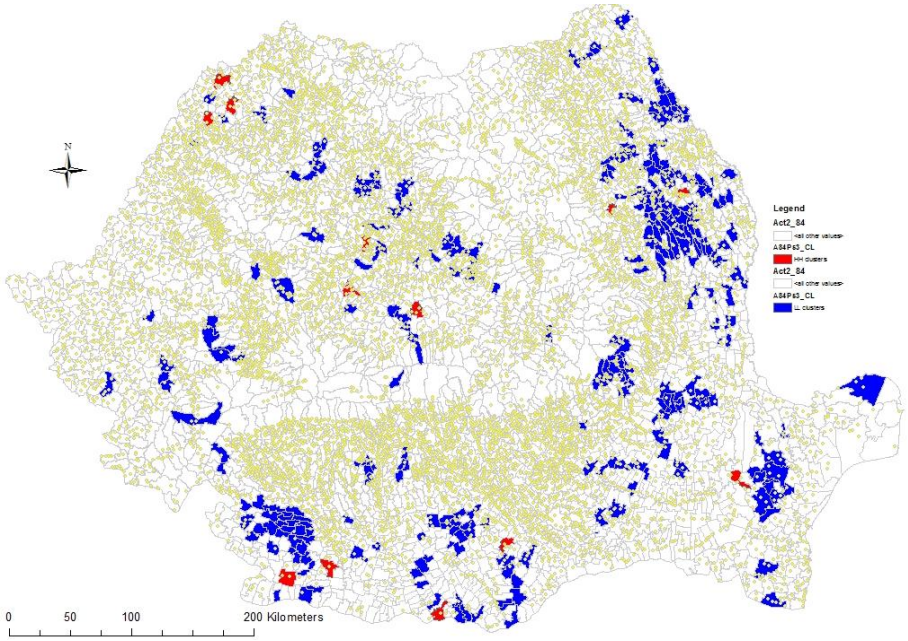

Fig.4. Map 2. The HH and LL clusters for the tertiary employees in public administration in 2011 (RPL data INS) and A: Locations with No State intervention in Broadband investment

Source: Map realized by authors in Arc GIS, using data from Arc Cloud, NUTS5/LAU2 shape file ESRI Romania
Note: (World Bank 2017 Feature Layer, Territorial Observatory, MDRAP) at Lau2 level and villages

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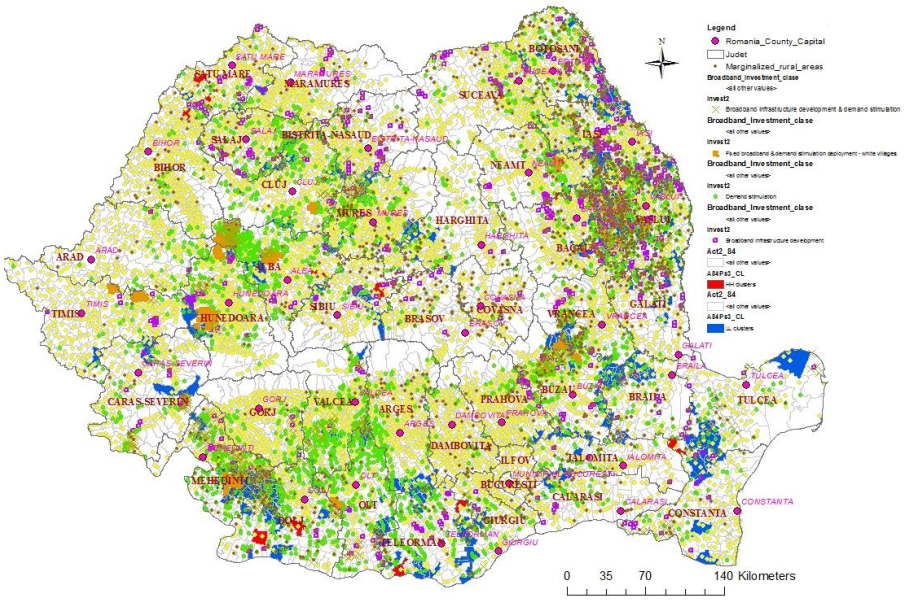

Fig.4. Map 2. The HH and LL clusters for the tertiary employees in public administration in 2011 (RPL data INS) and B: Typologies of Broadband investments and Marginalised rural areas

Source: Map realized by authors in Arc GIS, using data from Arc Cloud, NUTS5/LAU2 shape file ESRI Romania Note: (World Bank 2017 Feature Layer, Territorial Observatory, MDRAP) at Lau2 level and villages

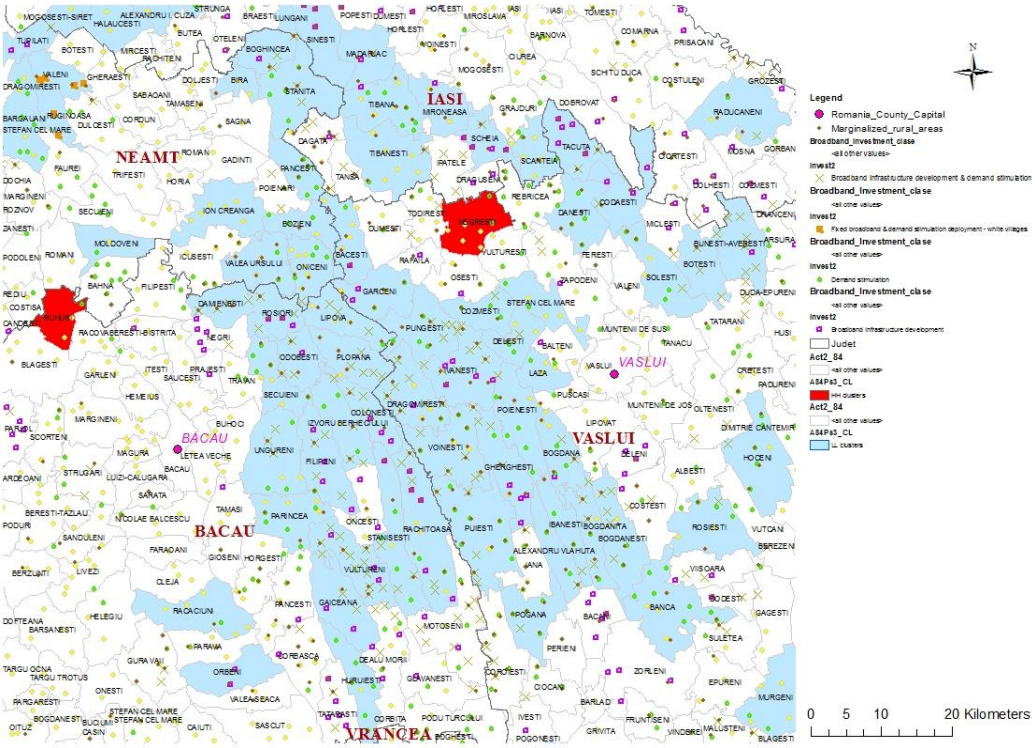

Fig. 5. Detail 1. Vaslui and Surroundings

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Source: Map realized by authors in Arc GIS, using data from Arc Cloud, NUTS5/LAU2 shape file ESRI Romania

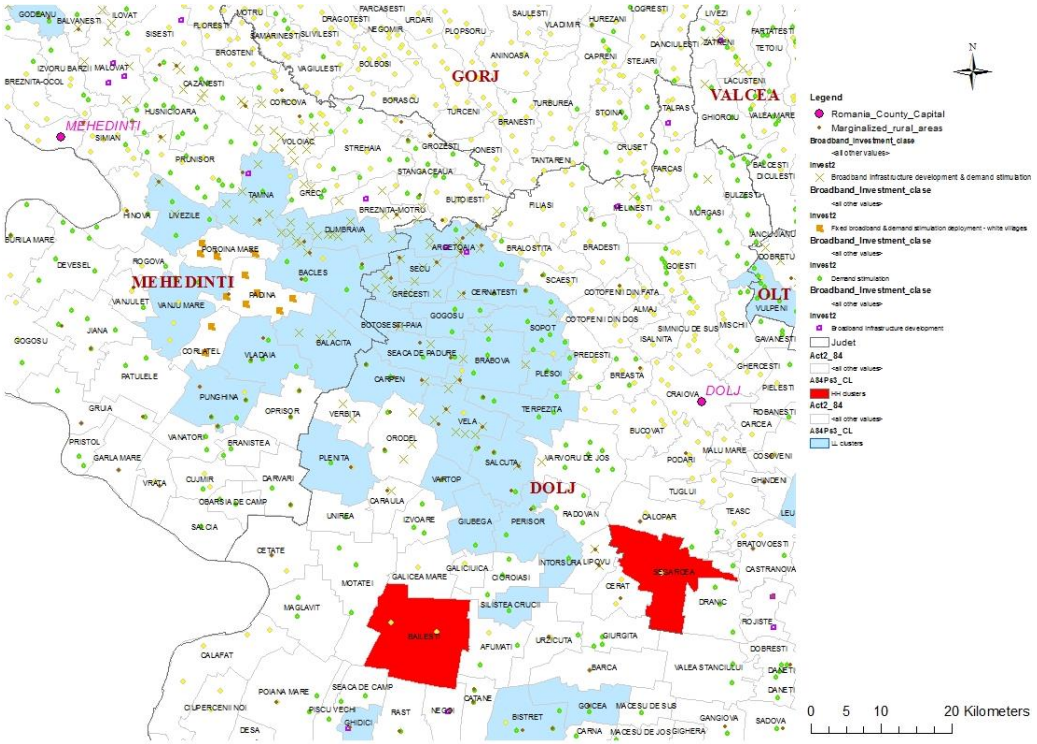

Fig. 6. Detail 2. Mehediți and Surroundings

Source: Map realized by authors in Arc GIS, using data from Arc Cloud, NUTS5/LAU2 shape file ESRI Romania

DiMaggio & Hargittai (2001), arguments to look further the Internet penetration, transformation that induce new dimensions of inequalities – "digital inequality: in equipment, autonomy of use, skill, social support, and the purposes for which the technology is employed". The race to fill the digital gap is a shapeshifter while "the rapidity of organizational as well as technical change means that it is difficult to presume that current patterns of inequality will persist into the future"!

Dunleavy et.al. (2005) iterate as important uncertainities for Digital – Era Governance, among which the "Civil liberties groups critique data warehousing without adequate individual privacy rights, especially when such data is linked to ever more intrinsically personal identifiers, such as biometric data and genetic information".

Conclusions

In Romania, the high human capital in public services is spatially concentrate in couple hubs (see maps – red bullets), especially in urban areas with a broadband infrastructure coverage at the (best) European standards. (Figure 3. Map 1). On opposite side, we can observe the disparities in rural areas related to urban areas concerning the lack of high human capital (blue color shapes) in public administration and a poor broadband infrastructure, as well as an insufficient e-government development. It is visible, too, a wide dispersion of marginalized rural areas,

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where is a poor socio-economic development, a few public services and a weak broadband infrastructure (correlation with socio-economic indicators).

Broad band expansion priorities should be spatially correlated with the absence of high human capital in public administration. There is visible a spatial correlation between the LL clusters and marginalized location as well as low or absent broadband infrastructure coverage. Also, very important, at the county level is visible on the detailed maps the center periphery model, where the center is usually the county residence and the LL clusters are the frontier / boundaries of the counties – we could call them "no man's land". In other words is important to emphasize the broadband infrastructure employment multiplication effect as well as the presence of public administration services towards the population as a growth and development factor for each location.

In the digital innovation context should be relinked the public services with the population in the sense of helping and supporting the citizen not only in relation with the state but in view to solve citizen's individual problems.
Both Digital Agenda 2020 and the Administration strategy are strongly correlated together but are not harmonized with the high human capital policy, even if there are objectives strongly dependent by this category. The digital skills acquisition for the tertiary employees in public administration is a priority. To create and to sustain an innovative digital public services Romania needs to improve its profile distribution of employees' categories: more scientists, engineers and technicians. It's important also, to improve the human resources and the data management in order to implement the policy indicators and to respond proactively to the public.

The high human capital problem is a delicate one. In public administration the high human capital is clustered in a few innovative hubs which in the absence of a functional and interconnected national administration IT system. These objective conditions makes impossible the democratic governance act, especially on the context of regional decentralization. Considering that the human resource is finite, and more and more in deficit (especially by new digital skills profile) a solution could be the development of intelligent public services at distance in a customized way, tailored for the local problems (Brown, 2015).

In marginalized locations and especially in villages/communes where are made investments in broadband there should provide skills acquisition opportunities, correlated with the beneficiaries profile. A large part of these activities need to be managed in a coordinated and synchronic manner with the operationalization of the broad band expansion, by the Labor Ministry in active measures programs.

Not in the last the broadband infrastructure investment and operationalization in a functional manner is an instrument both for inclusion and increasing resilience of the community, mechanism to attract new investment.
Another direction, very important to be researched further in Romania, is the multiplication effect of the broadband infrastructure expansion and new jobs creation next to capital investment returns (multiplication effect) and the innovation potential increasing across the territory, transversal in socio-economic systems.

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Annex 1

Table A. Detailed content of the activities included in Public administration and defence; compulsory social security according to The International Standard Industrial Classification of All Economic Activities ISIC Rev.4 code 84

84 - Public administration and defence; compulsory social security				
	841 - Administration of the State and the economic and social policy of the community			
		8411 - General public administration activities		
			This class includes: - executive and legislative administration of central, regional and local bodies - administration and supervision of fiscal affairs: · operation of taxation schemes · duty/tax collection on goods and tax violation investigation · customs administration - budget implementation and management of public funds and public debt: · raising and receiving of moneys and control of their disbursement - administration of overall (civil) R&D policy and associated funds - administration and operation of overall economic and social planning and statistical services at the various levels of government	This class excludes: - operation of government owned or occupied buildings, see 6810, 6820 - administration of R&D policies intended to increase personal well-being and of associated funds, see 8412 - administration of R&D policies intended to improve economic performance and competitiveness, see 8413 - administration of defense-related R&D policies and of associated funds, see 8422 - operation of government archives, see 9101
		8412 - Regulation of the activities of providing health care, education, cultural services and other social services, excluding social security		
			public administration of programs aimed to increase personal well-being: · health · education · culture · sport · recreation · environment · housing · social services - public administration of R&D policies and associated funds for these areas	This class excludes: - sewage, refuse disposal and remediation activities, see divisions 37, 38, 39 - compulsory social security activities, see 8430 - education activities, see division 85 - human health-related activities, see division 86 - activities of libraries and archives (private, public or government operated), see 9101 - operation of museums and other cultural institutions, see 9102 - sporting or other recreational activities, see division 93
			This class also includes: - sponsoring of recreational and cultural activities - distribution of public grants to artists - administration of potable water supply programs - administration of waste collection and disposal operations - administration of environmental protection programs - administration of housing programs	
		8413 - Regulation of and contribution to more efficient operation of businesses		

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			This class includes: - public administration and regulation, including subsidy allocation, for different economic sectors: · agriculture · land use · energy and mining resources · infrastructure · transport · communication · hotels and tourism · wholesale and retail trade - administration of R&D policies and associated funds to improve economic performance - administration of general labor affairs - implementation of regional development policy measures, e.g. to reduce unemployment	This class excludes: - research and experimental development activities, see division 72
	842 - Provision of services to the community as a whole			
			This class includes: - administration and operation of the ministry of foreign affairs and diplomatic and consular missions stationed abroad or at offices of international organizations - administration, operation and support for information and cultural services intended for distribution beyond national boundaries - aid to foreign countries, whether or not routed through international organizations - provision of military aid to foreign countries - management of foreign trade, international financial and foreign technical affairs	This class excludes: - international disaster or conflict refugee services, see 8890
	843 - Compulsory social security activities			
			funding and administration of government-provided social security programmes:I13 work-accident and unemployment insurance · retirement pensions · programs covering losses of income due to maternity, temporary disablement, widowhood etc.	This class excludes: - non-compulsory social security, see 6530 - provision of welfare services and social work (without accommodation), see 8810, 8890

Source: https://unstats.un.org/unsd/cr/registry/regcs.asp?Cl=27&Lg=1&Co=84

Note: These economic activities are subdivided in a hierarchical, four-level structure of mutually exclusive categories, facilitating data collection, presentation and analysis at detailed levels of the economy in an internationally comparable, standardized way. Source: https://unstats.un.org/unsd/EconStatKB/KnowledgebaseArticle10132.aspx

Table B. ICT ranking and value in 2017 and 2016

	(Global) Rank 2017	Ro IDI 2017	EU 40 IDI 2017	Rank 2016	IDI 2016	EU 40 IDI 2016	d2017-2016	regional Rank 2017 (Europe)	regional Rank 2016 (Europe)
IDI	58/176	6.48	7.5	61/175	6.23	7.34	0.25	35 /40	36/40
access	60	6.98	7.8	60	6.8	7.73	0.18		
use	61	5.59	6.94	66	5.08	6.62	0.51		
skill	60	7.25	8.02	51	7.37	7.97	-0.12		

Source: ITU 2017/I, p84

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Table C. Key indicators for Romania (2016)

Key indicators for Romania (2016)	Romania	Europe	World
Fixed-telephone sub. per 100 inhab.	19.1	37.7	13.6
Mobile-cellular sub. per 100 inhab.	106.4	118	101.5
Fixed-broadband sub. per 100 inhab.	20.7	30.2	12.4
Active mobile-broadband sub. per 100 inhab.	73.7	80.1	52.2
3G coverage (% of population)	99.9	98.5	85
LTE/WiMAX coverage (% of population)	75.2	92.2	66.5
Mobile-cellular prices (% GNI pc)	0.7	1	5.2
Fixed-broadband prices (% GNI pc)	0.9	1.2	13.9
Mobile-broadband prices 500 MB (% GNI pc)	0.2	0.6	3.7
Mobile-broadband prices 1 GB (% GNI pc)	0.5	0.6	6.8
Percentage of households with computer	74	79.6	46.6
Percentage of households with Internet access	72.4	82.5	51.5
Percentage of individuals using the Internet	59.5	77.9	45.9
Int. Internet bandwidth per Internet user (kbit/s)	155.5	178	74.5

Source: ITU 2017/II, p.152

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INNOVATION SECURITY OF CROSS-BORDER INNOVATIVE MILIEU*

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Abstract. Innovative milieu is an elusive networking scheme established within geospatial, socio-economic, institutional, and knowledge types of boundaries that enable the actors involved to excel in particular field(s) of activity. Generally these are high-tech sectors of the economy, the so called smart and creative industries that are highly reliant on human capital, knowledge, and competences. Gradual expansion of interregional and international ties increases the possibility for synergies, fostering network diversification and intra-regional overspecialisation all at the same time. Along with numerous positive externalities, such as avoidance of the cognitive lock-in effect, regional clusters of excellence become dependent on their external counterparts, either within national or international domain. This dependence is caused by utilization of shared science and technology facilities, interdependent production processes, complementary technologies, etc. Unforeseen circumstances, such as temporal economic sanctions and product embargo can affect the sustainability of the innovation activity in the region and create structural holes along the value chain. Regional innovation policy should account for possible threats to the regional as well as national innovation systems. In this paper we examine different scenarios for the development of innovative milieus across borders. The study draws upon cross-border cooperation initiatives of European border regions, featuring brief case study examples for each of the negative development scenarios identified. There are three major types of threats to innovation security of a border region determined: a) disintegration and decay, b) internal asymmetries, c) unilateral integration initiatives. The article concludes with policy recommendations on innovation security strategy for the borderland regions.

Keywords: innovation security; economic security; regional innovation system; cross-border cooperation; border region; borderland; innovation system vulnerability

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JEL Classifications: O30, R10, F5

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1. Introduction

The modern-day regional sustainable development is interlinked with innovation activity being the core of its long-term competitiveness. Taking the perspective of innovation economy region is not only being a party to the innovation process but also the defining environment of its implementation. Its favourability depends on many factors, such as the enabling institutional setup, the localization of specialized companies, the state of intra-regional demand for innovation, the accumulation of strategic resources, the social integration of actors leading to formation of an innovative milieu, et cetera. The latter factor is often underestimated by policymakers due to its elusiveness. Although it sets the motion vector of the entire innovation economy via establishment of the constellations of competences – the interlinked 'clusters of competencies' (Niosi, 2000), the 'competence blocks' (Eliasson, 1996; Carlsson et al., 2002) or the 'ensembles of competences', as articulated by Maskell and Malmberg (1999) in their pursuit to grasp the substance of regional competitiveness. In this same logic the ideas on an inventive-enabling environment (i.e. 'creative field', 'creative space', 'creative milieu', 'regional collective learning', 'innovation ecosystem', etc. see a review of Mikhaylov, 2016) and the 'embeddedness' (Gertler et al., 2000; Oerlemans et al., 2001) of innovation are being developed. The basic framework behind these concepts is that the innovative context of the region is being formed from the interactions of heterogeneous regional actors, generated and defined by their internal aspirations to ensure the competitiveness of enterprises and a certain quality of life for individuals. This sustainable interactive communication, often being of 'untraded' and 'unintended' nature (Storper, 1995), results in the development of a shared vision over the innovative development, embodied in long-term strategy of regional clusters or the regional innovation system (RIS) as a whole. Acting as *lex non scripta* to local communities of innovation this development strategy should correlate the official regional policy but it not always does.

Despite the apparent region-wide benefits with regard to entrepreneurial consolidation (incl. entrepreneurial universities, innovative NGOs) and the existence of commonly accepted far-reaching development plan of the regional community innovation activity does not imply a full consistence with the long-term interests of the region's innovation sustainability *per se*, as was discussed earlier (Mikhaylova and Mikhaylov, 2015, 2016). Taking into account the dualistic nature of the influence of innovation – carrying possible negative externalities, unintended and disruptive consequences (Bergek et al., 2013; Hall and Martin, 2005), the region is interested not so much in innovations itself, as a result of innovation activities, but in the effects they impose on the regional system. Changes in the subsystems of the RIS caused by implemented innovations should coincide with the development objectives of the system as a whole and its individual subsystems. Moreover, it is expected that regionally 'brewed' innovations will be in demand by local economy, influencing the general socio-economic welfare. Yet, as it is reflected in numerous studies' results, the misbalance in innovation activity is typical to outlying, peripheral regions (e.g. studies in the scope of Russia held by Baburin and Zemtsov, 2014; Mikhaylova and Mikhaylov, 2016). Scholars note that being the state geo-economic outskirts, border and coastal regions do not follow the nation-wide development trends it terms of both the demography and economy (Melançon and Doloreux, 2013; Morrissey, 2015). Huggins and Johnston (2009), Lagendijk and Lorenzen (2007), Tödtling and Trippl (2005), and Virkkala (2007) further highlight the differences in innovation activity of regions. The peripheral location of the border and coastal regions increases vulnerability of their innovation systems to external exposure. Lack or incoherence of globally competitive industrial leaders – the growth nodes of the regional economy, absence of sufficient demand for innovation, low market capacity and other factors force local businesses, research centres, university labs and other actors to search for networking opportunities abroad. This makes the economy and the innovation activity of these regions volatile with regards to development objectives of neighbouring states and large market players, who set the development direction for the entire value-added network (incl. innovation driven networks). This leads to a dissonance between the regional strategic goals, as an

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element of the national system (incl. national innovation system – NIS), and the goals of individual economic entities or clusters at the regional level (i.e. RIS), which are fully aligned with the activities of the more influential players from outside. Moreover, the long-term sustainability of the regional innovative milieu is threatened by the variety of external factors, including the highly unstable political relations.

The objective of this study is to identify possible threats to regional innovation security in case of innovative milieus integration across national borders. In the next section we review background studies on regional innovation system with a focus on cross-border networking and the role of innovative milieu in regional development. Section 3 provides an overview of research methodology. Section 4 features a number of brief case studies on cross-border regional innovation systems that exhibit different development scenarios and feature the exposure to various threats for regional innovation security. The paper closes with some discussion and policy recommendations.

2. Background and literature review

Research on the nature and role of innovation in regional development received its most widespread attention in economic geography and regional studies. Significant influence over the innovation theory had the idea of geographic localization of innovation (Almeida and Kogut, 1997; Audretsch and Feldman, 2003; Feldman and Audretsch, 1996). It is reflected in a number of concepts that describe the spatially determined process of generation, implementation and diffusion of innovation focusing on actors' proximity and social embeddedness of the economy: innovation diffusion, knowledge spillover, absorptive capacity, et cetera. Common geographical location is said to ensure a coherent institutional, political and socio-cultural context for its participants. A variety of scientific approaches on this matter can be structured in two general categories: firstly, those, focusing *on spatial networking*, combining studies on the features of territorial distribution of productive forces in a region and the emergence of agglomeration effects (i.e. external economies) that contribute to innovation activity; secondly, dealing with *contextual environment*, explaining various aspects of regional environment formation and its influence over the innovation process.

The first approach is characterized by a shift in focus toward the study of interdependencies between the placement of productive forces and the innovative capacity of region's economy (e.g. the concepts of new industrial districts, innovation cluster, new industrial spaces, technology poles and others). Researchers articulate that spatial clustering of economic entities within the same geographical area (incl. cross-border area) contributes to growth of their innovative activity, since it facilitates the process of knowledge dissemination, mutual learning and adaptation via the effects of 'knowledge spillovers' (Breschi and Lissoni, 2001; Caragliu and Nijkamp, 2016) and 'innovation diffusion' (Rogers, 2003). Region in this context is a scale and space for economic interactions and innovation activity, as well as a source of strategic resources for businesses: specialized labour market, network of suppliers and subcontractors, particular institutional infrastructure, etc. However, continuous innovative growth provision of regional firms is not limited to localization of economic activity. As proven by numerous studies, innovation capacity diminishes over time due to the alignment of technological development levels in the process of mutual learning that creates 'technological lock-in' (Witt, 1997) (also known as 'cognitive lock-in' (Thrane et al., 2010) or 'competency trap' (Akgün et al., 2007) taking a broader perspective of knowledge proximity). Overcoming this effect by regional firms is associated with the search for additional channels of information, accessing which enables to maintain the desired diversity level of knowledge, competencies, technologies, information circulating within the regional system – the 'cross-fertilization', and provides a further innovation development. Thus, innovation activities of regional companies within the first approach are considered in two aspects: on the one hand, – clustering of economic entities (i.e. their localization and concentration) and the establishment of a favourable surrounding (i.e. inventive-enabling, empowering, inspiring, fertile), and on the other – the participation of local actors in the networks beyond localized interactions

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capturing heterogeneous actors from outside the region, i.e. the extra-local networking via Amin and Thrift's 'network nodes' (1992), or the 'global pipeline' actors as put by Bathelt et al. (2004).

The second approach is characterized by the perception of innovation activity as a social process, which is formed due to various institutional routines and social agreements (Alic et al., 1992; Morgan, 1997). The agglomeration economies of spatially proximate actors are enriched by what Becattini (1989, p.38) has called a relationship between the "community of people and a population of firms", leading to the emergence of certain innovation environment formed by the daily social intercourse. Rootedness or embeddedness of such socio-economic relations in a particular area is influenced by the regional context, which is a set of norms and rules of behaviour that have emerged under the influence of economic and socio-cultural factors. The accumulation of social capital in regional networks enables to create a relationship based on trust and a sense of belonging to a single regional community (or 'territorial community' featuring professional associations – 'communities of practice'), which greatly facilitates the exchange of knowledge and information between market participants, and eventually helps to reduce costs and uncertainty (Brown and Duguid 1991; Camagni, 1991; Mezhevich, 1978; Stephanopoulos, 2012; Wolfe, 2002). Thus, an important social aspect of innovation is to assist mutual learning between regional (i.e. local) and external actors, which is affected by the complex of internal and external intangible factors defined by Storper (1997).

The innovation potential of various actors is determined by their ability to detect, disclose, adapt and use new knowledge that is to learn. The ability to learn reflects the dynamics and cooperative relations of organizations, their adaptation to changing environmental conditions and different contextual factors (Camagni, 1991; Cooke and Morgan, 1993; Fomina et al., 2018; Kirat and Lung, 1999; Sorenson et al., 2006). Meanwhile company is not regarded as an isolated agent of innovation, but as stakeholder of collective learning (Rauter et al., 2017), and as part of the locus with its own innovation potential (Moulaert and Sekia, 2003). Studying the issues of regional development in the context of globalization, Storper (1997) drew attention to the importance of organizational and technological learning within agglomerations, based on the non-commercial, 'untraded interdependences': foundations, values, norms, institutions. The European concept of innovation milieu acts as an umbrella for the research on the role of endogenous institutional capacity in the emergence of highly innovative companies (e.g. see Aydalot, 1986). Regional development is found to be highly related to the creation of favourable innovative environment; i.e. the institutional setup that favours long-term risk investment (incl. those in R&D, modernization of fixed assets, staff advanced training, etc.). Often these advantages are given to particular territories or large-scale projects. Typically, these are the technological and knowledge sites (i.e. clusters, S&T parks, technopoles, etc.) that concentrate regional resources and are characterized by a variety of actors involved. Their essence is to provide the conditions necessary and sufficient for the establishment of a unique milieu that would enable to locally ensure the effective implementation of learning and innovation processes. Integration of distinct innovation systems over the border places a particular emphasis on innovation security domain of regional innovation policy.

3. Research methodology

The research scope covers an area of 48 European states, including the 28 countries of the European Union (EU), the partially recognized states of Kosovo and Pridnestrovie (Transnistria), and the European part of Russian. The total number of 218 border regions corresponding to second level of a common classification of territorial units for statistics (NUTS 2) of the European Commission (2015) is analysed. These includes a list of 160 cross-border regions, 23 European grouping of territorial cooperation, and 17 large-scale cross-border cooperation domains as defined by the Association of European Border Regions (AEBR). The research methodology has a two-stage structure. The first stage is the general assessment that incorporates open-source data on international projects in the borderland directed at intensification of economic and innovation activity, SME competitiveness (e.g. projects

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of the European Territorial Cooperation (ETC) programmes, the Pre-Accession Assistance (IPA) and the Connecting Europe Facility (CEF) Pan-European instruments). An overview is made over cross-border initiatives focused on establishment of cross-border clusters and/or a common innovation infrastructure (e.g. science and technology park, technopolis, etc.). The data sources are the European Cluster Observatory, the European Cluster Collaboration Platform, the Global practitioners network for competitiveness, clusters and innovation (TCI), as well as national platforms with information on regional clusters, innovation activity and cross-border networking (e.g. the Russian Cluster Observatory, public agencies for industry and innovation). The study implies floating timeline by integrating all of the data available, giving emphasis to completed projects.

The second stage implies an in-depth analysis of a selection of remarkable experiences in implementation of cross-border cooperation projects initiated at least ten years ago. The retrospective approach is necessary to provide enough data and expert opinions of project managers, scholars, public officials on the results achieved (incl. the intermediate results). The identified sample is classified into identified types of general development threats to innovation security for regional innovation systems of the borderland. Research results present one brief case study per each type allocated. The general objective is to summarize and classify the possible variations in the deployment of cross-border cooperation actions with a particular emphasis on the threats to regional and/or national innovative milieus.

4. Research findings

The highest intensity of cooperation across national borders is being naturally found within the single space of the European Union (EU). The internal border areas are being increasingly integrated in socio-cultural, economic, infrastructural, political, and other spheres with an assistance of pan-European funding (incl. Interreg instrument of the European Cohesion policy). Moreover, the cross-border regional innovation systems integration initiatives between the borderland areas of the EU states are generally more mature (i.e. are initiated 10 and more years ago). Figure 1 shows the schematically represented process of cross-border regional innovation system formation. It should be noted that cross-border regional innovation system (CBRIS) is defined as a system that unites firms and organizations of various types systematically involved in the interactive learning process, rooted in the institutional environment of an area of adjacent territories belonging to different nation-states.

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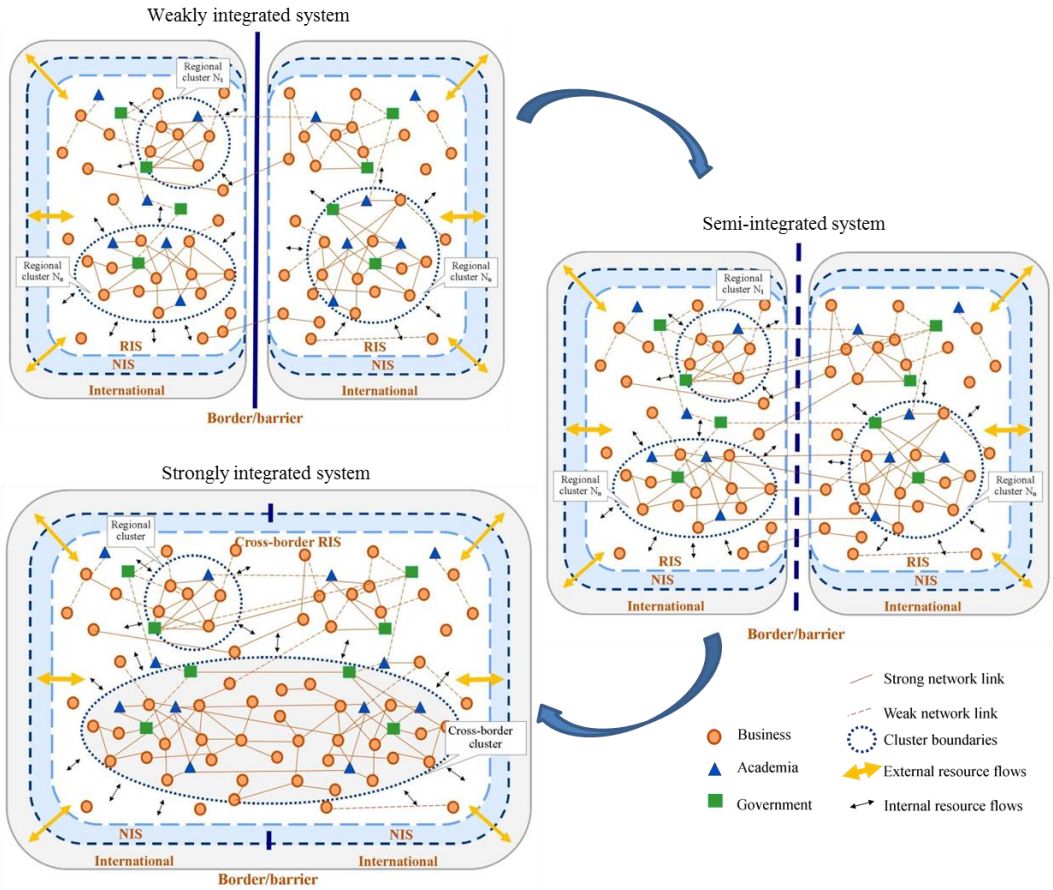

Fig.1. Cross-border regional innovation system integration stages

Source: based on stages classification suggested by Lundquist and Trippl (2011)

Weakly integrated systems are commonly found outside the EU, incl. its external borders (e.g. the Warmian-Masurian voivodeship of Poland and the Kaliningrad region of Russia). These regions have security checkpoints at their border crossings and the barrier function of the border dominates over the contact one. Least integrated are regions with potential, smoldering or active conflicts. Mostly these are borderland areas in Eastern Europe, such as the Balkan Peninsula. Semi-integrated systems are most widespread, as they naturally evolve in the common space of the European Union, as well as Switzerland and Norway. Strongly integrated systems are rare, as they imply significant coherence of the borderland and the synchronization of regional innovation systems (incl. knowledge generation, exploitation and subsystems).

High integrity of regional innovation systems result in numerous positive externalities, such as positive dynamics in new firm creation (incl. university spin-offs, start-ups, MNC subsidiaries), especially in high-tech sector; growing variety of industry sectors (e.g. ICT, biotechnology, nanotechnology, food, environmental technologies, creative industries, logistics, etc.); growth in FDI volume, increased private expenditure on R&D; GDP growth and productivity; decrease of unemployment figures and increase in average annual salary; increase in market diversification, involvement in global value chains; influx of qualified workforce; infrastructure development, etc. The best practice include the cross-border regions of Oresund (Denmark – Sweden), Upper Rhine (France – Germany – Swizerland), Bothnian Arc (Sweden – Finland). Notwithstanding the aforementioned benefits to

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regional development, strong integrity of the borderland may be harmful in case of internal asymmetries or rapid disintegration of ties.

Asymmetry in the formation and development of a cross-border innovative milieu has a two-fold manifestation. First is the gradual transition of innovative milieu of the less influential region towards the socio-economically superior territory. This process is accompanied by partial exclusion from national innovation system or the priority shift in partnership network towards the adjacent borderland. One clear example is the Scania region of Sweden. Over the past ten years this region expresses functional disintegration from the Swedish national innovation system of ties, placing national interregional integrity at a threat. Its spatial proximity to Copenhagen metropolitan area (the capital city of Denmark) as well as the functional complementarity in medical biotechnology specialisation has resulted in natural unification of the two regional innovation systems (Fig. 2). This cross-border integration was boosted in the new millennium with the construction of the Oresund Bridge, which sharply increased the volume of daily commutes across national borders.

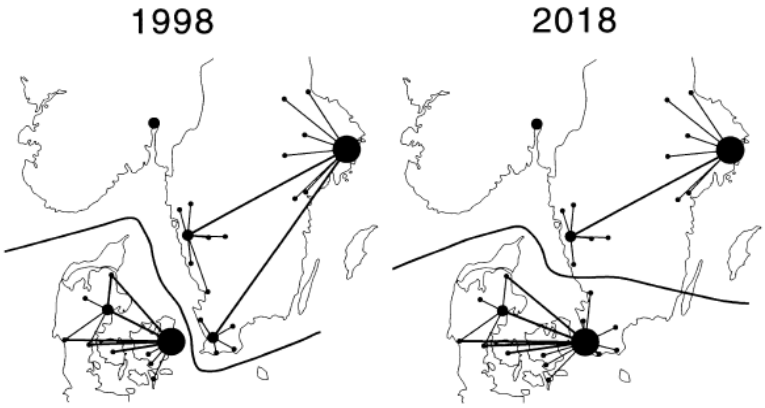

Fig.2. Rearrangement of the Swedish national innovation system

Source: adopted from Matthiessen (2000)

Second pattern is the initial domination of one counterpart over the other in terms of available resources (e.g. financial, administrative) supporting the long-term development scenario set. The general benefits of cross-border cooperation and integration are often being evaluated from the short-term perspective. Underestimation of the long-term effect can reduce the efficiency of regional development policies and even harm national innovation system. A particular example may be Limburg (Netherlands) – North Rhine-Westphalia (German) borderland region (Fig. 3). Active deployment of cross-border cooperation initiatives has brought numerous positive externalities; however, differences in strategic priorities of long-term development meant that the distribution of these benefits is uneven. Dutch smart specialization strategy for Southern Netherland fully corresponds with the horticultural specialization of Venlo, focusing the efforts of local municipalities (e.g. the Greenport Venlo initiative). Different situation is found to be on the German side of the border, where the strategic priority lies within high-tech industries. Innovation policy of the federal state is not aligned with ongoing sectoral focus on horticulture (driven by the Dutch counterpart), thus, reduces the efficiency of national measures undertaken.

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Fig.3. Venlo-Lower Rhine cross-border region

Source: adopted from Broek and Smulders (2015)

Divergence of the cross-border regional innovation system leads to unilateral outflow or unbalanced exchange of ideas, knowledge, and technologies, where one region becomes a donor and the other accumulates all the significant competitive competencies in the innovation sphere. The possible consequences of the peripheral region are (incl. industry sector-wise): strong technological, infrastructural, financial, personnel and other dependencies; environmental, ethical, social issues due to legislation flaws (e.g. legislation gap on animal experiments, ecological standards, labour rights, etc.); investment outflow and brain drain to adjacent border region hosting major stages of the innovation process (e.g. research, design, etc.); resources allocation in areas not corresponding national long-term development priorities; growth of political and economic influence of neighbouring country on regional development; unequal resource input in research collaboration (incl. loss of unique rights to inventions resulting from previously undertaken basic science research), etc.

Disruption of previously established networks (e.g. industrial, research, technological, educational, social, cultural) that form the core on a single transboundary regional innovation system is a serious challenge for both adjacent territories. Although this may be affected by macroeconomics (e.g. the global technological shift; such as change in the focus from raw materials, such as coal), all of the recent examples of decay are driven by geopolitics. Of all the changes occurred over the past decade, the collapse of Russian – Ukrainian long-lasting value chains has the greatest impact in the scope of Europe. The innovative milieu established over the long period of time had gained significant fragility in socio-cultural terms. Rapid distortion of a single value chain generated isolated actors with incomplete competences on both sides of the border, and developed conditions for the following threats: structural holes along the value chain (loss of partners with complementary competencies – supplementary or critical in nature); difficulties accessing external resources – HR, finance, technology, etc., and infrastructure – industrial, energy, transport, logistics, etc.; brain drain, closure of complex research projects, limited R&D funding; increased expenses on foreign technologies, equipment, licenses, etc.; limited access to foreign education, health care, cultural amenities; institutional system collapse (e.g. norms, regulations), etc.

Enclosed attitude towards the development of a cross-border innovative milieu implies unilateral integration initiatives, i.e. the course on closeness (even latent) by one of the adjacent regions, showing lack of desire for transboundary integration. Territories of this type of borderland have occasional, episodic, 'shallow' interactions, not implying joint creation of new knowledge (R&D or fully-flagged S&T cooperation). Relations of the regional innovation systems are reduced to foreign trade and episodic academic contacts (e.g. individual academic mobility, seldom co-authorship, etc.). This type of relations are rarely beneficial to either borderland areas, but are found to be widespread outside EU due to general market protection measures (e.g. the entire borderland of

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Belarus, European part of Russia, Ukraine, etc.). In terms of regional innovation security of the borderland these measures limit the variety of trade partners and specialized business services provided; decrease the volume of R&D expenditure by foreign entities; fragmentize and restrict embeddedness of the innovation process; reduce numbers of joint implementation of innovative projects and collaborative R&D; obstruct labour mobility and create social closeness; create cultural and ideological disunity of the borderland, foster differences in mentality and traditions; increase the dependence of regional innovation processes on unique innovative infrastructure of neighbouring states or, on the contrary, create complete infrastructural isolation (i.e. in case of absence of certain S&T infrastructure, logistics, etc.).

Conclusions

Strategic cross-border coupling of innovative milieus is a complex task, not least due to semi-peripheral status of many borderland areas. Adherence of the two distinct regional innovation systems requires all-embracing attention of public authorities with regard to sustaining optimal balance of national innovation system integrity and transboundary coherence. Regional socio-economic divergence is a particular factor fostering unequal distribution of roles within a single cross-border regional innovation system. Actors of less favourable borderland in terms of legislation, infrastructure, funding opportunities, human capital, etc. are subjected to development priorities of the networking counterpart across border. Being neglected this problem may result in the shift of R&D subject area, change in specialisation, intellectual resources outflow, etc., decreasing the input value of local territorial capital in national accounts. The extreme scenario would be rearrangement of the national innovation system with alienation of the region's innovation system. Efficient place-sensitive regional innovation policy can strengthen the innovation profile of the region by achieving synergies from combining resources across state border. The missing elements of the complex cluster categories are to be sourced externally, while the smart specialisation strategy has to support the enhancement of local strengths. Oresund region is the best practice of establishing an internationally competitive cross-border regional innovation system based on complementary competitive advantages in biotechnology, medicine and pharmaceuticals.

As noted by Tvaronavičienė and Černevičiūtė (2015), knowledge and technology transfer is highly related to the willingness of doing so. Our study results suggest that internationalization of regional innovative milieu over the borderland area can confront numerous restrictions at any stage of the lifecycle. The strongest restriction for sustainable collaboration is unfavourable geopolitics. Thus, a significant part in the formation of a favourable innovation environment takes the elaboration, approval and implementation of a regional innovation strategy for long-term development, being shared by major stakeholders at both sides of the border. The strategy should reflect and consistently promote the image of the region in the future. Its achievement is based on the identified strengths and is consistent with its current capabilities and cultural characteristics.

An essential role in creating and maintaining a desired innovation environment is given to the process of increasing the interactivity and openness of regional innovation processes. Increase of interactivity presumes the involvement of business, government, academia representatives and the general public in innovation process on a systematic basis in order to identify and jointly resolve common regional problems, as well as to organize new and improve the effectiveness of existing channels and processes of cooperation and information exchange. Increasing the openness of transboundary innovative milieu is associated with increase in informal extra-regional interactions, including through mobility of labour resources, scientific and student mobility, preparing the economy to the entry of new companies and ideas, adopting cultural diversity, supporting internationalization processes in the region.

Regional innovation policy should account for the following important factors affecting sustainability of regional innovative milieu across borders: the presence of a common vision among stakeholders, enshrined in the strategy

of innovative development of the cross-border regional innovation system; a high level of innovative business activity and the desire to share and adopt knowledge; formation of an atmosphere of innovative entrepreneurship (i.e. risk encouragement); the possibility of informal contacts and information exchange between employees of various companies; availability of mechanisms for interaction between the three institutional helices – the government authorities, academic research and business sectors; institutional assistance to the development of various forms of networking.

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THE INVESTMENT CLIMATE IN LATVIA'S, LITHUANIA'S AND BELARUS'S CROSS-BORDER REGIONS: THE SUBJECTIVE-OBJECTIVE ASSESSMENT*

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Abstract. As **t**he world experience indicates, the favourableness of investment climare or, in other words, a region's entrepreneurial environment determines a region's sustainable development. First assessments of investment climate were developed and applied by western experts in the middle of the 1960s. They were based on the subjective assessment of countries' characteristics. The further development of the methodology for comparative assessment of countries' investment climate started to expand and complicate the system of characteristics assessed by experts, and to introduce objective statistical indexes. In recent decades, more research into investment climate at the level of regions appeared, as a result of the understanding of a specific and unique character of regional features, as well as its dramatic differences from the country as a whole. It is possible to distinguish objective, subjective, and subjective-objective metholologies for assessment of investment climate. According to the outcomes of the subjective-objective assessment of the investment climate in Latvia's (Latgale), Lithuania's (Vilnius, Alytus, Utena, Panevezys, and Kaunas counties), and Belarus's (Vitebsk, Grodno, Minsk, Brest oblasts, and Minsk city) cross-border regions, the regions under study were divided into 4 groups in accordance with W.Zapf's Well-being Typology Matrix: 1) low objective and subjective indicators - *"Deprivation",* 2) low objective indicators and high subjective indicators - *"Adaptation*", 3) high objective indicators and low subjective indicators – *"Dissonance*", 4) high objective and subjective indicators – *"Well-being*".

Keywords: investment climate (entrepreneurship enviroment), subjective-objective assessment, cross-border regions, W. Zapf's Well-being Typology Matrix.

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1. Introduction

The volume and structure of investments determine sustainable economic development and growth. Consequently, the favourableness of investment climate or, in other words, the development level of entrepreneurial environment determines a region's sustainable development (Šimelytė, Antanavičienė 2013; Tvaronavičienė *et al.* 2013; Dudzevičiūtė 2015; Ohotina *et al*. 2018). Entrepreneurship level is currently considered as one of the most important intangible growth factors in developed countries. Since the beginning of the 20th century, researchers from different countries have started to become interested in the factors that influence entrepreneurial environment and conditions in which the investment activity happens (Stern 2002; Titarenko 2005; Petrenko *et al.* 2017; Ohotina 2017; Fabus 2017, 2018; Pietrzak *et. al.* 2017; Jankelova *et al.* 2018; Tvaronavičienė 2018). The Ministry of Education and Science of the Republic of Latvia also definied research into the quality of entrerpreneurial environment and the assessment of its influence on investment attraction and economic growth as priority areas for social sciences in the period 2018–2021 (LR Izglītības un zinātnes ministrija 2017).

First assessments of investment climate were developed and applied by western experts in the middle of the 1960s. The Harvard Business School research which was based on the subjective assessment of countries' characteristics was one of the first in this area (Stobaugh 1969). The further development of the methodology for comparative assessment of countries' investment climate followed the way of expansion and complication of the system of the characteristics assessed by experts and introduction of objective (statistical) indexes. Nowadays, there is a large number of indicators worked out by international organizations which can be applied to assessing investment climate in the countries worldwide. Some indicators are based on microeconomic, business-orientated factors, while others are based on macroeconomic and political factors. Furthermore, alongside the given indicators there are also social, economic, and political indicators that indirectly characterize the favourableness of the investment climate. For example, if there is a lack of competition (*Global Competitiveness Index of the World Economic Forum, Competitiveness Index of the International Management Development Institute, etc*.) or political instability (*Political Risk Ranking by the agency PRS Group)* the investment climate cannot be considered as favourable. We should also consider the indicators in which the state of investment climate makes a constituent part of the indicator (*Global Competitiveness Index of the World Economic Forum*).

In recent decades more research into investment climate at the level of regions have appeared, as a result of the understanding of a specific and unique character of regional features, as well as its dramatic differences from the country as a whole and the failure to apply familiar and approved in the international practice methodological approaches to the assessment of the regional investment climate (*Model for Evaluating the Romanian Regional Competitiveness Reagrding Investment Attraction; The Investment Attractiveness in the Regions and Sub-regions of Poland; Quality Index of Conditions for Small and Medium Business in 2013-2014:Regional Disproportions,etc.*).

Various criteria should be considered when assessing methods of investment climate. First, the scientific and practical significance of the indicator should be assessed (Menshikov, Lavrinenko 2008). It is also necessary to take into account the existence of the methodology on which the assessment methods are based, as well as the credibility of data and outcomes; it is important to consider for what purpose the research methods have been elaborated as well as the factors that influence the indicator; methods of data collection and their sources (Valsts reģionālās attīstības aģentūra 2012); clarity of methods (a possibility to repeat) and the approach applied to the assessment of investment climate (Litvinova 2013).

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Within the framework of this article the authors developed a subjective-objective methodology for assessment of the favourableness of regions' investment climate; the methodology was tested for the assessment of the investment climate in Latvia's, Lithuania's, and Belarus's cross-border regions. The subjective assessment of the regions under study was carried out on the basis of the data of the survey on representatives of small and medium-sized businesses within the framework of the project "The Establishment of the United Entrepreneurship Support and Networking System for the Sustainable Latvia, Lithuania and Belarus Cross Border Cooperation (B2B)"; the objective assessment was carried out on the basis of objective statistical data.

2. Methodology and Research Method

Nowadays there are a large number of indicators developed by international orgaizations which can be applied for assessing investment climate. The authors studied objective, subjective, and subjective-objective indicators which characterize investment climate directly or indirectly.

The main advantage of applying objective methodologies of research into investment climate as compared to subjective methodologies is their lower time and financial expenses. While applying objective methodologies to carry out the research, the following downside and difficulties should be taken into consideration. Using statistical databases there is some risk of the lack of statistical data that can be used as indicators of the investment climate. While applying subjective methodologies, it is possible to assess the factors of investment climate on which there is a lack or shortage of statistical data. The main disadvantage of qualitative assessments is their strong dependence on experts' subjective opinions, as well as enterprise performance indicators – duration of a company, number of employees, income behavior, dynamics of profitability, market share, volume of output and services sold over the recent years (Ohotina 2015). Entrepreneur, manager and other expert surveys also involve high time and financial expenses. The combination of quantitative and qualitative approaches is considered to be the most preferable and common methodology for the assessment of investment climate at present. As a result, the negative aspects of applying each approach separately are reduced. Moreover, subjective data is a significant addition to the main picture which statistics provides. The authors applied this approach for the development of the methodology for assessment of investment climate in Latvia's (Latgale region), Lithuania's (Vilnius, Alytus, Utena regions, Panevezys, Kaunas counties), and Belarus's (Vitebsk, Grodno, Minsk, Mogilev oblasts, and Minsk city) cross-border regions.

The authors on the basis of the risk approach in assessing investment climate considered various types of the investment potential that influence the favourableness of the investment climate: natural-resource, labour, infrastructure, production, consumer, finance, institutional, innovation, tourist, as well as various types of the investment security: political, social, economic, ecological, criminal, financial-legislative. In the table there are statistical indicators of the factors according to which the assessment of the investment climate in the cross-border regions under study has been carried out (Ohotina et al., 2018) (see **Table 1**).

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Table 1. Set of statistical indicators of the investment climate

Investment potential
p_1 – Natural-resource potential
$p_{1.1}$ – the area of a region territory in proportion to the area of the territory of Latvia, Lithuania, Belarus; the structure of the land area, %: $p_{1.2}$ – agricultural lands; $p_{1.3}$ – lands with marshes and waters; $p_{1.4}$ – wooded lands; $p_{1.5}$ – other lands.
p_2 - Tourist potential
$p_{2.1}$ – number of museums per 100,000 people; $p_{2.2}$ – number of theatres per 100,000 people; $p_{2.3}$ – number of museum visits per 1,000 people; $p_{2.4}$ – number of theatre visits per 1,000 people; $p_{2.5}$ – number of culture centres per 100,000 people; $p_{2.6}$ – number of hotels per 100,000 people; $p_{2.7}$ – hotel capacity, average number of rooms per 1 hotel; $p_{2.8}$ – number of rural guest houses per 100,000 people; $p_{2.9}$ – number of tourist organizations per 100,000 people.
P_3 - Labour potential
$p_{3.1}$ – density of population; $p_{3.2}$ – natural population growth; $p_{3.3}$ – migration balance; $p_{3.4}$ – working-age population; $p_{3.5}$ – infant life expectancy; $p_{3.6}$ – employment level; $p_{3.7}$ – economic activity; $p_{3.8}$ – number of students at higher education (colleges, universities) per 10,000 people.
P_4 - Infrastructure potential
$p_{4.1}$ – density of roads, km per 1,000 km^2 ; $p_{4.2}$ – number of educational establishments (colleges, universities) per 100,000 people; $p_{4.3}$ – number of libraries per 100,000 people; $p_{4.4}$ – number of secondary schools per 100,000.
P_5 - Production potential
$p_{5.1}$ – GDP per capita.
P_6 - Consumer potential
$p_{6.1}$– average salary (gross); $p_{6.2}$– average retirement pension; $p_{6.3}$– average income per 1 household member; $p_{6.4}$– availability of automobiles per 1,000 people.
P_7 - Finance potential
$p_{7.1}$– amount of FDI stock per resident; $p_{7.2}$– non-financial investments, in actual regional price in relation to general volume.
P_8 - Institutional potential
$p_{8.1}$– total number of enterprises per 1,000 people; $p_{8.2}$– number of micro-enterprises; $p_{8.3}$– number of small enterprises, $p_{8.4}$– number of middle-sized enterprises; $p_{8.5}$– number of large enterprises.
P_9 - Innovation potential
$p_{9.1}$– number of science-research centres per 100,000 people; $p_{9.2}$– number of staff employed at science-research centres out of the number of total population.
Investment security
R_1 - Social security
$r_{1.1}$– pre- working-age population; $r_{1.2}$– coefficient of potential demographic burden; $r_{1.3}$– *c*oefficient of pensioner demographic burden; $r_{1.4}$– number of divorces per 100 marriages; $r_{1.5}$– divorce rate coefficient (number of divorces per 1,000 population); $r_{1.6}$– mortality rate coefficient (number of deaths per 1,000 people).
R_2 - Economic security
$r_{2.1}$– unemployment rate; $r_{2.2}$– youth unemployment rate; population with the shortage of financial resources for, %: $r_{2.3}$– buying meat and fish produce at least once a week; $r_{2.4}$– timely payment for housing and utility services; $r_{2.5}$– purchase of fuel (if there is no central heating); $r_{2.6}$– payment for unanticipated needs if required.
R_3 - Ecological security
$r_{3.1}$– tons in average per 1 km2; air pollution emissions %: $r_{3.2}$– solid; $r_{3.3}$– sulphur dioxide; $r_{3.4}$– carbon oxide; $r_{3.5}$– nitrogen dioxide; $r_{3.6}$– nonmethane volatile organic compounds; $r_{3.7}$– other types of pollution
R_4 - Criminal security
$r_{4.1}$– number of reported crimes per 10,000 people; $r_{4.2}$– road traffic accidents per 10,000 people
R_5 - Financial- legislative security
$r_{5.1}$– inflation; $r_{5.2}$– number of closed down enterprises
R_6 - Political security
$r_{6.1}$– expert assessment

Source: the authors' drawing based on the literature analysis

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While collecting statistical data from the regions in Latvia, Lithuania, and Belarus, the national data bases were used, the data from the ministries of the countries under study, collections of statistical data that characterize social and economic development of the regions under study; the statistical base of the European Statistical Agency Eurostat for the EU regions. In order to assess political security of the territory under study the author interviewed six international experts. Поскольку понятие инвестиционного климата является многомерным, the comprehensive assessment of the investment climate has been identified on the basis of the sum method, by means of summing up true values of indicators of generalized investment potential and generalized investment security.

The authors of the research carried out the subjective assessment of the investment climate in Latvia's, Lithuania's, and Belarus's cross-border regions on the basis of the survey on representatives of small and medium-sized business within the framework of the project "The Establishment of the United Entrepreneurship Support and Networking System for the Sustainable Latvia, Lithuania and Belarus Cross Border Cooperation (B2B)" funded by the European Neighbourhood Instrument Cross-Border Cooperation Programme Latvia-Lithuania-Belarus 2007–2013.

The survey in the regions was carried out in the main communication languages in the region:

– in Russian and Latvian – in Latgale;
– in Lithuanian – in Lithuania;
– in Russian – in Belarus.

The sampling according to the method of selection has been stratified according to the key areas of the research. Requirements to the representative sampling mean that according to the emphasized parameters, the structure of the units under research should approach the corresponding proportions in the population (Yadov 2005). In the process of the work on the database in the SPSS programme, the survey data underwent the process of weighting according to the key lines of stratification; the deviations of the sampling parameters from the parameters of the population do not exceed 2.5%. The survey was carried out in the form of a questionnaire available both in a paper format and online. Therefore, companies that wanted to stay anonymous had an opportunity to fill out the questionnaire online on the Internet (Lavrinenko *et al*. 2015).

3. Empirical data and analysis

According to the calculated objective values of the integral index of the investment climate in Latvia's, Lithuania's, Belarus's cross-border regions, the classification of the regions into the quintile groups was carried out, where the regions with a very unfavourable investment climate fall into the 1st group, but the regions with a very favourable investment climate fall into the 5th group (see **Fig.1**).

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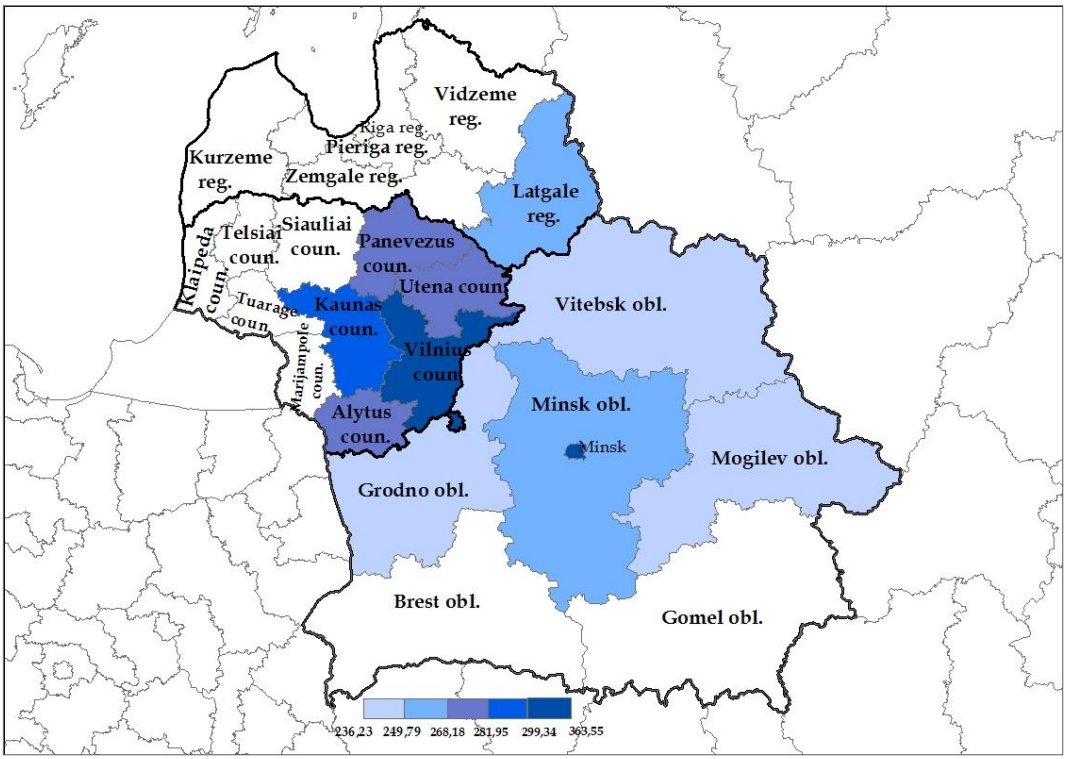

Figure 1. Map of the classification of Latvia's, Lithuania's, and Belarus' cross-border regions according to the value quintiles of the objective assesment of the investment climate

Source: the authors' figure drawn in ArcGis 10 programme according to the calculations of the statistical data of Latvia's, Lithuania's, and Belarus' cross-border regions applying the elaborated methodology for the assessment of the investment climate

The investment climate in Latvia's, Lithuania's, and Belarus's cross-border regions is quite heterogeneous as well as in other regions in these countries (Ohotina 2018). According to the values of objective assessment of the integral index of the investment climate, Vitebsk, Grodno, and Mogilev oblasts fall into the quintile 1 group; Latgale region, and Minsl oblasts fall into the quintile 2 group; Alytus, Panevezys, and Utena counties fall into the quintile 3 group; Kaunas county falls into the quintile 4 group, and Vilnius county, and Minsk city fall into the quintile 5 group.

When carrying out a more detailed analysis of values of all types of investment potential and security according to the objective assessment, a very high level of tourist, labour, consumer, production, finance, and innovation potentials, and high social and ecological security determined the place of Vilnius country in the quintile 5 group. Very high labour, consumer, and innovation potentials, and economic security, a high finance potential as well as criminal security are peculiar to Minsk. In Minsk, there is very low institutional and natural-resource potentials, financial and legislative, political and ecological security. When considering factors which determine the placement of regions in the quintile 1 group with a very unfavourable investment climate, it was pointed out that Vitebsk oblast has a very high natural-resource potential and economic security, as well as a high criminal security prevailing. All other types of potential and security are either very low or low. Mogilev oblast has a high economic security and natural-resource and labour potentials; all other types of potential and security are either very low or low (see **Table 2**).

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Table 2. Ranking of investment potential and investment security according to the objective and subjective assessments

Regions	Investment climate quintile groups	Natural-resource potential	Tourist potential	Labour potential	Infrastructure potential	Production potential	Consumer potential	Finance potential	Institutional potential	Innovation potential	Social security	Economic security	Ecological security	Criminal security	Financial and legislation security	Political security
*Objective assessment**																
Latgale region	2	4	3	1	5	2	2	1	2	3	5	1	3	2	3	3
Alytus county	3	2	4	2	3	3	4	1	4	1	3	2	5	5	4	4
Kaunas county	4	2	3	4	3	5	4	4	5	5	2	3	4	2	4	1
Panevezys county	3	2	4	2	4	4	4	2	4	1	3	3	5	3	4	5
Utena county	3	3	4	1	4	3	3	2	4	2	2	2	5	5	4	3
Vilnius county	5	2	5	5	2	5	5	5	3	5	4	3	4	1	4	1
Vitebsk oblast	1	5	2	3	2	1	1	2	2	2	2	5	2	4	1	3
Grodno oblast	2	4	2	4	1	2	2	3	1	2	1	5	1	5	1	3
Minsk city	5	1	3	5	2	2	2	4	1	5	3	5	1	4	1	1
Minsk oblast	2	5	3	5	1	2	2	4	1	4	1		2	1	1	2
Mogilev oblast	1	4	2	4	2	1	1	2	1	2	2	4	1	1	2	2
*Subjective assessment***																
Latgale region	1	4	1	3	1	1	2	1	2	1	2	3	3	3	1	1
Alytus county	5	3	2	2	4	2	3	3	3	5	5	5	5	5	5	5
Kaunas county	4	5	5	5	5	4	5	5	4	4	4	5	5	5	5	4
Panevezys county	2	2	2	3	2	2	2	2	2	2	3	4	2	4	4	2
Utena county	5	4	3	1	3	1	1	3	1	3	4	3	4	4	3	5
Vilnius county	4	5	5	5	5	5	5	5	5	5	5	4	4	3	4	4
Vitebsk oblast	1	3	2	1	1	3	3	2	3	3	3	1	2	2	2	1
Grodno oblast	3	3	4	4	4	5	4	4	5	3	2	2	3	2	3	3
Minsk city	2	1	4	3	3	4	3	3	3	2	1	2	3	1	2	2
Minsk oblast	3	1	1	2	2	3	1	1	1	4	3	3	1	3	3	3
Mogilev oblast	3	2	3	4	3	3	4	4	4	1	1	1	1	1	1	3

Source: *the author's calculations of the statistical data of Latvia's, Lithuania's, and Belarus's regions applying the elaborated methodology for the assessment of the investment climate

** the author's calculations of the statistical data of Latvia's, Lithuania's, and Belarus's regions applying the elaborated methodology for the assessment of the investment climate

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According to the calculated subjective values of the integral index of the investment climate in Latvia's Lithuania's, Belarus's cross-border regions, the classification of the regions into quintile groups was carried out (see **Fig. 2**). According to the values of the integral index of the investment climate, Latgale, and Vitebsk oblast fall into the quintile group 1; Minsk and Mogilev oblasts fall into the quintile group 2; Panevezys and Utena counties, and Minsk city fall into the quintile group 3; Alytus county and Grodno oblasts fall into the quintile group 4; Vilnius and Kaunas counties fall into the quintile group 5.

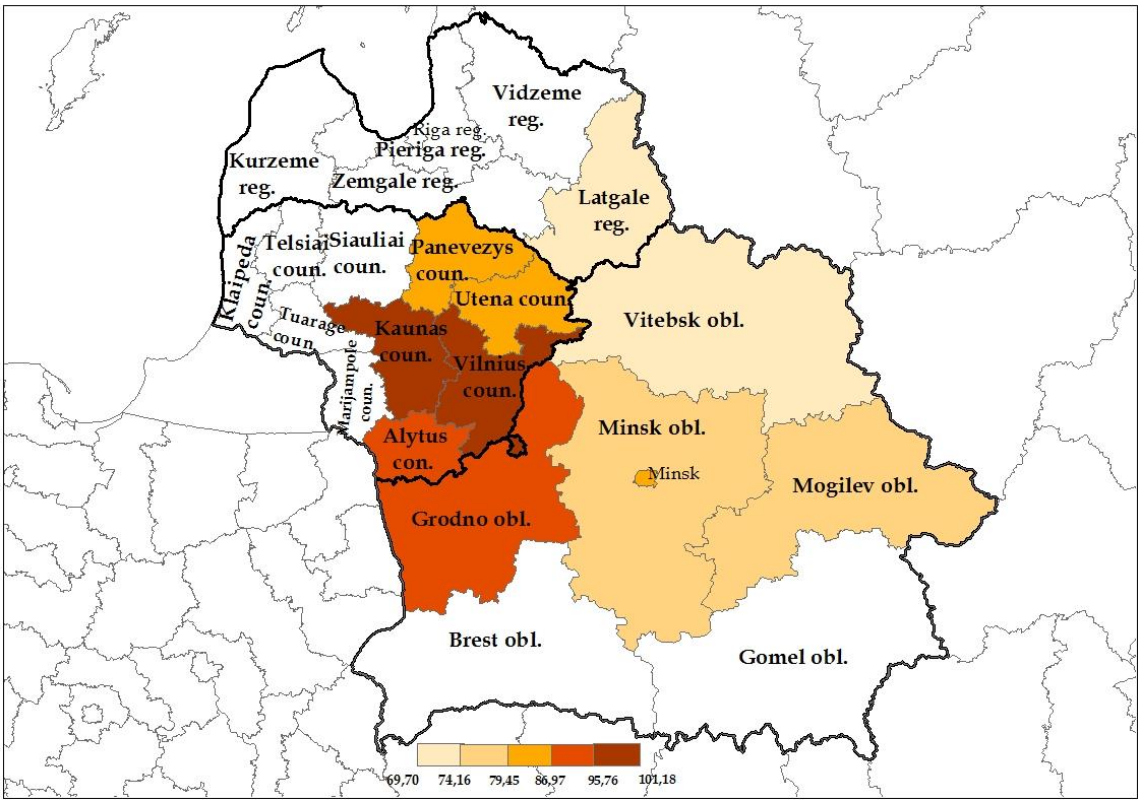

Figure 2. Map of the classification of Latvia's, Lithuania's, and Belarus's cross-border regions according to the quintile values of the subjective assessment of the investment climate

Source: the author's drawing in ArcGis 10 programme according to the outcomes of the survey on small and medium-sized enterprises in Latvia's, Lithuania's, Belarus's cross-border regions as a result of the elaborated methodology for the assessment of investment climate

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In order to correlate the objective and subjective assessments of the investment climate in cross-border regions, it is possible to use W. Zapf's Well-being Typology Matrix. The axes of subjective and objective assessments form four quadrants: 1) low objective living conditions and low subjective well-being – "Deprivation", 2) low objective living conditions and high subjective well-being – "Adaptation", 3) high objective living conditions and low subjective well-being – "Dissonance", 4) high objective living conditions and high subjective well-being – "Well-being" (Zapf 1984).

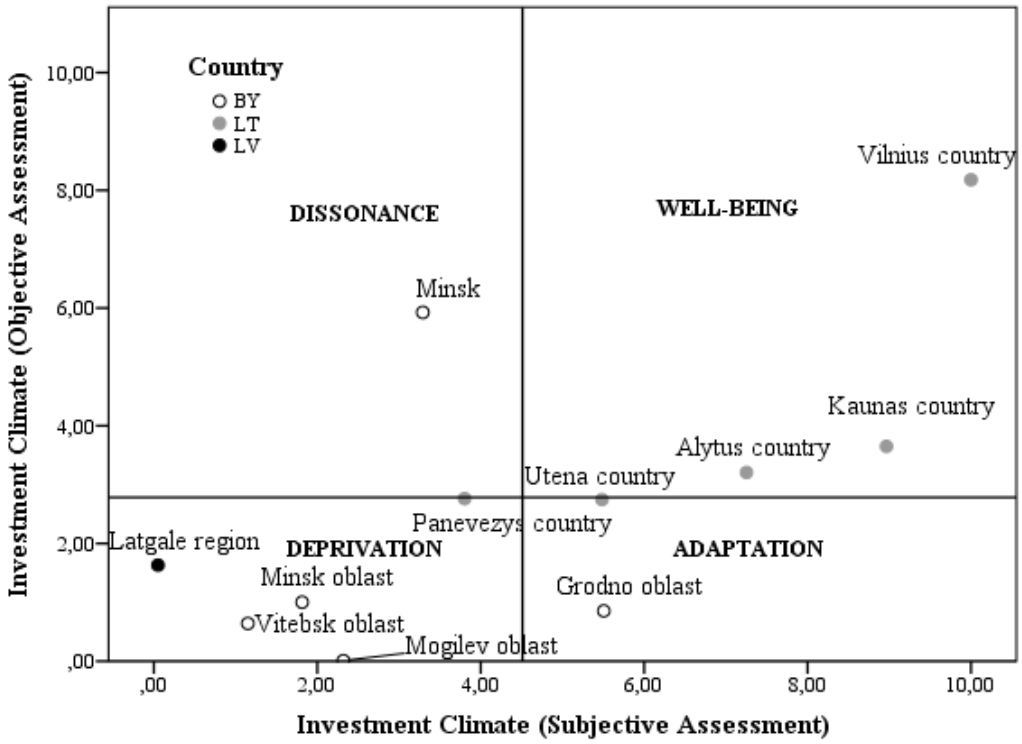

Figure 3. Placement of Latvia's, Lithuania's, and Belarus's cross-border regions on W. Zapf's Well-being Typology Matrix according to integral standardized values of objective and subjective indicators of investment climate

Source: the author's figure according to the calculation of the statistical data and the outcomes of the survey on small and medium-sized enterprises in Latvia's, Lithuania's, Belarus's cross-border regions

Latvia's, Lithuania's, Belarus's cross-border regions have been classified into 4 groups according to W. Zapf's Well-being Typology Matrix. The matrix cross point denotes the average normalized values of objective and subjective indicators in the regions, i.e. 2.78 and 4.51 respectively. According to the values of the integral standardized indicators of objective and subjective assessments, every region is located in the corresponding matrix quadrant (see **Fig. 3**).

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Utena, Alytus, Kaunas and Vilnius counties fall into the "***Well-Being***" group. According to the objective assessment in Utena county there is a very high ecological and criminal security, and high tourist, infrastructure and institutional potentials (see **Table 3. 1.**); according to the subjective assessment, there is a very high political security, a high natural-resource potential, and social, ecological and criminal security. According to the objective assessment, in Alytus county there are high tourist, consumer, and institutional potentials, as well as a very high financial-legislative security. According to the subjective assessment by directors and managers of small and medium-sized businesses, in these regions there is a very high innovation potential, and social, economic, ecological, criminal, financial-legislative and political security. According to the objective assessment, Kaunas county is characterized with very high production, institutional, innovation potentials, and high labour, consumer and finance potentials, and ecological and financial-legislative security. There is a high or very high subjective assessment of all types of investment potential and investment security. According to the objective assessment, in Vilnius county there are very high tourist, labour, consumer, production, finance, and innovation potentials, and high social and ecological security. According to the subjective assessment, there is an average level of criminal security, and a high or very high level of other types of investment potential and investment security (see **Table 2**).

Minsk city is located in the "**Dissonance**" group. As it has been already mentioned before, according to the objective assessment, in Minsk there are very high labour, consumer and innovation potentials, and economic security, a high finance potential, and criminal security (see **Table 2**). However, subjective indicators are high only in tourist and production potentials. 60.4% of directors and managers at small and medium-sized businesses mention that Minsk has its established brand (a positive image). In the respondents' opinion, the Minsk brand is stated in the availability of labour resources and large core enterprises; it is a clean, hospitable and cheap for tourist's city; the status of the capital city also enhances the brand of this region (Lavrinenko *et al.* 2015). Although only 11.4% of respondents believe that the established brand promotes the improvement of the investment climate, which determines the place of Minsk in the "Dissonance" group.

Latgale region, Panevezys county, Vitebsk, Minsk and Mogilev oblasts fall into the "Deprivation" group. According to the objective assessment, in Latgale region there is a very high infrastructure potential, social security and natural-resource potential; only natural-resource potential is high according to the subjective assessment. According to the objective assessment, in Panevezys region there is a very high ecological and political security, as well as a high tourist, infrastructure, production, consumer and institutional potentials; according to the subjective assessment, there is high economic, criminal, and financial-legislative security. According to the objective assessment, in Vitebsk oblast there is a very high natural-resource potential and economic security, as well as high criminal security; all other types of potential or security are either very low or low. In this oblast, all types of investment potential and investment security are assessed as either average or lower. According to the objective assessment, in Mogilev oblast there is high economic security, natural-resource and labour potentials; all other types of potential and security are also either very low or low; according to the subjective assessment, there are high labour, consumer, finance and institutional potentials (see **Table 2**).

Grodno oblast is located in the "Adaptation" group. According to the objective assessment, in Grodno oblast there is very high economic and criminal security, a high natural-resource potential, labour potential, and tourist potential. According to the subjective assessment, in the oblast there are very high production and institutional potentials, and high tourist, labour, infrastructure, consumer and finance potentials (see **Table 2**).

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Conclusions

First assessments of investment climate based on the subjective assessment of countries' characteristics were developed and applied by western experts in the middle of the 1960s. The further development of the methodology for comparative assessment of countries' investment climate started to expand and complicate the system of characteristics assessed by experts, and to introduce objective statistical indexes. Research into regions' investment climate are less common. However, in recent decades, more research into investment climate at the level of regions have appeared, as a result of the understanding of a specific and unique character of regional features, as well as its dramatic differences from the country as a whole.

Nowadays, there is a large number of indicators worked out by international organizations which can be applied to assessing investment climate. Lately, scientists have emphasized research based on the objective-subjective approach (Сухина 2004; Lonska 2015). The authors developed the methodology for the assessment of investment climate in Latvia's, Lithuania's, and Belarus's cross-border regions on the basis of the objective-subjective assessment of the factors.

According to the ratio of objective and subjective assessments of investment climate in cross-border regions following W.Zapf's Well-being Typology Matrix, Utena, Alytus, Kaunas, and Vilnius counties fall into the "*Well-being*" group (high objective and subjective indicators). In these regions, there are high investment opportunities and the best possible conditions for investment; directors and managers of small and medium-sized businesses also objectively evaluate this situation.

Minsk city falls into the "*Dissonance*" group (high objective indicators and low subjective indicators). Psychological peculiarities, temper, and a number of other factors which require a more detailed scrutiny might determine the understated assessment provided by directors and managers of enterprises.

Latgale region, Panevezys county, Vitebsk, Minsk, and Mogilev oblasts fall into the "*Deprivation*" group (low objective and subjective indicators). In private investors' opinion, investing in these regions might involve significant objective difficulties, as well as a number of subjective obstacles. These regions might be interesting for investors who operate in certain areas depending on what types of investment potential and security are of a high level according to objective assessment. Grodno oblast falls into the "*Adaptation*" group (low objective indicators and high subjective indicators).

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FLEXIBLE FORMS OF EMPLOYMENT, AN OPPORTUNITY OR A CURSE FOR THE MODERN ECONOMY? CASE STUDY: BANKS IN POLAND

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Abstract. The presented topic is of utmost importance due to the consequences that the implementation of atypical forms of employment has for all labour market actors. Sometimes employees decide on such forms of employment due to the pressure from employers who see it as a chance to optimize the costs. The conducted study confirmed that flexible forms of employment are more common among young people, who are at the beginning of their professional career, than among workers with seniority. The flexible forms of employment are also less frequent among managerial staff. The discussion is supported by empirical research conducted on a sample of 1,920 bank employees in Poland. This study is the first one that investigates the flexible forms of employment on a big sample of Polish bank employees and show the character of Polish bankers.

Keywords: flexible forms of employment; flexible staffing arrangements; atypical employment; alternative work arrangements; flexibility; flexicurity; banking

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JEL Classifications: J4, J8, J81, M5

1. Introduction

Recent years have seen rapid economic, demographic and social changes on both the global and Polish market (Voronov, Lavrinenko and Stashane 2014; Romashkina and Andrianova 2007; Bondaryeva, Kravchenko and Mieshkov 2015; Garbat 2018). Companies need to exercise more flexibility and adapt to the changes faster (Vanhercke et al. 2014). It has resulted in a number of job opportunities based on forms other than the traditional employment contract. This diversity is dictated by the need to adapt to the new conditions, skills and expectations, both on the part of employers and employees.

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Some authors point out that one should look at flexible forms of employment through the prism of particular sectors of the economy (Storey et al. 2002). This allows one to see their specific character. Some sectors are adapting to flexible employment (Süß and Kleiner 2007; Schmidt 2011). According to research by Ch. Pfeifer (2005), one of such sectors is services, and especially banking. It is also one of the fastest growing sectors of the economies in Central and Eastern Europe (Kaźmierczyk 2015, Davydenko**,** Kaźmierczyk, Romashkina, Żelichowska, 2017). Banks often introduce new technological solutions and know-how faster than other businesses.

In addition, most banks operating in Poland belong to Western investors and that should encourage rapid implementation of the organizational and management tools from the more developed countries. Therefore, banks in Poland are expected to promote flexible forms of employment. This is accompanied by social and demographic changes, such as sharp decrease in the birthrate, the increase in enrolment, popularization and simultaneous decline in the quality of tertiary education. All things considered, the flexible forms of employment may be both an opportunity or a threat for young workers (Heyes 2011). On the other hand, the rapid development of the banking sector as a leader in introducing new solutions (also organizational ones) favours banks as the subject of study of flexible forms of employment. Flexible forms of employment in Polish banks have not so far been analyzed precisely. This study is the first that investigates the differences in flexible forms of employment that was carried out on a sample of Polish bank employees and took into account their age, level of education, work experience and the size of a bank's locality.

The main aim of this paper is to assess the popularity of flexible forms of employment in banks and compare its levels in different social groups. The two main theses propounded in this paper are that flexible forms of employment are more common among young people at the beginning of their professional career than among workers with seniority, and that flexible forms of employment are less frequent among managerial staff.

To accomplish the research aim the authors used source literature in English, German, Polish and Russian on economics, human resource management, sociology, banking and industrial and organizational psychology (The ACM Digital Library, EBSCO, Emerald, BazEkon, ProQuest). A survey of nearly 2,000 bank employees in Poland was also carried out.

This article consists of five main sections. The introduction is followed by a [general] review of the issue of employment flexibility and various forms of flexible employment and section three presents the data sources and the research methods employed. In section four, the findings are presented to be then followed by conclusions.

2. Literature review

The great popularity of flexible forms of employment in Europe was researched by: Jahn, Riphahn and Schnabel (2012), Storey et al. (2002), Süß and Kleiner (2007), Jasarevic (2012). In Poland, opinions on the popularity of flexible forms of employment are divided. Some authors point to the popularity of flexible forms of employment (Węgrzyn 2009). Others argue that traditional forms of employment are still dominant in Poland (Kalinowska 2008). The popularity of temporary employment in Europe ranges from 5% (the Baltic States and Romania), to 23% (in Spain) and even over 25% in Poland. Poland takes the first places in the ranking of temporary employment growth among Eastern European countries (International Labour Office 2016, p. 52, 56).

One of the groups that may be particularly exposed to continuous and forced work within flexible forms of employment are young people. They occupy a special position on the labour market (Andrzejczak 2014; Paszkowicz 2009; Davydenko 2004). Poland, as a consequence of the reform of the education system, has witnessed a shift towards the preparation for work on the level of higher education. There are still a lot of

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universities whose graduates find it difficult to find employment (especially in the area of economics and management). The labour market is unable to absorb all the graduates (Andrzejczak 2015). For this highly digitalized group the Internet is a natural environment (Barska and Wojciech, 2014). According to a study by Barska and Wojciech, in 2025 c. 75% of employees around the world will be represented by the so called millenials, i.e. people aged between 18 and 34, lazy, spoilt, impatient and heavily committed to the Internet. According to Twaronite, this group will place a high value on the flexibility of employment (2015). On the one hand, young people are "...the most tractable" (Grzeszczyk 2003, p. 68) and they are probably ready to be employed within the framework of flexible forms of employment (Shelest 2015; Shelest 2016). Moreover, younger employees are less exposed to negative organizational commitment and turnover intention attributable to job insecurity (Cheng and Chan, 2008). In turn, it is the new generation that will have an ever-growing impact on the labour market. Therefore employers, when planning their businesses' future and employment structure, will have to take into account their characteristics.

Flexible forms of employment are sometimes abused. They are often used as a cost-reducing tool (International Labour Office 2016, p. 57; Eurofound 2015; Jahn et al. 2012), while at the same time reducing worker safety. Therefore, in some countries, including Poland, they have come to be known as "junk contracts", which clearly reflects their perception by the general society (Bak-Grabowska and Jagoda 2015). This term reflects the social sense of the flexible forms of employment. Work under "junk contracts" is perceived as unstable and less paid. Regardless of the positive or negative characteristics of the flexible forms of employment, the constant emergence of new forms of employment aimed at increased flexibility can be observed (especially in the transition countries).

With such rapid changes in the economy, many people find it hard to distinguish and comprehend the general principles of the alternative forms of employment. Even the names themselves may be vague and confusing, for instance: outsourcing, staff leasing or job sharing. Despite the wide and easy access to information, many people, especially the elderly, find it difficult to distinguish between the newly-occurred unusual forms of employment. The respective rights and responsibilities that arise from them are also hardly comprehensible. It can be presumed that these forms of employment can provide certain opportunities to both the elderly and the young who are willing to take up any work.

Flexibility, in general, means versatility and ability to adapt easily to new conditions. This also pertains to the labour market where it means something completely different for both parties, employers and employees. For the former group, flexibility may refer to the necessity to adjust in many areas of one's business, such as production intensity, market competition and demand (Soniewicki 2015). Employees, on the other hand, may view flexibility as a need for lifelong learning, upskill or even changing qualifications.

With regard to the labour market, flexibility can be defined as the ability to adapt to the new market conditions, as well as changes in technology and information (Wyrwa and Piątyszek-Pych 2012). First of all, attention should be drawn to such aspects as (Kalinowska et al. 2014):

- employment flexibility, which gives entrepreneurs the opportunity to match the structure of the employees to the actual demand and changes in the volume of production and services,
- functional flexibility, allowing employees to perform many tasks in multiple positions; this is connected with multi-profile qualifications and skill diversification of employees,
- financial flexibility, that represents the variability of wages,
- flexibility of working time, offering atypical forms of working time arrangement, depending on the prevailing economic situation on the market, as well as the capacity of the company,
- spatial flexibility, that represents the freedom of choice of a locality where the assigned work will be performed.

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The concept of flexible forms of employment (or flexible work arrangements) is not easy to define. Difficulties in defining atypical forms of employment were noted by Drela (2013), Süß and Kleiner (2007). The term "alternative forms of employment" is commonly used to describe types of employment relationship which are different in form. This way of thinking has been adapted by Salikova (2012). Therefore, if such alternative forms of employment differ from the traditional ones, one can be tempted to declare that they are in contrast to the typical employment relationship (Burroni and Keune 2011). It is described by, for example, contract length being other than for an indefinite period, only part-time openings, flexible hours of work, places of work other than the head office and lack of constant supervision on the part of the employer. Banks' employment flexibility can be demonstrated by the ease with which employees are dismissed during depression, particularly in the time of economic crises. In many countries of the European Union, flexible forms of employment were more popular after the crisis (International Labour Office 2016). The Polish economy has gently suffered the last crisis. There has been no decline in GDP and the banking sector is constantly growing. Unfortunately, the collected data is not suited to assess the dynamics of flexible forms of employment under the influence of the business cycle.

Economic growth is accompanied by increased competition between companies. The importance of productivity and efficiency results in reduced costs, for example employment-related ones. Flexible forms of employment enable to reduce operating costs, and sometimes protect workers against unemployment (Wilthagen 1998). Moreover, aging societies and cultural transformations, such as changes in women and men's roles in the family, or an increase in the number of single parents raising children, contribute to the emergence of atypical forms of employment (European Commission 2007). A tendency to relax these regulations in a big part of OECD countries is observed (OECD 2013). These all intensify the development of flexible security.

Classification of flexible forms of employment can be accomplished in several ways, using different criteria. Considering degrees of flexibility, we can distinguish different flexible forms of employment, such as (Kalinowska et al. 2014):

- very flexible (contract of mandate, contract for specific work, management contract, teleworking, outsourcing),
- medium flexible (agency contract, preliminary contract, staff leasing, job sharing, part-time working) (Eurofound 2015),
- partly flexible (contract for a probationary period, temporary contract, appointment, internship contract, seasonal work).

One of the most commonly used classifications of alternative forms of employment on the Polish labour market is as follows (Bąk 2009):

- labour employment – based on the labour law, such as: fixed-term contracts, part-time work, on-call work, telework;
- non-labour employment – based on the civil law, e.g. civil law contracts, self-employment;
- other – e.g. job sharing, staff leasing, outsourcing.

In conclusion, flexible forms of employment have many positive aspects. On the other hand, it should be emphasized that there are also reasons for criticism of the discussed forms of employment. According to the critical approach such models are unusual, uncertain, deviating from the prevailing rules and, therefore, bring anxiety and fear of the unknown (Krukowski and Oliński 2010). Flexible forms of employment can both increase or decrease innovativeness of companies and workers. The latter do not identify with the employer (Storey et al. 2002).

Labour employment includes those forms of contracts which are governed by the Labour Code. By operation of law, the employee is subordinated to his/her employer. He or she is protected by a wide range of employee rights.

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The main forms of labour employment include: temporary contract, probationary period contract, fixed-term contract, replacement employment contract, part-time work, on-call employment and teleworking.

The term "non-labour employment" is to be understood as such employment relationship which, in its form, is not subject to the Labour Code. This form of employment is used more and more often, due to the fact that it corresponds in a better way to the realities of the current labour market. The most common agreements of this type are: contract of mandate, contract for specific work, agency agreement, self-employment, job sharing, outsourcing (Dolgui and Proth 2013).

Flexible forms of employment are present in Poland and other European countries, such as France, Spain or Germany. In the last case, we can often come across the form of employment called "Geringfügige Beschäftigung" which is used for a fixed-term, part-time relationship (Eichhorst and Kendzia 2016; Buschoff and Protsch 2008). One can distinguish between two types of this form of employment, i.e. intended for businesses (the commercial sector), and for private households. The differences between them arise from different accounting methods and the amount of National Insurance contributions. In England, this atypical form of employment is called the "zero-hour contract". It includes a part-time job and on-call employment. According to this form, employees are entitled to annual leave and the minimum wage (Cheese 2015; Contract types and employer responsibilities). Summarising, Poland, Slovenia, Romania and Slovakia usually use the new employment forms identified mostly concern employees. At the same time, southern European countries, the Baltic States, Germany and Denmark usually generally involve the self-employed (Eurofound 2015).

3. Data

The research results presented are part of a broader study, which was based on the same research method and data. Thus, the description of the research method and data is applicable also to the results of research on other aspects of HRM and other papers by authors. The data from the survey, which was conducted from January 2016 to April 2016, were used to test the research thesis. The "snowball" technique was used in order to collect the data. The survey participants were invited by existing subjects. Personal contacts and individual visits to banks were used to collect the data. More than 20,000 queries were sent with a request to fill in the questionnaire via e-mail, social networking websites (such as Facebook and GoldenLine) and thematic forums. Both an electronic version (Anonimowe Badanie Pracowników Banków 2016) and hard copy one of the questionnaire were used in the survey.

The main survey was preceded by a two-staged pilot survey. First, the survey was conducted on a small group of target participants (180 students). In the second stage, the target group consisted of 100 employees from the banking sector. The aim was to reveal any inconsistencies and to examine whether the questions were understandable. Thanks to the pilot study, the questionnaire was modified and improved.

The questionnaire consists of an introduction followed by 23 closed-ended questions and several demographic and work-related questions. The main part of the questionnaire contains questions which refer to seven important human resource management areas (recruitment, motivation, flexible forms of employment, organizational culture, mobbing, training and outplacement). Some of the questions were used to test the research thesis. Banking employees were asked about the form of current and the first form of employment. They could choose some of the forms listed or give own form of employment.

The questionnaires have been completed by 1,949 respondents. 29 questionnaires were rejected due to low credibility and reliability (for example, some respondents selected "0" in response to all of the closed-ended

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questions). As a result, the final research sample consists of 1,920 respondents (152 electronic version and 1,768 hard copy). Table 1 provides more details regarding the sample structure.

Table 1. Sample structure

Criterion		Number of individuals	Percentage
Gender	Female	1,312	68.33%
	Male	473	24.64%
	No answer	135	7.03%
Education	University (major in economics)	883	45.99%
	University (other)	515	26.82%
	High school (major in economics)	270	14.06%
	High school (other)	189	9.84%
	Vocational	2	0.1%
	Elementary	2	0.1%
	No answer	59	3.1%
Occupied position	Senior managerial position	43	2.24%
	Middle-level managerial position	129	6.72%
	Lower-level managerial position	153	7.97%
	Non-managerial position	1,485	77.34%
	No answer	110	5.73%
Organizational unit	Headquarters	409	21.3%
	Regional branch	416	21.66%
	Operational branch	1,020	53.13%
	No answer	75	3.91%
Type of bank	Commercial bank	1,342	69.90%
	Cooperative bank	481	25.05%
	No answer	97	5.05%
The equity	National	919	47.86%
	Foreign	863	44.95%
	No answer	138	7.19%
Workplace	Front office	1,118	58.23%
	Back office	460	23.96%
	No answer	342	17.81%
Disability	Lack	1,820	94.79%
	Slight level	12	0.63%
	Moderate level	8	0.42%
	Significant level	2	0.1%
	No answer	78	4.06%

Source: own computations based on the survey data.

The composition of the research sample according to gender, type of education and type of bank corresponds to the structure of employment in the banking sector in Poland (2011). The mean age of respondents was 36,6 years. The mean work experience in banking was 12,1 years, ranging from 1 to 43 years. The mean total work experience of respondents was 15,0 years (Table 2).

Table 2. Summary statistics on age and work experience

Criterion	Minimum	Maximum	Mean	Median	Standard deviation
Age	19	64	36.612	35	9.7496
Work experience in banking	1	43	12.065	10	9.5799
Work experience with current employer	1	43	9.835	7	9.3882
Total work experience	1	45	14.976	12	10.2416

Source: own computations based on the survey data.

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The locality size criterion demonstrates that the largest group of respondents came from the localities inhabited by 50 thousand people, the fewest surveyed people coming from localities with 200-500 thousand inhabitants (Table 3).

Table 3. Summary statistics on place of residence

Size of locality	Up to 50 thous people	658	34.27%
	50-100 thous people	251	13.07%
	100-200 thous people	245	12.76%
	200-500 thous people	124	6.46%
	More than 500 thous people	541	28.18%
	No answer	101	5.26%

Source: own computations based on the survey data.

4. Empirical analysis

A majority (74.1%) of bank employees are employed at the beginning of their professional career by means of different types of flexible contracts different time span, defined by employer (60.5% on a fixed-term contract). Only 18.8% could eventually count on an indefinite employment contract, which gives them the most employment privileges and the highest social security. Nearly 8% of the bankers at early stages of their careers are employed under contracts of mandate or contracts for specific work, and 9.5% work on temporary contracts (probationary period contracts or replacement employment contracts).

Table 4. First and current forms of employment – basic statistics

	First form of employment	Current form of employment
	%; number of answers	%; number of answers
Indefinite employment contract	18.8%; 361	66.1%; 1,270
Fixed term contract	60.5%; 1,162	21.0%; 404
Contract of mandate, contract for specific work	7.9%; 152	2.0%; 39
Agency agreement	1.3%; 24	0.8%; 16
Work contracting	0.5%; 9	0.6%; 11
Self-employment	0.7%; 13	0.6% ; 12
Teleworking	0.4%; 8	8.5%; 163
Job sharing	0.3%; 6	0.4%; 8
Probationary period contract, replacement employment contract	9.5%; 183	1.8%; 35
On-call employment	0.1%; 2	0.1%; 2
Others	-	0.1%; 2
All flexible forms of employment together	74.1%, 1,423	25.5%; 489
No answer	7.1%; 137	8.5%; 163

Source: own computations based on the survey data.

The structure of the forms of employment in the case of further employment (current form of employment) looks completely different (Table 4). Most of the employees work under an indefinite employment contract (66.1%). Various flexible forms of employment apply to 25.5% of the employees. The most common form is the fixed-term contract and teleworking (8.5%).

The main thesis argued: flexible forms of employment are more common among young people starting their professional activity than senior workers. The thesis was confirmed both in reference to the first, and current forms of employment. Application of flexible forms of employment is facilitated by: the employee's young age (up to 35 years), short experience with the current employer (up to 7 years), short work experience in banking (up to 10 years), and short total work experience (up to 12 years). All of these factors interacted equally with the use

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of flexible forms of employment. It means that both in the case of the first and the next jobs, more seniority and more experience foster employment on the basis of an employment contract for an indefinite period. The proportion of young employees working under flexible forms of employment was several times higher than of employees with longer experience. For example, up to 41.7% of employees up to 35 years of age were employed (currently) within the framework of flexible forms of employment. At the same time, the proportion of older employees (over 35 years) being employed on the basis of these forms of employment was only 13.7%. In accordance with the assumptions as adopted earlier, the increase in the use of flexible forms of employment, promotes the decrease of employment based on the traditional employment contract for an indefinite period (Table 5 and 6).

Green Line research shows that flexible forms of employment can be particularly beneficial for learners (73%), as well as for people taking up a job for the first time (25%) and they allow to combine work with study and personal life (25%) (Zielona Linia 2011). Moreover, according to R. Muster's research, young people indicate that flexible forms of employment allow them to combine work and education. At the same time, they reduce their creditworthiness (2012). Often, atypical employment is forced on their part by an employer who does not want to increase labor costs and employ them on the basis of an employment contract for an unspecified period of time. The young declared that they would willingly change the form of employment if they only could.

Table 5. First form of employment in different groups – population and seniority

Group	Indefinite employment contract; %; number of answers		All flexible forms of employment together; %; number of answers		Fixed term contract; %; number of answers	
	Chi-squared; df; significance; Phi Yula/ V Cramera	answers	Chi-squared; df; significance; Phi Yula/ V Cramera	answers	Chi-squared; df; significance; Phi Yula/ V Cramera	answers
Female	*4.832; 1;* ***0.028****; 0.054*	21.8%; 265	*4.800; 1;* ***0.028****; 0.054*	78.2%; 950	*0.061; 1; 0.805; 0.006*	64.8%; 787
Male		16.9%; 76		83.1%; 373		65.5%; 294
Up to 50 thous people	*18.529; 4;* ***0.001****; 0.105*	21.3%; 130	*18.503; 4;* ***0.001****; 0.104*	78.8%; 482	*8.509; 4; 0.075; 0.071*	65.0%; 397
50-100 thous people		27.7%; 64		72.3%; 167		61.0%; 141
100-200 thous peole		13.4%; 31		86.6%; 200		71.9%; 166
200-500 thous people		22.6%; 26		77.4%; 89		59.1%; 68
Above 500 thous people		17.2%; 87		82.8%; 420		66.5%; 337
Senior managerial position	*5.647; 3; 0.130; 0.058*	33.3%; 14	*5.664; 3; 0.129; 0.058*	66.7%; 28	*1.561; 3; 0.668; 0.030*	59.5%; 25
Middle-level managerial position		23.3%; 27		76.7%; 89		69.0%; 80
Lower-level managerial position		19.6%; 29		80.4%; 119		66.2%; 98
Non-managerial position		19.5%; 270		80.5%; 1,116		64.5%; 894

Source: own computations based on the survey data.

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Table 6. First form of employment in different groups – education, type of bank, age

Group	Indefinite employment contract; %; number of answers		All flexible forms of employment together; %; number of answers		Fixed term contract; %; number of answers	
	Chi-squared; df; significance; Phi Yula/ V Cramera	answers	Chi-squared; df; significance; Phi Yula/ V Cramera	answers	Chi-squared; df; significance; Phi Yula/ V Cramera	answers
University (major in economics)	*36.657; 5;* ***0.000****; 0.145*	18.8%; 156	*4.800; 1;* ***0.028****; 0.054*	81.3%; 676	*26.195; 5;* ***0.000****; 0.123*	67.5%; 561
University (other)		15.0%; 71		85.0%; 401		69.1%; 326
High school (major in economics)		30.8%; 78		69.2%; 175		53.4%; 135
High school (other)		24.0%; 42		76.0%; 133		62.3%; 109
Vocational education		100.0%; 2		0.0%		0.0%
Elementary education		0.0%		100.0%; 2		100.0%; 2
Commercial bank	*1.509; 1; 0.219; 0.030*	19.4%; 242	*1.458; 1; 0.227; 0.029*	80.6%; 1007	*4.699; 1;* ***0.030****; 0.053*	63.7%; 795
Cooperative bank		22.1%; 100		78.0%; 354		69.3%; 314
Banks with majority of national capital	*7.943; 1;* ***0.005****; 0.069*	23.2%; 198	*7.873; 1;* ***0.005****; 0.069*	76.8%; 655	*1.065; 1; 0.302; 0.025*	63.4%; 540
Banks with majority of foreign capital		17.7%; 143		82.3%; 667		65.8%; 533
35 years and under	*36.705; 5;* ***0.000****; 0.145*	9.4%; 85	*132.135; 1;* ***0.000****; 0.272*	90.6%; 817	*11.533; 1;* ***0.001****; 0.080*	69.0%; 622
Above 35 years old		31.3%; 276		68.7%; 606		61.3%; 540

Source: own computations based on the survey data.

Table 7. First form of employment in different groups – work experience

Group	Indefinite employment contract; %; number of answers		All flexible forms of employment together; %; number of answers		Fixed term contract; %; number of answers	
	Chi-squared; df; significance; Phi Yula/ V Cramera	answers	Chi-squared; df; significance; Phi Yula/ V Cramera	answers	Chi-squared; df; significance; Phi Yula/ V Cramera	answers
7 years work experience with current employer and under (median)	*108.567; 1;* ***0.000****; 0.247*	10.3%; 92	*108.303; 1;* ***0.000****; 0.246*	89.7%; 799	*6.850; 1; 0.009; 0.062*	68.1%; 607
Above 7 years work experience with current employer (median)		30.2%; 269		69.9%; 624		62.2%; 555
10 years and under work experience in banking (median)	*117.813; 1;* ***0.000****; 0.257*	10.9%; 107	*117.495; 1;* ***0.000****; 0.257*	89.1%; 874	*16.516; 1;* ***0.000****; 0.096*	69.3%; 680
Above 10 years work experience in banking (median)		31.7%; 254		68.4%; 549		60.1%; 482
12 years and under total work experiance (median)	*125.861; 1;* ***0.000****; 0.266*	9.4%; 83	*125.581; 1;* ***0.000****; 0.265*	90.6%; 797	*9.193; 1;* ***0.002****; 0.072*	68.6%; 604
Above 12 years total work experience (median)		30.8%; 278		69.2%; 626		61.8%; 558

Source: own computations based on the survey data.

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The thesis also corroborated that (in the case of current form of employment): flexible forms of employment occur less often in managerial positions than in non-managerial ones. Managers were more often than non-executives employed under indefinite employment contracts. For example, up to 92.5% of senior managers and only 69.1% of non-managerial employees were employed on the basis of indefinite employment contracts. Employment under the indefinite employment contract is the prevailing form of employment for managers. The analysis clearly separates senior managers from non-managerial employees, the two being at opposite poles with reference to the method of employment. The Green Line report also indicates that flexible forms of employment are relatively rarely used in managerial positions (Zielona Linia 2011). Other results were obtained by Bąk-Grabowska and Jagoda. Empirical studies conducted among 397 empoployees at 49 enterprises in Poland confirmed that management staff is less than other workers employed on the basis of contract of employment and more often on the basis of self-employment. At the same time they are almost never employed on the basis of civil-law contract (2016). One can suspect that bank managers are employed on more stable terms than employees in other sectors. In addition, the specificity of the bank as a public trust institution forces (at least in theory) a greater bond between the employee and the bank. With respect to education, it has been noted that there are differences between people with economic education and non-economic one (regarding both the first and the current forms of employment). Employees with economic education were employed under flexible forms of employment less often than their non-economic counterparts. Simultaneously, they were hired more often on the basis of indefinite employment contracts. Whereas in the case of the first contract of employment, the differences in the responses did not exceed 10 percentage points, this usually slightly increased in time with respect to the current employment contract. The conclusion is that it pays off to have economic education working at bank, which is conducive for employment stability. The type of education (economic vs. non-economic) has become increasingly important for forms of employment. Economic education gave employees greater stability. One may suspect that employees with economic education are the core of employees, and those who do not have economic education can assume supporting roles (and undertake auxiliary activities). This would be consistent with the concept of shamrock organization by Ch. Handy (2014). The shamrock organization model is a leaf shape symbolic representation with three types of workforce (core staff, contractual fringe, consultancy). Probably workers with different education level represent different "leafs". Its relation however require confirmation by additional studies.

Table 8. Current form of employment in different groups – gender, size of locality, seniority

Group	Indefinite employment contract; %; number of answers		All flexible forms of employment together; %; number of answers		Fixed term contract; %; number of answers	
	Chi-squared; df; significance; Phi Yula/ V Cramera	answers	Chi-squared; df; significance; Phi Yula/ V Cramera	answers	Chi-squared; df; significance; Phi Yula/ V Cramera	answers
Female	*1.761; 1; 0.185; 0.033*	72,9%; 874	*1.696; 1; 0.193; 0.032*	27.2%; 326	*3.159; 1; 0.075; 0.044*	22.1%; 265
Male		69.6%; 304		30.4%; 133		26.3%; 115
Up to 50 thous people	*50.419; 4; **0.000**; 0.173*	80.5%; 491	*49.948; 4; **0.000**; 0.173*	19.5%; 119	*27.491; 1; **0.000**; 0.128*	17.5%; 107
50-100 thous people		78.0%; 184		22.4%; 53		19.1%; 45
100-200 thous peole		65.0%; 147		35.0%; 79		29.6%; 67
200-500 thous people		63.2%; 67		36.8%; 39		32.1%; 34
Above 500 thous people		64.3%; 320		35.7%; 178		27.1%; 135
Senior managerial position	*26.427; 3; **0.000**; 0.126*	92.5%; 37	*26.583; 3; **0.000**; 0.126*	7.5%; 3	*21.722; 3; **0.000**; 0.114*	2.5%; 1
Middle-level managerial position		81.3%; 100		18.7%; 23		13.8%; 17
Lower-level managerial position		82.2%; 120		17.8%; 26		17.8%; 26
Non-managerial position		69.1%; 939		30.9%; 420		25.4%; 345

Source: own computations based on the survey data

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Table 9. Current form of employment in different groups – education, type of bank, age

Group	Indefinite employment contract; %; number of answers		All flexible forms of employment together; %; number of answers		Fixed term contract; %; number of answers	
	Chi-squared; df; significance; Phi Yula/ V Cramera	answers	Chi-squared; df; significance; Phi Yula/ V Cramera	answers	Chi-squared; df; significance; Phi Yula/ V Cramera	answers
University (major in economics)	*29.719; 5;* ***0.000****; 0.132*	76.2%; 634	*29.975; 5;* ***0.000****; 0.133*	23.9%; 199	*16.871; 5;* ***0.005****; 0.099*	20.9%; 174
University (other)		65.2%; 304		34.8%; 162		29.0%; 135
High school (major in economics)		78.0%; 184		22.0%; 52		17.8%; 42
High school (other)		63.5%; 106		36.9%; 62		25.7%; 43
Vocational education		100.0%; 2		0.0%		0.0%
Elementary education		100.0%; 2		0.0%		0.0%
Commercial bank	*19.259; 1;* ***0.000****; 0.107*	69.0%; 847	*19.443; 1;* ***0.000****; 0.108*	31.1%; 382	*9.791; 1;* ***0.002****; 0.077*	25.4%; 312
Cooperative bank		79.9%; 354		20.1%; 89		18.1%; 80
Banks with majority of national capital	*16.582; 1;* ***0.000****; 0.101*	76.5%; 641	*16.545; 1;* ***0.000****; 0.100*	23.6%; 198	*7.605; 1;* ***0.006****; 0.068*	20.3%; 170
Banks with majority of foreign capital		67.5%; 539		32.6%; 261		26.0%; 208
35 years and under	*169.835; 1;* ***0.000****; 0.311*	58.4%; 516	*171.331; 1;* ***0.000****; 0.312*	41.7%; 369	*123.129; 1;* ***0.000****; 0.265*	34.1%; 301
Above 35 years old		86.3%; 754		13.7%; 120		11.8%; 103

Source: own computations based on the survey data.

Table 10. Current form of employment in different groups – experience

Group	Indefinite employment contract; %; number of answers		All flexible forms of employment together; %; number of answers		Fixed term contract; %; number of answers	
	Chi-squared; df; significance; Phi Yula/ V Cramera	answers	Chi-squared; df; significance; Phi Yula/ V Cramera	answers	Chi-squared; df; significance; Phi Yula/ V Cramera	answers
7 years work experience with current employer and under (median)	*222.651; 1;* ***0.000****; 0.356*	56.1%; 486	*222.025; 1;* ***0.000****; 0.355*	43.9%; 381	*158.451; 1;* ***0.000****; 0.300*	35.8%; 310
Above 7 years work experience with current employer (median)		88.0%; 784		12.1%; 108		10.5%; 94
10 years and under work experience in banking (median)	*168.296; 1;* ***0.000****; 0.309*	59.6%; 572	*167.613; 1;* ***0.000****; 0.309*	40.4%; 388	*125.492; 1;* ***0.000****; 0.267*	33.3%; 319
Above 10 years work experience in banking (median)		87.5%; 698		12.6%; 101		10.7%; 85
12 years and under total work experiance (median)	*170.950; 1;* ***0.000****; 0.312*	58.0%; 499	*170.487; 1;* ***0.000****; 0.311*	42.0%; 362	*131.603; 1;* ***0.000****; 0.274*	34.8%; 299
Above 12 years total work experience (median)		86.0%; 771		14.1%; 127		11.7%; 105

Source: own computations based on the survey data.

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In case of the current form of employment, it turned out that commercial banks more often than cooperative ones tap flexible forms of employment and concurrently less often use indefinite employment contract. This can be explained by the more corporate nature of commercial banks, another way of managing them and a different organizational culture of these two types of banks (2008). The staff at commercial banks are younger, they have less seniority (shorter length of service with the current employer) in banking and shorter total work experience (The average age of an employee at commercial banks was 35.03 and at cooperative banks 41.16 (F=34.218, p=0.000, t=-10.811, df=647.934, p=0.000). The average length of work experience with current employer at commercial banks was 8.32 and at cooperative banks 13.96 (F=87.746, p=0.000, t=-9.583, df=590.630, p=0.000). The average length of work experience in banking at commercial banks was 10.58 and at cooperative banks 15.99 (F=105.328, p=0.000, t=-9.127, df=611.426, p=0.000). The average length of total work experience at commercial banks was 13.37 and at cooperative banks 19.28 (F=75.984, p=0.000, t=-9.748, df=648.432, p=0.000)). In addition, they are rarely absent from work, which reflects a higher level of employee discipline than of those who work in cooperative banks (The average number of days absent from work in the last year (not including annual leave) at commercial banks was 9.5 and at cooperative banks 14.13 (F= 7.441, p=0.007, t=-2.054, df=203.778, p=0.041).

For both the first and the current forms of employment, it turned out that banks whose majority shareholders are foreign investors, make use of flexible forms of employment more often than ones owned by domestic capital. This is due to the fact that all cooperative banks in Poland have majority domestic capital, whereas most of commercial banks are predominantly owned by foreign investors (The average age of an employee at banks with majority of national capital was 38.82 and at banks with majority of foreign capital 34.21 (F=43.076, p=0.000, t=10.020, df=1642.829, p=0.000). The average length of work experience with current employer at banks with majority of national capital was 11.82, and at banks with majority of foreign capital 7.74 (F=94.161, p=0.000, t=9.213, df=1567.994, p=0.000). The average length of work experience in banking at banks with majority of national capital was 14.11 and at banks with majority of foreign capital 9.85 (F=97.386, p=0.000, t=9.493, df=1599.274, p=0.000). The average length of total work experience at banks with majority of national capital was 17.08 and at banks with majority of foreign capital 12.621 (F=77.751, p=0.000, t=9.340, df=1659.010, p=0.000). The average number of days absent from work in the last year (not including annual leave) at banks with majority of national capital was 10.84 and at banks with majority of foreign capital 10.05 (F=1.466, p=0.226, t=0.498, df=685, p=0.619).

Women are slightly less likely than men to be employed at the beginning of their careers within the framework of flexible forms of employment. If we assume that a typical employment contract for an indefinite period is the safest and most desirable form of employment, it undermines the argument of discrimination against women at the workplace. Simultaneously, the gender (female) is positively associated with higher job insecurity (Ištoňová and Fedáková 2015). Muster's research confirms that Polish women choose flexible forms of employment because they allow them to combine the role of mother and employee. At the same time, they give less respect and social respect (2012). Discrimination against women in banks requires further analysis, however.

The results obtained in relation to the size of the employees' branch locality are varied. Its interpretation requires a broader analysis.

New questions arose in the next analysis of the forms of employment: is the first employment based on a particular form of employment favouring this form of employment in the future? Or is the first employment within the framework of the flexible forms of employment conducive to further employment on the same basis?

In other words, will the persons who were employed under a flexible form of employment have a real chance of subsequent employment under a contract of employment for an indefinite period? Due to the small sample size in

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the case of flexible forms of employment, and due to the lack of statistical significance in the case of fixed-term contracts, one can draw conclusions from table 11 only to a limited extent.

Table 11. Correlations of first and current forms of employment

	Chi-squared	df	significance	Phi Yula
Fixed term contract – first and current	0.364	1	0.547	0.015
Indefinite employment contract – first and current	13.524	1	**0.000**	0.091
Contract of mandate, contract for specific work – first and current	262.462	1	**0.000**	0.401
Agency agreement – first and current	521.827	1	**0.000**	0.565
Work contracting – first and current	27.980	1	**0.000**	0.131
Self-employment – first and current	480.375	1	**0.000**	0.542
Job sharing – first and current	302.807	1	**0.000**	0.431
Probationary period contract, replacement employment contract – first and current	39.829	1	**0.000**	0.156
On-call employment – first and current	0.001	1	0.980	0.001
All flexible forms of employment together – first and current	12.951	1	**0.000**	0.089

Source: own computations based on the survey data.

It is important that only a small part of people who are employed at banks for the first time for an indefinite period, will further be employed under this form (0.091 correlation). It means that the change in the forms of employment is really possible. At the same time, it should be remembered that the elasytical forms of employment differently than in the past are also used in the case of employment of specialists (Muster 2012) and the banking sector is specific and many banks offer the possibility of developing, according to the specific promotion paths related to training (Davydenko**,** Kaźmierczyk, Romashkina, Żelichowska, 2017).

Conclusions

The carried out analysis allowed us to assess the popularity of flexible forms of employment in banks and compare its levels in different social groups. There are gropus of emploees or groups of banks caracterised by sporadic flexible forms of employment (senior managerial position 7.5%; university education (major in economics) 23.9%; cooperative bank 20.1%; banks with majority of national capital 23.6%; above 35 years old 13.7%; above 7 years work experience with current employer 12.1%; above 10 years work experience in banking 12.6%; above 12 years total work experience 14.1%). Moreover, the conducted study confirmed the posed thesis, namely that flexible forms of employment are more common among young people, who are at the beginning of their professional career, than among workers with seniority. This thesis has been confirmed both with regard to the employees' first and the current form of employment. It is important that flexible forms of employment are more popular among young people with less work experience at the present employer, less experience in banking and less job seniority in general.

The results of the empirical analysis also support the second thesis, which assumed that flexible forms of employment are less frequent among managerial staff. The higher a banker's position on the career ladder, the more likely he or she is to enter into the traditional employment contract for an indefinite period of time rather than one of the flexible forms of employment. This thesis has been confirmed only in relation to the current form of employment. All employees, including future managers, are more likely to enter into flexible forms of employment when at the beginning of their career.

A number of areas that require further in-depth analysis have emerged from this study. For example, females at the beginning of their professional career are slightly less likely than males to be employed in flexible forms of employment. This counters the expected argument, especially in the context of the discrimination of females on the labour market. Another area that requires further research is the influence of the size of the banks' locality on the use of flexible forms of employment. The relevant data obtained are inconclusive.

All the empirical analysis based on sample of bank employees in Poland, thus the results could not be the same in different countries and professional groups. Moreover, bankers are only a part of the financial sector workers and react in different way to the business cycle changes. It will be interesting to study flexible forms of employment in a conditions of business crisis. It requires survey of employees in different phases of business cycles. Probably some new insights considering flexibility could be reached by analysing psychological stress and job insecurity of workers. Furthermore, the results obtained in relation to the size of the employees' branch locality requires a broader analysis. The relationship between flexible forms of organisation, shamrock organization by Ch. Handy and education level also requires confirmation by additional studies.
Banks in Poland (especially the commercial ones and banks with the majority of foreign capital) commonly make use of flexible forms of employment. In view of the above-mentioned social changes and the increasing importance of young employees [on the job market], the following questions arise: What are their expectations? Do they really want flexible forms of employment? Would they not prefer to have a stable job, which would give them the opportunity to take out a mortgage?

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TOWARDS QUALITY ASSURANCE OF THE STUDY PROCESS USING THE MULTI-CRITERIA DECISION-MAKING METHOD

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Abstract. The article explores in detail higher education studies that appear as one of the essential university processes. University studies are not a new phenomenon; however, they are overwhelmed by the volume of information surrounded by a wide range of diverse stakeholders. Therefore, the university inevitably needs changes in the adequate fulfillment of its mission thus meeting and harmonizing the expectations of different stakeholders of modern society and the state. Therefore, the concept and role of the study process itself in society are changing. The studies considered to be timely and qualitative are becoming a more and more relevant question to universities. Based on the previous scientific analysis of the study process at the university level and a concept of Quality Assurance for university studies formulated by the Bologna Process, the article examines the relationships and importance of the components (criteria) composing the study process at the university level. The article is aimed at revealing the diversity of the study process and at evaluating the importance and significance of the criteria composing it. To achieve this goal, the multi-criteria decision-making method the Analytical Hierarchy Process were invoked. The representatives of two major Lithuanian universities participated in the carried out research the results of which demonstrated that the criteria of the study process were fundamentally different, and some of those were difficult to measure applying quantitative parameters. Despite this circumstance, giving more attention to a combination of criteria for a particular process of university studies creates conditions for purposeful modeling the study process and the pursuit of high-quality university studies.

Keywords: study process; universities; Bologna Process; Multi-Criteria Decision-Making Method; Analytical Hierarchic Process (AHP)

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Additional disciplines: mathematics; education management

1. Introduction

Probably there is a little to argue that the performance of higher education institutions and universities in particular, are multidimensional, complex and dynamic in its origin. Surrounded by a large-scale of diverse stakeholders, universities are training and developing a new generation by providing information, teaching, the use of research methods and new knowledge based on the latest scientific achievements. Universities are one of

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the oldest forms of organization. Despite that fact, the implementation of higher education studies is one of the main operational processes implemented by universities. The need for the high-quality performance of universities is determined by rising competition among them, the aim to improve internal activities and demand from stakeholders to create value for money (Asif & Searcy, 2014; Dalati & Al Hamwi, 2016; Oganisjana *et al.* 2017).

That is why such questions as 'what studies at the university level can be considered as high-quality' and 'how to assess whether the studies at the university level are of high-quality' are extremely relevant in the context of contemporary global higher education.

In the ancient Greek, the term 'arête' meant perfection. Aristotle argued that the distinctive quality of a knife was its sharpness. It follows that the main purpose of the knife is to cut, and thus a good knife should be the one cutting well. Following this idea, we are trying to find out the "arête" of the studies at the university level.

The article is aimed at analysing the process of the studies at the university level from a qualitative point of view based on the principles of the internal quality assurance of higher education developed by the European Higher Education Area using multi-criteria assessment research methods.

The study process at the University consists of many entirely different elements. Study programmes, learning outcomes, a necessity of human and material resources, infrastructure, international mobility for students and career planning opportunities should be only a few points in the long list. During the process, a large number of different types of information from student admission conditions to their satisfaction with studies, alumni activities and monitoring a professional career path of graduates are available. The process involves a wide range of different stakeholders, including students, lecturers, university administration, business and employers. It should be noted that the above listed social stakeholders have different expectations and understanding of what kind of the studies at the university level are qualitative. To sum up, the complexity of the prior listed elements determines a specific model for the studies at the university level discussed in this research.

The analysis of the study process at the university level was based on the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) (ENQA, 2015). The frame mentioned above enabled to select, structure and analyse different components of the study process, more specifically, criteria. A review of multi-criteria decision-making assessment methods revealed they could be applied for examining social phenomena or constructs. The article referred to the analytical hierarchy method (AHP) (Saaty, 1994) and the detailed analysis of the study process at the university level the matrixes of the criteria of which had been developed according to the AHP methodology. The assessment involved the participation of the representatives of two largest Lithuanian universities.

The analysed research results revealed that the criteria for the study process at the university-level were different concerning their nature and a degree of complexity. Some of them are difficult to measure employing quantitative parameters. The compatibility of expert opinions with the analyzed phenomenon was difficult to reach. Nevertheless, the results of the carried out research allow forming a model of the criteria for the study process at the university level, which can be useful for university policymakers by modelling the study process in the best possible way, satisfying the expectations of social stakeholders and striving for the highest quality of the studies at the university level.

The article is organized as follows. The first part provides the theoretical background of the quality of the studies at the university level. The second part presents the study process modeled for the university according to the standards and guidelines for ESG. The criteria for the study process have been compiled and grouped. The third

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part describes research results obtained applying the multi-criteria assessment method and suggests conclusions and insights for further research.

2. Theoretical Discussion: the Study Process and its Quality at the University Level

In the past decades, the study process at the university level has been widely discussed and studies considering various aspects by scientists worldwide analyzed. In 2010, the Agency for Quality Assurance in Higher Education in Greece conducted the study for determining the importance of the criteria for measuring the quality of higher education (Tsinidou, Gerogiannis, & Fitsilis, 2010). This research and other works (Law, 2010), (Narang, 2012), (Ardi, Hidayatno, & Zagloel, 2012) analysed the significance of the criteria for the study process at the university level from student perspective. Also, research papers exploring the ways of how to integrate students into the quality assurance procedures of the higher education institution (Elassy, 2013), (Elassy, 2015), quality improvement (Poole, 2010), the role of academic staff in internal quality assurance in higher education in Georgia (Shurgaia & Shurgaia, 2015), the national accreditation policy and quality assurance in higher education in Egypt (Schomaker, 2015), the effect of quality and quality assurance on private higher education institutions in China (Cao & Li, 2014) have been reviewed. Other works made attempts to develop and substantiate the quality management model for higher education services at the universities in Japan (Sultan & Wong, 2010), to analyse the relationship between university autonomy and control over quality management (Beerkens, 2011), external evaluation and university transformation in Finland (Haapakorpi, 2011) and process management (Kettunen, 2012). Another area covered research analysing student satisfaction, more precisely differences between student initial expectations and real experience during the studies at the university (Arif, Ilyas, & Hameed, 2013). The studies of the expectations of different social stakeholders into the quality of higher education were made by Sandmaung *et al* (2013) (Sandmaung & Khang, 2013). The empirical analysis of the relationship between quality culture and work efficiency in higher education institutions was performed by (Ali & Musah, 2012).

Quality assurance is a continuous evaluation process that involves assessing (monitoring, assurance, maintenance, improvement) a university as an institution, a university unit or a study programme. In these cases, the focus is switched on two aspects: accountability and improvement. The procedure provides data and information on decisions regarding the setup process and the assessment of the set criteria. Quality assurance can be either internal (set and developed by the institution) or external (initiated by the association or quality assurance agency), particularly in the cases where it is considered as a prerequisite for the institution to receive funding, to be accredited or to obtain or pursue its activities (Vlăsceanu, Grünberg, & Pârlea, 2007).

A review of research papers devoted to this area emphasizes the significance and relevance of the subject throughout the world. Nevertheless, there is not much scientific material that comprehensively and empirically analyses the process of higher education at the university level as a whole. This work refers to the concept assuring study quality as the central axis for measuring and evaluating the quality of higher education at the university level. The concept of quality assurance in higher education is under development by the European Bologna Process for the second decade. The European Standards and Guidelines for Quality Assurance in Higher Education (ESG) can be considered as a comprehensive instrument for assisting universities with ensuring the quality of studies they provide (ENQA, 2015). The latest ESG version released in 2015 defines the internal quality assurance of the studies at the university level in the following parts (Table 1):

Table 1. Internal quality assurance of university studies based on ESG provisions (*Source:* compiled by the authors and based on ESG provisions)

Chapter	Description	Key terms
1. Policy on quality assurance	Universities should have a publicly available quality assurance policy as a part of its strategic management.	Quality assurance Continuous improvement

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	Internal stakeholders should develop and implement this policy through the established structures and processes, including external social actors	Accountability Quality culture Stakeholders Processes
2. Design and approval of study programmes	Universities should follow the process of developing and validating study programmes that should be designed in such a way that they could achieve their objectives, including the intended learning outcomes. The qualifications provided by the programme should be clear, communicated and in line with the level of the defined national qualification framework as well as with the level of qualifications of the European Higher Education Area	Study programmes Learning outcomes Study workload Approval of study programmes
3. Student-centered learning, teaching and assessment	Universities should ensure that study programmes are conducted in a way that encourages students to take an active role in the learning process while the conducted student assessment reflects this approach	Students motivation Reflection Flexible learning paths Variety of teaching methods Self-studies (individual learning) Student appeal procedures
4. Student admission, progression, recognition and certification	Universities should prepare and publish rules covering all stages of the student cycle such as admission, the regulation of the learning path during the study, recognition, certification	Student admission (enrolment conditions) Introduction to studies and a study programme Progression Mobility Recognition and certification
5. Teaching staff	Universities should take care of their teacher competencies and should have a fair and transparent process of recruiting and improving their competences	Suitable teaching environment Competent teachers Transparency
6. Learning resources and student support	Universities should have adequate funding to provide teaching and learning activities and easily accessible learning resources and facilities	Library IT infrastructure (resources) Mentors Providing information
7. Information management	Universities should ensure the collection, analysis and use of appropriate information for the effective management of their programs and other activities	Data collection Suitable indicators Student data Student satisfaction with studies Drop-out rates Career opportunities for graduates
8. Public information	Universities must make public information about their activities, including programmes, in a clear, objective, timely and easily accessible way	
9. On-going monitoring and a periodic review of programmes	Universities should periodically monitor and review their study programmes in order to ensure that they meet the set goals and student and society needs. The reviews should help with further improvement in the programmes. Any planned or performed action should be communicated publicly	Content of study programmes Changing needs of society Student workload Progression Recognition and certification Effectiveness of student evaluation Student expectations, needs and satisfaction with a study programme Learning environment
10. Cyclical external quality assurance	Universities should carry out periodical external quality assurance according to the ESG standards and guidelines	Ensuring the implementation of improvement after the external evaluation of the programme

Table 1 reveals the complexity of the quality assurance of the study process. It is composed of 10 chapters with nearly 40 key terms to describe the scope. The majority of research papers that has been analysed during this

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research evaluates or analyses one or only few components of this complex process. In order to analyse the whole process, we continued our research towards the direction proposed by the ESG.

3. Research Methodology

As mentioned by Mazurek and Perzina, (2017) pairwise comparison as a tool for decision making or measurement was considered in the works by Franciscan tertiary Ramon Llull (1275) or Marquis de Condorcet (1785). For the first time, the theory of pairwise comparison was provided by L. L. Thurstone in 1927. The methods of pairwise comparison were often criticized as too sophisticated; however, they had an excellent mathematical basis. Since early 1980s, pairwise comparison has become the central point of the analytic hierarchy process (AHP) and the analytic network process (ANP) introduced by T. L. Saaty along with his fundamental scale for pairwise comparison ranging from 1 to 9 (Saaty, 1980, 1990 and 2008). The AHP/ANP proved to be a useful tool in many areas of human action involving multiple criteria decision making such as economics, management and marketing, construction, medicine, politics, environmental protection, etc. An overview of AHP applications can be found in a number of works (for references see, e.g. (Mazurek & Perzina, 2017).

Multi-criteria assessment methods were used by the scientists for solving complex phenomena and decision-making. The choice of the AHP method was also determined by its universal characteristics compared to other multi-criteria assessment methods.
The advantages of the AHP method are as follows (Poškas, Poškas, Sirvydas, & Šimonis, 2012),:

- arithmetic mean is used for group decision-making,
- the structure of the task is hierarchical,
- assures the compatibility of the estimates,
- quantifies qualitative criteria (indicators),
- uses different dimensional criteria,
- the method is of medium complexity,
- requires the average (medium) labour cost in its application.

This work uses the AHP (Analytic Hierarchy Process) for evaluating the significance of the criteria and is based on the expert-filled dual matrix comparison. This method was described by T. Saaty in 1980 (Saaty, 1980). The choice of the method is conditioned by the fact that the significance of the indicator shows the expert opinion on the importance of the indicator for choosing the best alternative from the list of the alternatives under consideration. The components are hierarchically structured depending on their importance (Saaty, 1993). The more depth an expert puts into the analyzed system, the more accurate the forecasts and decisions will be. The theory of the method is based on human thinking. Faced with most of the controlled and uncontrolled elements that make up a difficult situation, the human mind attributes them to groups. The hierarchical system is developed to make a decision and involves several levels each of which is made of corresponding elements, i.e. criteria. Due to an uneven effect of the criteria, there was a need to determine the intensity of the impact and the importance of the criteria also known as weighting the criteria reflecting the opinion of expert evaluators on the importance of the criteria in comparison with other criteria (Lin, 2010; Nukala et al., 2005; Yang and Shia, 2002).

Succeeding the analysis of the papers devoted to the concept of quality assurance described in the theoretical part and in order to analyse the study process at the university level in a more detailed way from the qualitative approach, the following methodology has been chosen. At the first stage of the research, a questionnaire of pairwise criteria for the study process at the university level was prepared, which was done taking into account the concept of the quality assurance of internal studies according to ESG and the analysis of multi-criteria evaluation methods. The criteria for the study process at the university level I_j, j = 1,...,30 were divided into thematic groups D_m, m = 1, ..., 7 each of which comprised 3 to 5 criteria.

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Conducting a precise assessment of the quality assurance system at the university level is necessary for determining the significance of the components of the quality assurance system of the study process and criteria that make up them (Table 2). A set of the specific criteria describing the significance of the thematic group will reveal its importance, i.e. how much the criteria are higher or lower compared with other criteria.

Table 2. The specification of the content of the areas of the quality assurance system (thematic groups) and criteria (sub-factors) of the study process (*Source*: compiled by the authors)

Areas (thematic groups)		Criteria (sub-factors)	
Quality assurance policy	D_1	• continuous improvement • quality culture • accountability • stakeholders	I_1 I_2 I_3 I_4
Study programmes	D_2	• learning outcomes • student workload • institutional approval • monitoring and supervision • changes in external expertise	I_5 I_6 I_7 I_8 I_9
Students	D_3	• motivation, reflection • flexible learning paths • variety of pedagogical methods • independent learning • procedures for student complaints	I_{10} I_{11} I_{12} I_{13} I_{14}
Conditions for studies	D_4	• student admission • introduction to the programme • student progression • mobility • student certification	I_{15} I_{16} I_{17} I_{18} I_{19}
Teachers	D_5	• supportive environment • competent teachers • transparent recruitment	I_{20} I_{21} I_{22}
Study resources	D_6	• library • IT infrastructure • human support	I_{23} I_{24} I_{25}
Information	D_7	• relevant indicators • timely data • student satisfaction • drop-out rates • career paths	I_{26} I_{27} I_{28} I_{29} I_{30}

As for the second part of the research, the survey of experts E_k, k = 1, ..., 10 was conducted in February-May 2018. The experts from two largest universities in Lithuania, including Vilnius University (VU) and Vilnius Gediminas Technical University (VGTU), participated in the performed examination. The selected experts were university representatives holding a doctorate degree and having academic and administrative experience at the university. The expert group consisted of the present and former Deans and Vice-Deans of the faculties, Professors and the Heads of study programmes. The participants were professionals in their fields and developed and implemented the study process at the universities their represented. For expert selection, gender equality was taken into consideration.

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Following the research question, the experts were asked to evaluate the importance of the criteria of the study process, but not asked to evaluate the quality of the study process in the universities their represent.
The systematization and analysis of the collected data using the AHP method was performed in the third part of the research measuring the compatibility of expert opinions and calculating the weights of the criteria composing the study process at the university level.

4. The Application of the AHP Method for Assessing Criteria for the Study Process at the University Level

Let us recall that E_k, k = 1, ..., 10 denotes the kth expert. In addition, D_m, m = 1, ..., 7 and I_j, j = 1,...,30 denote the mth area and the jth criterion (see Table 2) accordingly. As it is mentioned above, to make a decision on the order of the priorities of criterion I_j in areas D_m, the AHP method (Satty, 2008) is used. The point of the method is the pairwise comparison of criterion I_j that is performed by each expert E_k separately in all areas D_m. To make a comparison, experts need a scale of the numbers indicating how many times one more important or dominant criterion is over another with respect to the property they are compared. Table 3 indicates the scale proposed by Satty (1980).

Table 3. The fundamental scale of absolute numbers (*Source:* Satty, 2008)

Intensity of importance	Definition	Explanation
1	Equal importance	Two criteria contribute equally to the objective
2	Weak or slight	
3	Moderate importance	Experience and judgement slightly favour one criterion over another
4	Moderate plus	
5	Strong importance	Experience and judgement strongly favour one criterion over another
6	Strong plus	
7	Very strong or demonstrated importance	A criterion is favoured very strongly over another; its dominance demonstrated in practice
8	Very, very strong	
9	Extreme importance	The evidence favouring one criterion over another is of the highest possible order of affirmation

Let's assume that w is the intensity of importance. Using Table 3, an expert constructs the tables of pairwise comparison. The criteria in the rows are compared with those in the columns. If a criterion in the row is more important than the one in the column, then, the corresponding cell is filled by number w. In another case, the expert uses the inverse intensity of importance, i.e., $1/w$. If criteria are of equal importance, then, the cell is filled by number 1. As an example see Table 4 representing the pairwise comparison of criteria I_1, I_2, I_3, I_4 (continuous improvement, quality culture, accountability, stakeholders) assigned by expert E_1.

Table 4. The pairwise comparison of criteria I_1, I_2, I_3, I_4 assigned by E_1 (*Source:* compiled by the authors)

D_1	I_1	I_2	I_3	I_4
I_1	1	1/5	3	5
I_2	5	1	9	9
I_3	1/3	1/9	1	3
I_4	1/5	1/9	1/3	1

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According to the opinion of E_1, criteria I_1 and I_3, I_3 and I_4 are of moderate importance, I_1 and I_4 are of moderate plus importance. In addition, E_1 strongly favour I_2 over I_1. Also, the evidence favouring I_2 over I_3 and I_4 is of the highest possible order of affirmation.

According to the same manner, all E_k made decisions on pairwise comparison tables. Every expert made the pairwise comparison of criteria in 7 areas, and therefore 70 pairwise comparison tables were constructed in total. Since all criteria are pairwise compared, the determination of the generalized weight (significance) of the criteria could be performed. Hence, the following sequence (see Table 5) should be implemented.

Table 5. The sequence of the AHP method

1.	*To create pairwise comparison matrices* $P_m^{(k)} = (p_{ij}^{(k)})$, *where* p_{ij}, $i, j = 1, ..., n$, *denote the pairwise comparison of* criteria I_i *and* I_j . Recall that k and m denote, respectively, the number of expert E_k, $k = 1, ..., 10$, and area D_m , $m = 1, ..., 7$, where n – the total number of criteria in the relative area, p_{ij} is the ratio of the ith and jth ranks assigned by the kth expert. Clearly, the considered instant elements of pairwise comparison matrices are coincident with the elements of pairwise comparison tables. Let us note, that $p_{ii}^{(k)} = 1$ and $P_m^{(k)}$ is an inverse symmetrical matrix, i.e. $p_{ij}^{(k)} = 1/p_{ji}^{(k)}$. The number of the non-recurrent elements of the nth-order matrix $P_m^{(k)}$, i.e. the number of the elements compared, is $n(n-1)/2$ (the total number of the elements of the comparison matrix is equal to n^2). Hence, for larger n, the task of comparison becomes more tedious and time-consuming. Moreover, as provided by (Mazurek and Perzina 2017), the human brain is capable of processing only up to 7 pieces of information at the same time. This indicates that the more criteria are compared, the more inconsistent these comparisons will be. Nevertheless, the proof for this claim is missing as there are no studies known to the authors investigating the issue.
2.	*To ensure the consistency of pairwise comparison matrix* $P_m^{(k)}$. The necessary condition for the consistency of the comparison matrix is the transitivity of the significance of the elements of matrix $P_m^{(k)}$. In the ideal case, the following equalities are satisfied: $$P_m^{(k)} q_m^{(k)} = n q_m^{(k)},$$ where $q_m^{(k)} = (q_{m,1}^{(k)}, ..., q_{m,n}^{(k)})^T$ are an eigenvector of $P_m^{(k)}$. It is a well-known mathematical problem of eigenvalues and eigenvectors: $$P_m^{(k)} q_m^{(k)} = \lambda_m^{(k)} q_m^{(k)}, \quad \textbf{(1)}$$ where $\lambda_m^{(k)} = n$ is an eigenvalue of matrix $P_m^{(k)}$, and n is the number of the criteria to be compared. As mentioned in (Saaty 1980, 1990, 2008; Ginevičius *et al.* 2004; Podvezko 2009), the AHP method is aimed at determining the weights of criteria and assessing the consistency of questionnaires elicited from the experts. For this purpose, a complicated practical eigenvalue problem should be solved as follows.

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2.1. First of all, let's create normalized decision-making matrix $B_m^{(k)} = (b_{ij}^{(k)})$, where

$$b_{ij}^{(k)} = \frac{p_{ij}^{(k)}}{\sum_{i=1}^{n} p_{ij}^{(k)}}. \qquad \textbf{(2)}$$

2.2. Find the largest eigenvalue of $P_m^{(k)}$. The problem of eigenvalues and eigenvectors is difficult to solve manually, and thus we calculate the approximate values of eigenvectors and respective largest eigenvalues. We calculate the eigenvector as the weight (significance) of criteria,

$$q_{m,i}^{(k)} = \frac{1}{n}\sum_{j=1}^{n} b_{ij}^{(k)}, \qquad i = \overline{1,n}. \qquad \textbf{(3)}$$

Let's remark, that the higher is the value of $q_{m,i}^{(k)}$, the higher is the importance of criterion I_i.

The use of (1) and (3) gives the approximate values of $\lambda_m^{(k)} = \left(\lambda_{m,1}^{(k)},...,\lambda_{m,n}^{(k)}\right)$.

2.3. It is known (see, e.g. Satty 1990) that the largest eigenvalue of the inverse symmetrical *n*th-order matrix is $\lambda_{\max}^{(k)} \geq n$. In the ideal case, when the matrix is absolutely consistent and the elements of the columns are proportional, $\lambda_{\max}^{(k)} = n$. Accordingly, in this case, the calculated values $\lambda_m^{(k)} = \left(\lambda_{m,1}^{(k)},...,\lambda_{m,n}^{(k)}\right)$ must be equal to *n*. If all values $\lambda_{m,i}^{(k)}$ differ, then, approximately

$$\lambda_{\max}^{(k)} = \frac{1}{n}\sum_{i=1}^{n} \lambda_{m,i}^{(k)}. \qquad \textbf{(4)}$$

2.4. For consistency index $S_I^{(k)}$ of $P_m^{(k)}$, we adopt values (see, e.g. Satty 1990)

$$S_I^{(k)} = \frac{\lambda_{\max}^{(k)} - n}{n-1}. \qquad \textbf{(5)}$$

It is the negative averages of the other roots of the characteristic polynomials of $P_m^{(k)}$. The smaller is the consistency index, the higher is the consistency of the pairwise comparison matrix. In the ideal case, $S_I^{(k)} = 0$.

2.5. Now, let's calculate the degree of consistency

$$S_m^{(k)} = \frac{S_I^{(k)}}{S_A}, \qquad \textbf{(6)}$$

where random consistency index S_A is given in Table 6. Let us note, that $P_m^{(k)}$ is consistent if $S_m^{(k)} \leq 10\%$ is acceptable. In another case, an expert is asked to revise his/her judgments. Otherwise, the created pairwise comparison matrix cannot be used for further investigations. However, this rule was criticized by some authors, see e.g. (Koczkodaj 1993). In the ideal case, $S_m^{(k)} = 0$. For information on how the inconsistency of pairwise comparison in the AHP framework changes when the number of the criterion to be compared increases, see e.g. (Mazurek and Perzina 2017).

3. *To test the consistencies of expert judgments*. Considering the results above, it is significant to determine the consistencies of expert judgments. Thus, Kendall's coefficient of concordance W_m (Kendall 1990) is used. The following calculation scheme is suggested.

3.1. Calculating the sum of the deviations from the squares of criterion ranks from the averages of criterion ranks:

$$z_m = \sum_{j=1}^{n}\left(\sum_{k=1}^{r} c_{m,j}^{(k)} - a^2\right)^2, \qquad a = \frac{1}{n}\sum_{j=1}^{n}\sum_{k=1}^{r} c_{m,j}^{(k)}, \qquad \textbf{(7)}$$

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where $c_{m,j}^{(k)}$ is the rank of the j*th* criterion in the *m*th area for the *k*th expert. Ranking is a procedure when the highest rank equal to 1 is devoted to the most important criterion (with the highest weight), the second rank is devoted next to the most important criterion, etc.

3.2. Kendall's coefficient of concordance is calculated according to the formula

$$W_m = \frac{12Z_m}{m^2(n^3 - n)}. \quad \textbf{(8)}$$

If the judgments of the experts are consistent $W_m = 1$, otherwise $W_m = 0$.
In order to determine the significance of the concordance coefficient, the further hypothesis should be tested:
H_0: the judgments of the experts are inconsistent ($W_m = 0$); H_1: the judgments of the experts are consistent ($W_m > 0$).

3.3. It was proved by Kendall that if the number of criteria is $n > 7$, then, the significance of the concordance coefficient could be determined with the help of criteria χ^2, as the random variable

$$\bar{\chi}_m^{\,2} = W_m r(n-1) = \frac{12Z_m}{rn(n+1)} \quad \textbf{(9)}$$

is distributed according to χ^2 - distribution with $\nu = n - 1$ degrees of freedom. The significance of concordance coefficient W_m is performed by comparing $\bar{\chi}_m^{\,2}$ with critical values $\chi^2_{\alpha,\nu}$ from chi-squared distribution with ν degrees of freedom and selected confidence level α. If $\chi^2_m > \chi^2_{0,05;\nu}$, then, H_0 is rejected, which means that the dependence between the judgments of the experts exist. Let's note, that if $3 < n \le 7$, then, the distribution of χ^2 must be applied choicely, as in the case where $\bar{\chi}_m^{\,2} \le \bar{\chi}^2_{\alpha,\nu}$, the judgments of the experts may be consistent. In this instance, critical values $S_{\alpha,n}$ from the table of those of Kendall's coefficient of concordance (Friedman 1940) are compared with Z_m values. If $Z_m > S_{\alpha,n}$, then, H_0 is rejected.

4. *To calculate general weights.* If the judgments of the experts are consistent, then, conclusions about the significance of the criteria should be performed by calculating general weights, i.e. the average of (2):

$$\bar{q}_{m,i} = \frac{1}{n}\sum_{k=1}^{r} q_{m,i}^{(k)}, \qquad i = \overline{1,n}. \quad \textbf{(10)}$$

The higher is the value of (10) , the higher is the importance of criterion I_i .

Table 6. The values of random consistency index S_A (*Source:* Saaty, 2008)

n	1	2	3	4	5	6	7	8	9	10	11	12
S_A	0	0	0,52	0,89	1,11	1,25	1,35	1,40	1,45	1,49	1,52	1,54

According to the steps from Table 5, the results and conclusions, according to the significance of the criteria listed in Table 2, are derived. First, the consistency of pairwise comparison matrices $P_m^{(k)}$ was tested. The use of (4) – (6) gives the degrees of consistency $S_m^{(k)}$ (%) (see Table 7) of pairwise comparison matrices.

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Table 7. The inconsistency ratios of pairwise comparison matrices (*Source:* compiled by the authors)

$S_m^{(k)}$ / E_k	$S_1^{(k)}$	$S_2^{(k)}$	$S_3^{(k)}$	$S_4^{(k)}$	$S_5^{(k)}$	$S_6^{(k)}$	$S_7^{(k)}$
E_1	7,00	7,29	7,53	9,00	1,48	6,30	8,72
E_2	6,93	8,10	9,38	8,69	7,90	7,45	8,80
E_3	1,15	9,06	7,05	8,15	2,82	6,33	9,80
E_4	7,82	8,74	8,78	6,93	2,82	2,81	6,53
E_5	9,90	8,67	6,99	8,31	7,82	6,30	8,68
E_6	9,37	81,53	18,18	52,49	7,82	9,15	25,49
E_7	6,81	39,78	84,69	35,30	60,16	0,89	27,54
E_8	7,54	9,28	9,85	8,07	4,65	0,89	9,09
E_9	8,26	6,80	9,85	8,35	0,72	7,79	8,66
E_{10}	4,44	5,91	0,63	0,63	3,72	0,89	0,63

Here, blue areas highlight such values of $S_m^{(k)}(\%)$ because rule $S_m^{(k)}(\%) \le 10\%$ is unsatisfied.

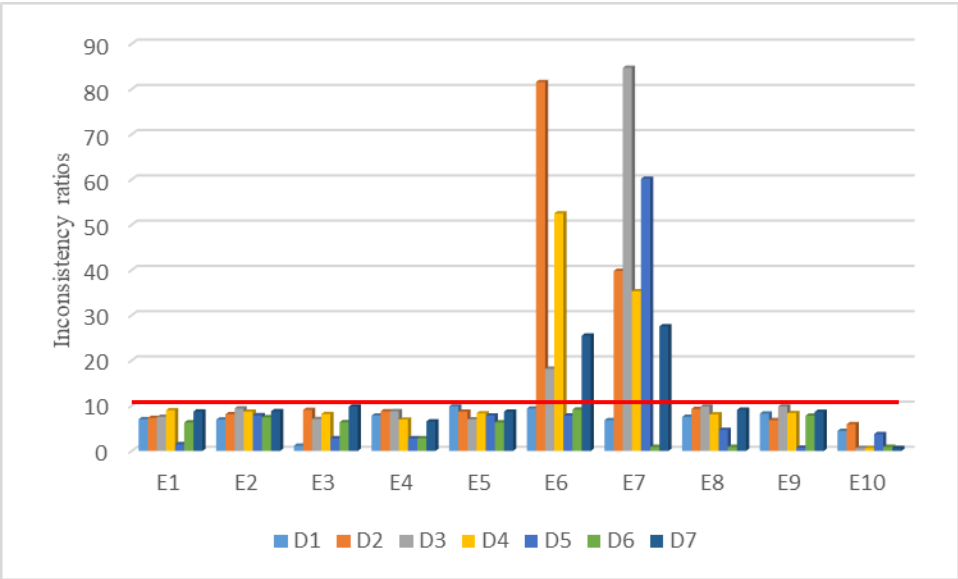

Fig.1. The inconsistency ratios of pairwise comparison matrices (*Source*: compiled by the authors)

First, since $S_m^{(6)}(\%) > 10\%$, $m = 2, 3, 4, 7,$ and $S_m^{(7)}(\%) > 10\%$, $m = 2, 3, 4, 7,$ (see Table 7 and Fig. 1), pairwise comparison matrices $P_m^{(6)}$, as m = 2, 3, 4, 7, and $P_m^{(7)}$, as m = 2, 3, 4, 5, 7, are inconsistent. Respective pairwise comparison matrices were created by experts E_6 and E_7 in areas D_2, D_3, D_4, D_7. As mentioned in Table 5, inconsistent pairwise comparison matrices cannot be used for further research, unless experts were asked to revise

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their judgments. Only pairwise comparison matrices for which $S_m^{(k)}(\%) \leq 10\%$ were selected for further decisions, i.e. the next stage of research.

Second, Table 5 shows the consistencies of expert judgments that should be performed. Thus, according to (7) - (9), the values of Z_m, W_m, χ_m^2 are calculated in every area D_m (see Table 8). Also, critical values $\chi_{\alpha,\nu}^2$ with $\nu = n-1$ degrees of freedom and $S_{\alpha,n}$ with confidence level α = 0,05 are selected (see Table 8).

Table 8. The consistency of expert judgments (*Source:* Personal elaboration, https://www.di-mgt.com.au/chisquare-table.html and Friedman, 1940)

	D_1, $n = 4$	D_2, $n = 5$	D_3, $n = 5$	D_4, $n = 5$	D_5, $n = 3$	D_6, $n = 3$	D_7, $n = 5$
W_m	46	61	62	40	81	39	58
χ_m^2	10,95	19,60	19,90	12,70	13,00	6,25	18,50
$\chi_{\alpha,\nu}^2$	7,82	9,49	9,49	9,49	5,99	5,99	9,49
Z_m	146,00	392,00	398,00	254,00	104,00	50,00	370,00
$S_{\alpha,n}$	101,70	183,70	183,70	183,70	48,10	48,10	183,70

Let us note, that all areas take $\chi_m^2 > \chi_{0,05;\nu}^2$, and thus, according to step 3.3 from Table 5, H_0 are rejected in all areas and there is no reason to discredit the consistencies of expert judgments. The same conclusion follows if we use critical values $S_{\alpha,n}$ from the table presenting the critical values of Kendall's coefficient of concordance as in all cases $Z_m > S_{0,05,n}$.

Since expert judgments E_k, $k = 1, ..., 10$ are consistent, the significance of criterion I_j, $j = 1,\ldots,30$ could be tested. Table 9 shows the results of the weights (2) of the *j*th criterion assigned by the *k*th expert E_k in separate areas D_m, $m = 1, ..., 7$. In addition, general weights (10) and ranks are listed (also see Fig. 2).

Table 9. The weights and ranks of criteria (*Source:* compiled by the authors)

	E_k / I_j	E_1	E_2	E_3	E_4	E_5	E_8	E_9	E_{10}	$\bar{q}_{m,i}$	Rank
D_1	I_1	0,20	0,11	0,13	0,23	0,05	0,50	0,17	0,26	0,21	3
	I_2	0,66	0,62	0,46	0,63	0,57	0,26	0,44	0,06	0,46	1
	I_3	0,09	0,05	0,19	0,10	0,24	0,08	0,08	0,12	0,12	4
	I_4	0,05	0,22	0,22	0,04	0,14	0,16	0,31	0,56	0,21	2
D_2	I_5	0,59	0,29	0,53	0,43	0,50	0,24	0,43	0,42	0,43	1
	I_6	0,07	0,04	0,07	0,07	0,16	0,10	0,18	0,10	0,098	4
	I_7	0,04	0,06	0,03	0,04	0,03	0,04	0,15	0,21	0,07	5
	I_8	0,11	0,15	0,26	0,34	0,25	0,51	0,07	0,23	0,24	2
	I_9	0,19	0,46	0,10	0,12	0,06	0,12	0,17	0,05	0,16	3
D_3	I_{10}	0,48	0,44	0,45	0,45	0,51	0,48	0,45	0,15	0,43	1
	I_{11}	0,11	0,13	0,16	0,07	0,13	0,07	0,15	0,26	0,13	4
	I_{12}	0,32	0,09	0,26	0,30	0,08	0,26	0,04	0,44	0,22	2

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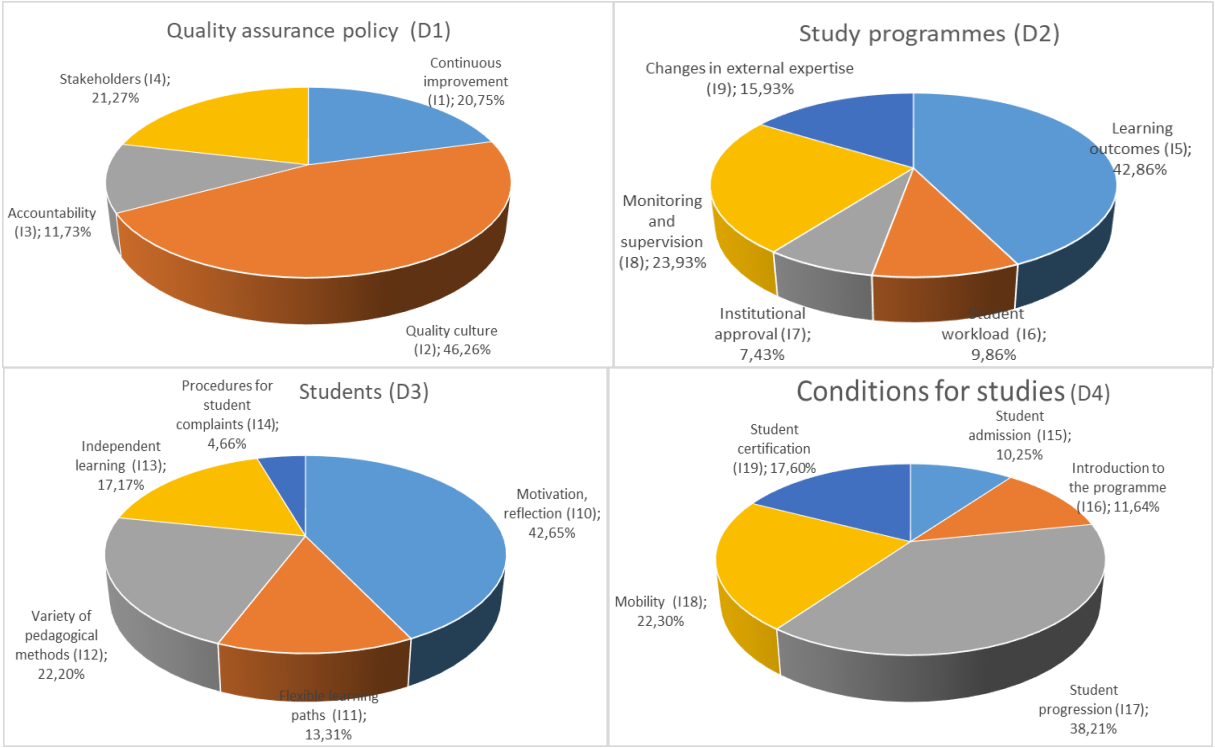
	I_{13}	0,06	0,31	0,10	0,14	0,26	0,16	0,30	0,05	0,17	3
	I_{14}	0,03	0,03	0,03	0,04	0,03	0,04	0,07	0,09	0,05	5
D_4	I_{15}	0,07	0,03	0,08	0,12	0,03	0,13	0,20	0,15	0,10	5
	I_{16}	0,47	0,16	0,04	0,04	0,08	0,04	0,04	0,05	0,12	4
	I_{17}	0,25	0,26	0,26	0,57	0,50	0,44	0,52	0,26	0,38	1
	I_{18}	0,17	0,49	0,47	0,07	0,26	0,07	0,16	0,09	0,22	2
	I_{19}	0,04	0,06	0,15	0,20	0,12	0,32	0,08	0,44	0,18	3
D_5	I_{20}	0,20	0,07	0,18	0,18	0,06	0,28	0,22	0,26	0,18	2
	I_{21}	0,74	0,78	0,75	0,75	0,65	0,63	0,69	0,63	0,70	1
	I_{22}	0,06	0,15	0,07	0,07	0,29	0,09	0,09	0,11	0,12	3
D_6	I_{23}	0,07	0,23	0,19	0,27	0,28	0,25	0,55	0,30	0,27	2
	I_{24}	0,64	0,08	0,72	0,67	0,64	0,68	0,37	0,54	0,54	1
	I_{25}	0,28	0,69	0,08	0,06	0,07	0,07	0,07	0,16	0,19	3
D_7	I_{26}	0,05	0,06	0,14	0,23	0,07	0,12	0,06	0,15	0,11	3
	I_{27}	0,22	0,03	0,04	0,11	0,04	0,03	0,03	0,09	0,08	5
	I_{28}	0,51	0,23	0,26	0,56	0,51	0,51	0,27	0,44	0,41	1
	I_{29}	0,08	0,12	0,07	0,07	0,14	0,07	0,15	0,05	0,09	4
	I_{30}	0,15	0,56	0,49	0,04	0,23	0,27	0,49	0,26	0,31	2



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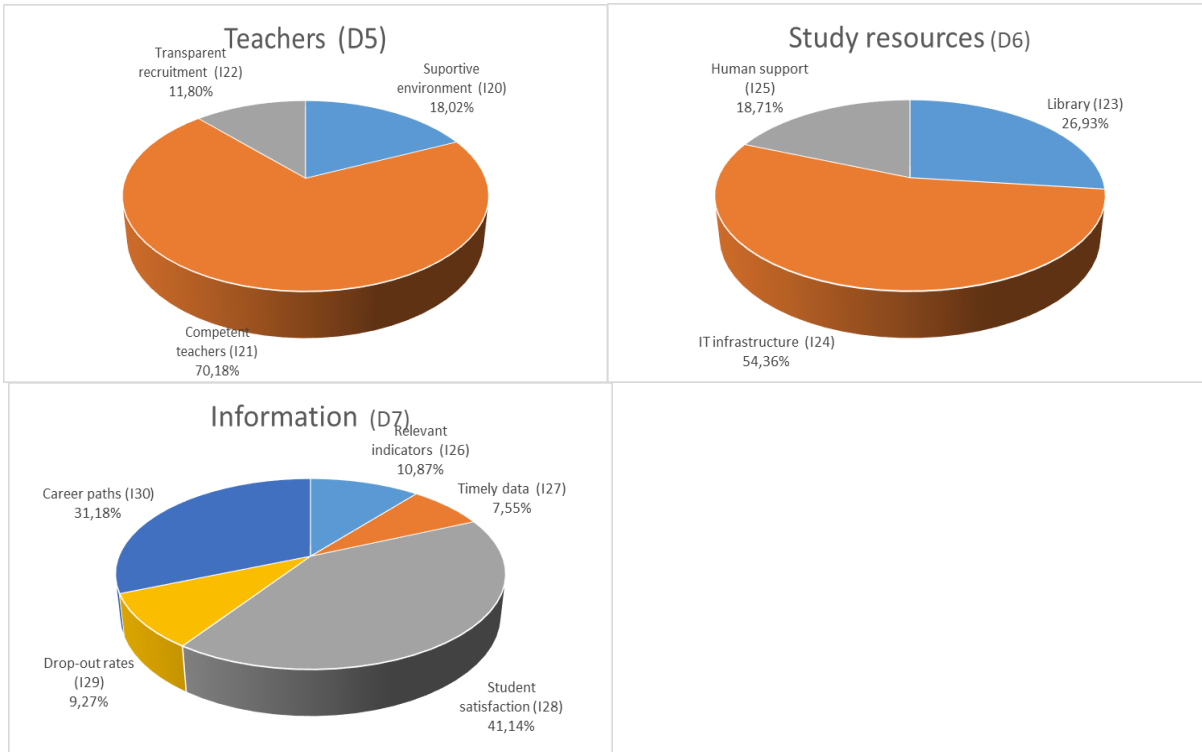

Fig.2. The general weights of criteria (*Source:* compiled by the authors)

Table 9 and Fig 2 show that, depending on expert opinions, the most significant criteria in areas D_m are I_2, I_5, I_{10}, I_{17}, I_{21}, I_{24}, I_{28} accordingly. To be more precise, the judgments of all experts considering the most important criterion I_{21} are the same in area D_5. The weight of this criterion is 70,18% of the total weights of criteria I_{20}, I_{21}, I_{22}. As for area D_3, only one expert E_{10} decided that the most important criterion was I_{12} rather than I_{10}. It is interesting to notice that experts prevail infrastructure rather than human input in area D_6. In all other areas, according to the most significant criteria, only opinions 2 or 3 are different. The weights of the most significant criteria in the above mentioned areas are not less than 38% of the total weights of the criteria in the respectful areas. Criteria I_3, I_6, I_{11}, I_{16}, I_{22}, I_{25}, I_{29} are of the lowest importance.

Recall that the group of experts is composed of decision makers from VU (E_k, k =1, 2, 3, 4) and VGTU (E_k, k =5, 6, 7, 8, 9, 10). Considering the consistent matrices of pairwise comparison (see Fig. 1), decisions on the significance of criterion I_j in areas D_m given the mentioned expert groups, are performed. Tables 10-12 and Fig. 3 and 4 exhibit the results determined following the prior steps (see Table 5).

Table 10. The consistency of the judgments of VU experts (*Source:* Personal elaboration, https://www.di-mgt.com.au/chisquare-table.html and Friedman, 1940)

	D_1, n = 4	D_2, n = 5	D_3, n = 5	D_4, n = 5	D_5, n = 3	D_6, n = 3	D_7, n = 5
W_m	63	51	84	36	81	19	39
χ^2_m	7,50	8,20	13,40	5,80	6,50	1,50	6,20
$\chi^2_{\alpha,\nu}$	7,82	9,49	9,49	9,49	5,99	5,99	9,49

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Z_m	50	136	134	58	26	6	62
$S_{\alpha,n}$	49,5	88,4	88,4	88,4	-	-	88,4

Table 11. The consistency of the judgments of VGTU experts (*Source:* Personal elaboration, https://www.di-mgt.com.au/chisquare-table.html and Friedman, 1940)

	D_1, $n = 4$	D_2, $n = 5$	D_3, $n = 5$	D_4, $n = 5$	D_5, $n = 3$	D_6, $n = 3$	D_7, $n = 5$
W_m	45	55	45	65	81	81	85
χ^2_m	5,40	8,80	7,20	10,40	6,50	6,50	13,60
$\chi^2_{\alpha,\nu}$	7,82	9,49	9,49	9,49	5,99	5,99	9,49
Z_m	36,00	88,00	72,00	104,00	26,00	26,00	136,00
$S_{\alpha,n}$	49,50	88,40	88,40	88,40	-	-	88,40

Table 12. The generalized weights and ranks of the criteria assigned by VU and VGTU experts

	Criteria (I_j)	VU		VGTU	
		$\bar{q}_{m,i}$	Rank	$\bar{q}_{m,i}$	Rank
Quality assurance policy (D_1)	Continuous improvement (I_1)	0,17	2	0,14	3
	Quality culture (I_2)	0,59	1	0,20	1
	Accountability (I_3)	0,11	4	0,07	4
	Stakeholders (I_4)	0,13	3	0,19	2
Study programmes (D_2)	Learning outcomes (I_5)	0,40	1	0,40	1
	Student workload (I_6)	0,13	3	0,13	3
	Institutional approval (I_7)	0,11	4	0,11	4
	Monitoring and supervision (I_8)	0,26	2	0,26	2
	Changes in external expertise (I_9)	0,10	5	0,10	5
Students (D_3)	Motivation and reflection (I_{10})	0,46	1	0,40	1
	Flexible learning paths (I_{11})	0,12	4	0,15	4
	Variety of pedagogical methods (I_{12})	0,24	2	0,20	2
	Independent learning (I_{13})	0,15	3	0,19	3
	Procedures for student complaints (I_{14})	0,03	5	0,06	5
Study conditions (D_4)	Student admission (I_{15})	0,07	5	0,13	4
	Introduction to the programme (I_{16})	0,18	3	0,05	5
	Student progression (I_{17})	0,33	1	0,43	1
	Mobility (I_{18})	0,30	2	0,14	3
	Student certification (I_{19})	0,11	4	0,24	2
Teachers (D_5)	Supportive environment (I_{20})	0,16	2	0,20	2

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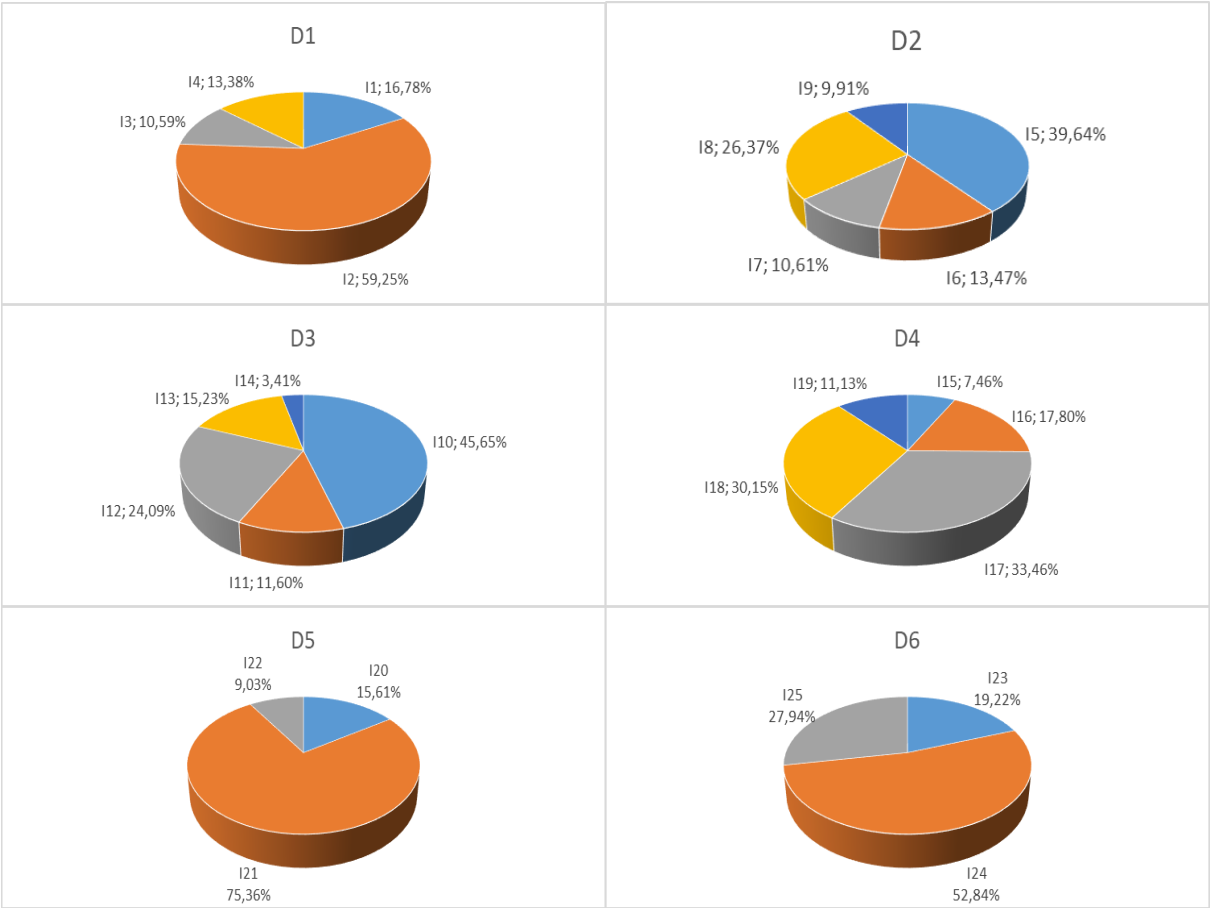
	Competent teachers (I_{21})	0,75	1	0,65	1
	Transparent recruitment (I_{22})	0,09	3	0,15	3
Study resources (D_6)	Library (I_{23})	0,19	3	0,35	2
	IT infrastructure (I_{24})	0,53	1	0,56	1
	Human support (I_{25})	0,28	2	0,09	3
Information (D_7)	Relevant indicators (I_{26})	0,12	3	0,10	4
	Timely data (I_{27})	0,10	4	0,05	5
	Student satisfaction (I_{28})	0,39	1	0,43	1
	Drop-out rates (I_{29})	0,08	5	0,10	3
	Career paths (I_{30})	0,31	2	0,31	2

The yellow areas in the above table highlight criteria for which the order of priorities assigned by a different expert group varies.



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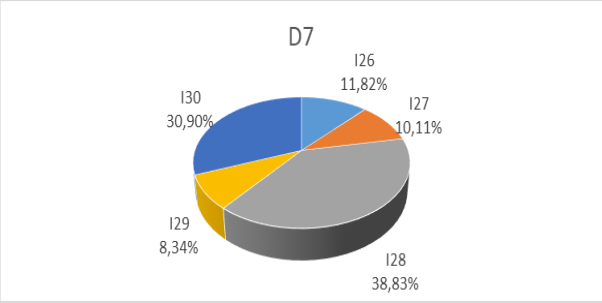
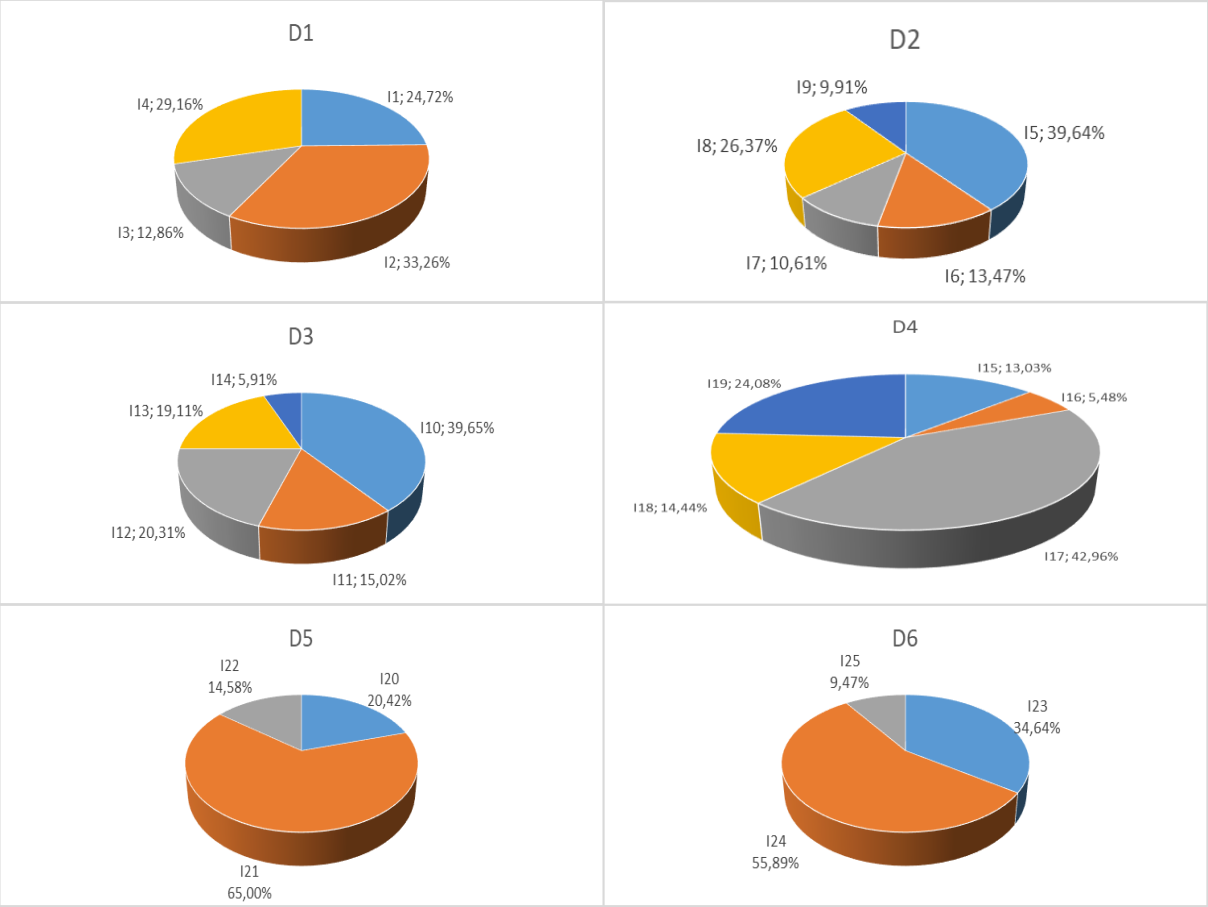


Fig.3. The general weights of the criteria assigned by VU experts *(Source*: compiled by the authors)



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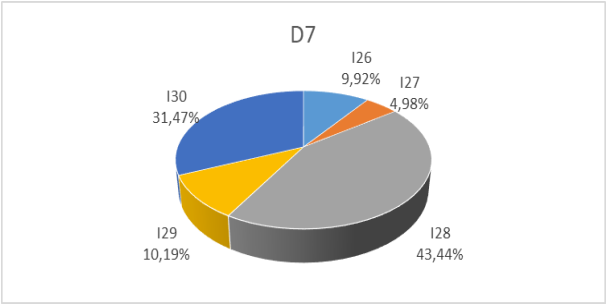

Fig. 4. The general weights of the criteria assigned by VGTU experts (*Source*: compiled by the authors)

It follows from Table 10 that there is no reason to discredit the consistencies of the judgments of VU experts in areas D_2, D_3, D_5, as $\chi^2_m > \chi^2_{0,05;\nu}$, m = 2, 3, 5. Table 10 shows that $\chi^2_m > \chi^2_{0,05;\nu}$, as m = 4, 5, 6, 7, and thus there is no reason to discredit the consistencies of the judgments of VGTU experts in areas D_4, D_5, D_6, D_7. It seems that the judgments of VU and VGTU experts in other areas are inconsistent. However, let's recall that if $3 < n \leq 7$, then, the distribution of χ^2 must be applied choicely, as in the case where $\bar{\chi}_m^2 \leq \bar{\chi}^2_{0.05,\nu}$ the judgments of the experts may be consistent. Clearly, following rule $Z_m > S_{0,05,n}$ (see step 3.3 in Table 5), in the instance of VU experts, H_0 may be also rejected in area D_1.

The use of the results in Table 12 and Fig. 3 and 4 provides us with the same main conclusions about the significance of the criterion regardless the consistencies of expert judgments. A comparison of general weights in Table 7 with those in Table 12 demonstrates that the order of priorities assigned by a different group of experts varies.

While summarizing the results of the whole research, several things have to be pointed out:
First, a selection of the experts' only from two universities in Lithuania could be named as a limitation of the research performed. Despite that, the opinions of the representatives of these two largest Lithuanian universities coincided on the most important criteria for ensuring the quality assurance of the study process at the university level.
As for the second, the involvement experts from other countries (such as Latvia, Estonia, Poland) in further research could make a significant contribution to the deeper analysis of the importance of criteria determining the quality assurance of the study process.

Conclusions

1. The analysis of theoretical and empirical research papers has confirmed the relevance of the quality of the study process at the university level in the context of higher education. For the last two decades, the importance of the quality of this process has been highlighted by a number of works worldwide. There are attempts to find keys to the quality of the study process at the university level from institutional, national and international (Bologna Process) perspectives.
2. It should be noted that the composition and development of studies at the university level is a permanent process covering a wide range of the areas composed of a large number of criteria of a different origin. However, the European Standards and Guidelines for Quality Assurance in Higher Education have provided an opportunity to compose this process in a systematic way. Also, such composition of criteria could serve as a balanced score-card for universities in the management of the study process.

3. Multi-criteria decision making methods are broadly used by scientists to assess complex phenomena. Based on the methodology for one of these methods (AHP), the questionnaire and survey of the experts were made in order to disclose this subject. The experts selected for research purposes represented two largest universities in Lithuania.
4. The obtained results of the carried out research have demonstrated the importance and weights of the criteria composing different areas of the study process at the university level. The findings have disclosed that such criteria as quality culture, learning outcomes, student motivation and reflextion, student progression, competent teachers, IT infrastructure, student satisfaction are the most important in striving to achieve the highest quality of the study process at the university level.
5. The rest of the criteria do not mean less importance of the quality of the study process at the university level. Despite that, paying attention to a certain scenario of criteria regarding the strategy and allocation of resources can lead to unique institutional performance and achievements in the quality of the study process at the university level.

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ACCEPTANCE CRITERION OF STATE COERCION IN CONTEMPORARY SOCIETY

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Abstract. The article presents acceptance criterion of the state coercion as a form of power realization. According to authors, essential signs of the state coercion, firstly, are functionaries and state authorities representing the society that in turn, legitimizing this state, secondly, the state coercion mediacy by the right. Its social nature causes understanding the state coercion as a legal relation that coercive and coerced subjects, authorized with certain rights and duties, enter. The authorization of subjects, in relation to which enforcement actions are applied, with legal rights and duties testifies to the legal conditionality of state coercion. As a result, it must satisfy the requirements of legality, legitimacy and justice at both levels of the legal system – sectoral and intersectoral – and at all stages of the process of its implementation. The general acceptance criterion of the state coercion is provided to recognize the conformity of its application to the requirements of justice as a moral category. Structural elements of this criterion are validity and proportionality. Their differentiation in content makes it possible to assert that the state coercion should be based on the law (validity) and correlated with individualizing circumstances, which allowing to correct the influence of the coercive on the coerced taking into account the specifics of the concrete case (proportionality).

Keywords: coercion; justice; validity; proportionality; legal right; legitimacy

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JEL Classifications: K000

Additional disciplines: law

1. Introduction

Questions that are related to the definition of the nature of state power and coercion, their essential signs, foundations, limits and methods of their application are central to the theory of law and for the practice of government control. Therefore, they have always been the focus of attention of legal science representatives. Especially if scientists looked through a boarder lens of legal positivism and used the methodologies of other disciplines: philosophy, sociology, political science, etc.

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We proceed from the premise that the state coercion is characterized by a clash of interests between the state as a main institute of a political power that has significant resources, and the subject or subjects that are opposed to it, and have a substantially smaller reserve of resources. At the same time, the state cannot claim a democratic and a legal status, if its legislation does not define acceptance criterion of the state coercion (Bingham, 2011), (Ambrose, 2014), (Tyler, 1990).

This is about such characteristics of state coercion in the presence of which, it is recognized by society as acceptable. Thus, our approach fully corresponds to the humanistic concept of the state and law functioning, according to which the person, his rights and freedoms are recognized as the supreme value of modern society. At the same time, the coercion should not represent an effective legal system always though it can be also estimated as a necessary element of this system (Lloyd, 1991), (Yankah, 2007-2008), (Zwolinski, 2015), (Kuril, 2018).

In this article we will consistently consider the following aspects of the acceptance of state coercion in modern society: 1) the concept of justice as the main acceptance criterion of the state coercion (Armstrong, 2009), (Munger, 2012); 2) the goal-means ratio in the structure of the justice concept (Gargarella, 2011), (Valentini, 2011); 3) the legitimacy of the state coercion (Green, 2015), (Hardin, 1989-1990), (Ripstein, 2004).

2. Methodology

The methodology of our research is determined by the peculiarities of its subject matter. We use a set of methods in the context of systematic approach to the phenomenon of state coercion in modern society. First of all, the usage of the dialectical method and the method of formal logic helps to define characteristic features, systemic connections, grounds, and general criteria for the admissibility of state coercion (Hughes, 2013), (Lamond, 2001), (Leiser, 2008), (Raponi, 2015). In addition, the usage of the systemic method makes it possible to determine the place of state coercion among the methods for implementing state power (Schauer, 2014), (Stavropoulos, 2009). Finally, we adhere to a sociological approach to the study of the state and law to analyze a state coercion as a social phenomenon (Arneson, 2003), (Wollner, 2011).

Of course, the historical legacy of philosophers, political scientists and jurists of the past is not remained beyond our research. We pay special attention to fundamental conceptions of justice, proportionality and legitimacy of coercion, developed by Th. Hobbes, Ch.L. Montesquieu, Kant and M. Weber. At the same time, we share views of contemporary critics of positivist concepts of state coercion (Himma, 2012). Therefore, we often refer to the works of L. Fuller, D. Lloyd and J. Finnis (Fuller, 1969), (Finnis, 2011).

3. Justice is the main acceptance criterion of the state coercion in the modern society

To begin with, the society is eventually the coercive subject in the exercise of state power. Using the mechanism of the state to achieve general goals, it appraises the advisability of using coercion in a specific situation. The criterion that society enjoys in such cases is its members' concept about the conformity of the exercise of public power procedures in the form of state coercion with their ideals. From this point of view, the implementation of the state coercion must comply the requirements of morality and the rules of conduct determined by these requirements. So, the state authority and the official, who apply the rules of law in the process of implementing coercive measures, are limited by the principles of moral acceptability, i.e. a certain "minimum of morality". In other words, the acceptability of the state coercion is determined, in particular, by moral requirements. They are like a system of provisions, prescriptions and guidelines that correspond to the national culture and form the boundaries of state coercion: humanity, personal dignity, conscience, justice, honor, duty, conscientiousness.

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However, the understanding of morality as the acceptance criterion of the state coercion is not entirely correct. The morality, as in its ordinary understanding and in the special definition offered by philosophers, is characterized by the breadth of coverage of the relations regulated by its norms. Therefore, it is necessary to use more concrete, in comparison with morality, concept, namely, the notion of the justice.

The justice in the ordinary sense is determined through a category of "impartiality", which is private category in relation to morality. From the perspective of philosophy, it is understood as a way to justify the distribution of profits and burdens between individuals that coexist within a single social space. In our opinion, the notion of justice is more specific than the concept of morality, and it also contains an explicit reference to the regulation of asymmetric relations between the coercive and the coerced. At the same time, such an evaluation criterion of the measures of state coercion application as proportionality plays center stage, reflecting the requirement of coercive justice. In general, we are talking about the correspondence between the negative consequences of coercion and the public danger of a committed act.

In our opinion, the exercise of state power in the form of the state coercion must be carried out in terms of its correlation (proportionality) with the danger that comes to the coercive person from the coerced one. The power influence in the form of the state coercion should not be excessive, i.e. it should prevent the excessive cruelty in relation to the coerced subject or subjects, or, conversely, excessive gentleness. The excessive or too mild coercion is able to initiate a tendency of delegitimation in society, as the coercive subject, concerning the mechanism of the state due to the dissatisfaction with its functioning. It can be caused by the violation of rights and freedoms both the certain person, and society in general, or by unreasonably severe measures of coercion and their application, or by disproportionately mild coercive measures and their implementation or evasion (Mishenin et al. 2018; Načisčionis et al. 2018; Tvaronavičienė, 2018). These tendencies can even lead to the state death, resulting in the certain level of justice in a society, that the state guarantees and protects, can't be maintained.

It should also be noted, that the proportionality can be identified with the law of talion, i.e. requiring compensation equal for an equal and in this sense proportioned. Although, we are of the opinion, that this understanding has no relation to the idea of justice as the acceptance criterion of coercion in the exercise of state power in modern society.

First, the law of talion ("an eye for an eye, a tooth for a tooth"), for all its seeming justice, in fact, cannot fully take into account all circumstances that individualize a particular situation. Second, as John Finnis correctly notes, this law is aimed at the material content or consequences of criminal acts, and not on their formal illegitimacy (dishonesty) (Finnis, 2011, 210-236). Therefore, the law of talion does not provide the reference of existing circumstances in their entirety with the content of the prevailing moral ideal in society. It also, in fact, does not condemn preference cases of the personal interest over the public welfare.

We believe that the proportion, considered in relation to the item of acceptance criterion of the state coercion in its sense is closer to the principle of repression economy offered by Charles Louis Montesquieu in the 18th century. According to VI and XII books of "The Spirit of Laws" analyzing, French enlightener noted, "Combined utilitarian, retributivist and liberal themes in his approach to punishment, while locating the fundamental justification for the right to punish capital crimes in the retributivist rationale of doing justice. As noted by Beccaria and numerous others whom he influenced, moderation in punishments and decriminalization of religious offences were key themes in his discussions" (Carrithers, 1998). The essence of this approach is the interdependence between the intensity of state coercion and circumstances of the case in its entirety. Where the entirety is defined in the context with the concept of justice existing in a particular society.

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Therefore, the proportionality of the applied measures of the state coercion and of the offending behavior by the coerced subject is a sufficiently effective criterion that allows us to draw the line between the permissible and the inadmissible coercion. Although, the justice does not mean only proportion. As another structural element of justice, as the acceptance criterion of state coercion, the validity of its application can be called. This is the state's right to act on behalf of society in order to achieve its goals, or, in other words, the state's authorization (its agencies and officials) by society to implement state coercion.

As we noted above, the society is the coercive subject in implementing measures of state coercion acting through the mechanism of state, expressing its will, therefore ultimately the society empowers the state to consider the application of concrete coercive measures. It seems clear that the state's lack of such a right automatically makes illegitimate the decision taken by it on the application of measures of state coercion.

However, this is not only about the fact that the state has the opportunity to exercise coercion delegated to it by society, but also about reasons and the usage procedure of specific coercive measures, their content. In this sense, the coercion justification as a structural element of justice is the validity of state coercion with the right, which is corresponding to the notions of morality prevailing in a given society.The distinction between justification and proportion need to be drawn in such a way as to include in the content of justification the validity of coercion by the right, broadly understood as a "general social right", and to the content of proportion - the correlation of state coercion with specific circumstances. That allows correcting the impact on the coerced person in accordance with the proposed options, but in the light of specific features in a particular case. Thus, it should be recognized that a moral category of justice consisting of proportionality and justification is a general acceptance criterion of the state coercion. The state organization is established initially as a fact, but gradually it is more and more filled with the principles of right, not because of free self-restraint or self-binding of the power, but on account of its external restriction regulating by the power and society cooperation. These restrictions emerge, grow in number and get stronger with the growth of social consciousness. At the same time, during the cultural development of society, the principle about the worth of the human person is formulated. It means, on the one hand, the mandatory justification displays of state power, which includes the form of coercion, and on the other hand, the legitimacy of the individual's behavior.

4. Path - goal approach in the structure of the justice concept

Considering justice as a moral category, lawyers and philosophers differently decide the question of the relationship in the structure of this concept of goals and means. Known approaches to its solution can be divided into two groups: 1) related to the goal-dominating paradigm that expressed in principle "the end justifies the means"; 2) relating to the paradigm of abstract humanism, according to which the means are autonomous. Among supporters of the first approach can be mentioned such philosophers as Jeremy Bentham, John Stuart Mill, Friedrich Nietzsche, Ludwig Andreas von Feuerbach, Jens Timmermann, and others, and the supporters of the second one are Immanuel Kant, Vladimir Soloviev, etc. Depending on the approach that we choose, the value accents are changed either to the subjective rights and human freedoms, his legitimate interests, or to the side of social order.

Thereby the question about the path-goal approach in the sphere of the state coercion implementation should be understood as a question of the content of existing moral priority (ideal) that the coercive subject (society) has at a particular moment. In this capacity, a person with his rights and freedoms may act or the tasks of securing the social order.

However, it is obvious that the choice in favor of one of these two approaches does not mean a complete rejection of the another one. Otherwise, the value of either human life or social order is questioned. Both can lead to

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negative consequences for society: to its degradation due to the egocentrism of society members and subsequent anarchy or to a reduction in their number. At the same time, these negative consequences are closely interrelated. Consequently, the shift in value accents always means preservation of a certain minimum volume of each element of social ideal, both individual and collective. In other words, the state coercion implementation requires to proceed from the need of ensuring the minimum volume of the rights and freedoms of the coerced subject and the social order provided by law in any case.

In general, as Dennis Lloyd correctly notes, the purpose of legal science is precisely to adapt traditional concepts to the new conditions of society by refusing the definition of right, in which the role of coercion was emphasized or denied. Instead of this, a systematic evaluation of the coercion forms and its place in the system of social relations regulated by the rules of law, is necessary. Such a research, which takes into account the evolution of human relationships, may lead to a revision of models and concepts, in relation of which the ideas of law and coercion should be analyzed. In other words, the modern theory of law requires a dynamic rather than a static approach (Lloyd, 1991, p. 45).

Meanwhile, there is a widely known conception of state coercion, according to which attention is focused on achieving the goal that faces the ruler, without any regard to other conditions. For instance, M. Weber argued that, in fact, the power's entity presumes probability that the subject is able to realize his will in social respect despite of any resistance. At that it does not matter, what are the grounds for this probability. At the same time, M. Weber unequivocally defined the state as a form of legitimate domination, that is, he introduced a different ("non-violent") dimension in the notion of power (Weber, Parsons, Henderson, 2012, 74-76; Tvaronavičienė, Gatautis, 2017).

Of course, this approach is based on a serious intellectual tradition of understanding power not only and not so much as a form of limiting the freedom of individuals and / or forcing them to take acts, acceptable to the holders (representatives) of power, but rather as a political strategy, which is aimed to achieving their goals. For example, English philosopher T. Hobbes defines the power as a means for man to achieve the good in the future, i.e. the presence of a subordinate person is not mandatory. Following this conception, it is necessary to go until the end and suppose an existence of some kind of power even in cases, when there is no relationship between the ruler and the subordinate subject. However, such a conclusion is in contrary to the social understanding of power and therefore is divorced from the reality.

In our opinion, the power has a social nature, because it is based on the interaction of individuals and groups. A key concept to define power in this sense is a notion of the will. First of all, originally the power relationships are the conflict relationships. This fact was emphasized, for example, by I. Kant and M. Weber, who pointed out such feature of the power as the resistance from a subordinate subject. However, the resistance can only arise in conditions of a conflict between the interacting parties.

Indeed, if we assume the opposite and suppose that power exists in conditions of the absence of a conflict, when a subordinate subject willingly obeys orders of a ruler and acts to achieve ruler's goals, then it is necessary to state that there is a contradiction between the scientific understanding of power and its ordinary interpretation, which points out an inseparability of the power from the subordination, because the conflict is immanently inherent to subordination. As a rule, the conflict is a clash of different goals of parties, which are fixed in rigid forms. From this it follows that social actors face goals, which they are well conscious. In addition, there is a collision between interacting persons for the implementation of their goals. At the same time, the acceptance of the state coercion should not be reduced to the fact of its compliance to the right. It is known that the right is characterized by such a significant parameter as the need for a considerable period of time for its formation, as well as for the emergence

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of a tradition of its observance in a particular society. But, is it possible to assess the use of coercive measures by the state publicly outside formalized procedures?

The conformity of specific measures of state coercion to the moral ideals of society can be assessed by the society, also directly expressing one's attitude towards them in specific cases. Forms of prompt expression of their attitude to the moral validity of coercive measures adopted by the state may be collective petitions (requests) for pardon (finding of innocence, relief from punishment, etc.) of a person complimented by the immorality of state coercion measures applying against him. They can be submitted to authorized state bodies and officials both in the course of public events (citizens' meetings, pickets, demonstrations, etc.), and in other ways.

5. Legitimacy of the state coercion in democratic society

As questions of the bases, acceptance and specifics of the state coercion measures have to be considered in democratic society in the context of legitimacy problems of such coercion, we will make several remarks. The first of them concerns a peculiar economic calculation at distribution of the coercive, imperative power energy in the course of the public relations regulation on the basis and according to the right.

On the one hand, public authorities and officials can and should apply coercive measures against real or potential offenders whose activities threaten the rights and interests of individuals, social groups, society and the state.
On the other hand, the difference of really legitimate acts of public authorities and officials from illegitimate consists not only in their restriction with so-called "due process of law" (Bingham, 2011, p. 29), but also in analyzing practicability and efficiency of coercion.

The society are managed by the authorities with both maximum and minimum "power" costs. They allow some degree of self-regulation freedom. Moreover, in a postindustrial society, it is often more effective to use indirect force in each case of committing an offense or the threat of its commission, but rather the redistribution of imperative energy in certain areas of social regulation, depending on the type of social relations.

Thus, Lon Fuller, arguing with supporters who recognizes the use of force as one of the distinguishing features of law, notes, that in many situations, practically, physical coercion and even the very possibility of its use are absent. For example, the state allows foreigners to engage in entrepreneurial activities on its territory only on the condition that they deposit a significant amount in the national bank that guarantees compliance with the rules of law applied in their field of activity. If they commit a violation of any of these norms, the state, in accordance with the court decision, will impose a fine in the form of a deduction from the deposit of the foreign entrepreneur. In other words, it is referred to a simple accounting operation. According to Lon Fuller, it would be a mistake to refuse call such a system "right", because the state did not have an opportunity to use force or threaten to use force, to force its requirements (Fuller, 1969, 87). We believe that he confuses here the concepts of "use of force" and "coercion," but he correctly notes that the rule of law tends to rationally and efficiently distribute imperative energy in the process of social regulation.

Otherwise, the state power achieves their goals by abusing power in the form of violence. From this point of view it is necessary to recognize as fair the conclusion to which Lon Fuller comes. In his opinion, one could rightly refuse to call this system "legal" if it turned out that the published laws and the judges dressed in the mantle are just a facade that in fact hides an unlawful act of confiscation (Fuller, 1969, 87).

A legislator "redirects" the excessive coercive energy of state power from certain branches (institutions) of law to others, where it is more appropriate. At the same time, he keeps it as needed for the right not to turn into a facade

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that covers the arbitrary rule. Therefore, in some branches of law in connection with the peculiarities of the legal regimes that are inherent in them, state coercion resides, as it were, in a latent form.

It should be highlighted that in situations similar to the modeled by Lon Fuller, state coercion is not simply hidden. Herein *legal coercion* comes to the forefront. It is most clearly appeared when a legal conflict is resolved without using the mechanism of state coercion. However, the latter remains valid and can be used, if the coercive power of law is not sufficient to resolve the conflict.

This feature of legal coercion has long attracted the attention of jurists who adhere to the notion of natural coercion of law. Its supporters connect the legal power provisions with the authority of law and its public recognition. They understand by the term "force of law" the need of the subject of law to organize their social life on the recognition of the idea of law basis as an unconditional imperative of its activity, as well as the activities of other subjects of law.

In our opinion, such a concept is not entirely correct. In fact, by "naturalness" here is meant not the specificity of the ontological grounds of a special type of coercion - legal coercion, but more common (in comparison with the implementation of state coercion measures) procedure for resolving the conflict between subjects of law. This means that the ontological grounds of legal coercion are not "natural" by their nature, but social. Of course, legal coercion, as Lon Fuller and Sergey Alekseev note, and state coercion are social phenomena. Whereas, as manifested in specific situations, the so-called "natural coercion of law", in fact, is a result that based on the preliminary calculation of the imperative energy distribution of state power in the spheres of public life.

It is our first remark that can be conditionally called "technical", as it refers to the technology of state coercion enforcement, mediated by the right. The coercion legitimacy (its legitimacy, justice), and not only its legality, depends on the prior application of coercive measures of their distribution by the branches of law and within each legal branch - according to its structural subdivisions (institutions).

Thus, the acceptance of the state coercion, use in the sphere of legal regulation of public relations, is conditioned by the calculation of all benefits and implications, the appropriateness and effectiveness, the costs of its application. In the common language, this legitimacy condition of state coercion is expressed in statements about "rigidity", even "cruelty" or, on the contrary, "softness", "humanity" of the current legislation and practice of its application by the court and law enforcement agencies - in the final analysis, their justice or injustice.
The next remark is - in a democratic society, the mechanism of state coercion mediated by law must be integrated into the structure of the legal system at the baseline. However, herein a problem about measures correlation of state coercion with the structural elements of the legal norm arises.

On the one hand, it would be quite logical to assume that the measures of state coercion find their expression in the sanction of the law norms. Actually, this appears when coercive measures are applied on the basis of a relevant act to persons guilty of committing offenses, if their guilt is proven in accordance with the procedure established by law. These measures are structurally isolated and clearly expressed in the legal norm.

On the other hand, competent state authorities and officials also apply such state coercion measures that are focused on preventing the commission of offenses or on the guaranty of restoration of the violated right and the realization of legal rights. Obviously, such coercive measures contain additional restrictions; they fall within the competence of the state and are applied for order processing in the public relations regulated by law. Nevertheless, they can be applied even in the absence of offenses. For example, administrative detention; delivery; pat search; things inspection; vehicle inspection; inspection of corporate premises, territories; seizure of things and documents; transport arrest and etc.

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In our opinion, such measures of state coercion find their legal expression not in sanctions, but in dispositions of legal standards. Moreover, these measures, firstly, do not imply direct contradiction to the interests, desires and will of the coerced subject, although they do not exclude it. Secondly, they transcend the conceptual understanding of state coercion as a reaction of the state to the illegal behavior of subjects of law. However, they remain within the limits of the normative (legal) measurement of state coercion. The legislation analyzing allows us to conclude that the measures of state coercion are non-uniform. In accordance with the concept of saving the distribution of imperative power, they can take the following form: *legal liabilities* (mulctary), or *protection measures*, *security measures* (preventive).

Finally, the third remark relates to the legal status of the coerced subject. In essence, the content of coercive subjects' rights and obligations is the right and obligation to subject the coerced subject to coercive action and apply appropriate state coercion measures to it. However, coerced subjects are also endowed with legal rights and duties. They are obliged to undergo various legal restrictions of personal, property or organizational nature, which contain measures of state coercion. Herewith, they have the ability to require compliance with the procedure for the application of these measures and their implementation in the rule of law. All subjects to relation of which uses the state coercion measures, are authorized by rights and duties that indicate the state takes under the protection of the law their rights and freedoms, interests. There is a legal restriction of state coercion, as a result of which it must comply with the requirements of legality, legitimacy and justice at all stages of its application - from consolidation in the law to achieving the set goals.

Conclusions

In consequence of the acceptance criterion of the state coercion research, we arrive at the following conclusions. Thus, the general acceptance criterion of state coercion is its compliance with the requirements of justice as a moral category. The structural elements of this criterion are validity and proportionality. Their differentiation in content allows us to assert that validity means the causation of state coercion by law. Proportionality is the correlation of state coercion with individualizing circumstances that allow one to correct the effect of the coercive subject on the options enforced in accordance with the proposed law and taking into account the specifics of the concrete case.

The acceptance of state coercion is determined formally and materially. *The formal definition* of the acceptance of state coercion is the same as the definition of the application of state coercion foundations in the narrow sense. We are talking about legislative consolidation material and procedural norms of law, containing requirements for the state coercion. They reflect the results of the pre-estimate calculation and distribution of the imperative energy of power conducted by the legislator in the main areas of legal regulation of public relations.

The material definition of the acceptance of state coercion is derived from a broad understanding of law, which is unlimited by a set of norms expressed in legislation. From this point of view, the conformity of state coercion measures and their application to the moral ideals of society is also assessed through direct (operative) expression by members of society attitude to state coercion as a form of state power realization in each concrete case. Let us emphasize once again, that the discussed problems are especially acute when the interests of the state are directly colliding in the whole variety of its bodies and officials, and of an individual or persons opposed to it. Being in the field of scientists view, the legal restriction mechanisms of state power and the individual's real opportunity to realize their rights and interests guarantee, receive their conceptual design.

Then, the legislator chooses from the existing concepts those that, in his opinion, are most consistent with the level of socio-economic, political, cultural and moral development of society, and fixes them in normative acts. Thus, the government has a standard dimension. The standard dimension of power enriching with ideas about the

proper behavior of a person, about justice, morality, humanism, prevailing in a concrete society, becomes legal in the broadest sense of the word. As a result, a legal dimension of such a form of exercising state power is shaped as the state coercion that meets the requirements of modern society.

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THE TAX MECHANISM OF MANAGING THE PROCESS OF FORMATION OF INFORMATION ECONOMY IN MODERN RUSSIA

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Abstract. The purpose of the work is to determine the features of application of tax measures for stimulation of formation of information economy in modern Russia, to substantiate the perspectives of their expanded application, and to develop practical recommendations and to compile a tax mechanism of managing the process of formation of information economy in modern Russia. The authors use the systemic approach, methods of statistical analysis (analysis of statistical data), analysis of causal connections (logical analysis), and formalization (graphic presentation of authors' conclusions and recommendations). The authors conduct a complex evaluation of the level of development of information economy of modern Russia (as of 2018) based on the data of the National Research University "Higher School of Economics", IMD World Competitiveness Center, and the World Economic Forum and determine that for building competitive, highly-effective, and sustainable information economy in modern Russia, it is necessary to pay attention to the issues of development of E-government and the spheres of new information and communication technologies. The authors also perform a complex empirical analysis of the practice of taxation in modern Russia, which showed that tax measures that are used for managing the process of formation of information economy in modern Russia are contradictory and insufficient for achieving substantial progress in formation of information economy. As a result, it is determined that the current Russian tax mechanism of managing the process of formation of information economy in modern Russia could be characterized as restraining. Its drawbacks, related to insufficient attention to underdeveloped characteristics of information economy and contradiction, could be solved with the developed tax mechanism of managing the process of formation of information economy in modern Russia, which could be characterized as stimulating.

Keywords: tax mechanism; management; information economy; modern Russia

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1. Introduction

Information economy is a result of the vision of the future of the modern global economic system. Formation of information economy is the most preferable variant of development of economies, including modern Russia, as it combines the following advantages. Firstly, high-tech. Specialization in production and dissemination of information technologies and products, which have stable high demand in domestic and global markets, allows obtaining a status of a high-tech country and guaranteeing sustainable development of economy in the long-term. Secondly, high effectiveness. Informatization allows optimizing economic activities by its full or partial authomatization, due to which high labor efficiency is achieved in economy. Thirdly, high competitiveness. Informatization economy allows manufacturing new products and using more efficient means of its promotion and sales, gaining advantages from "scale effect" and achieving the best price/quality ratio.

Striving for such advantages, modern Russia implements measures in various spheres that are aimed at stimulation of quick formation of information economy. These measures cover development of normative and legal provision and creation of telecommunication infrastructure and preparation of personnel for information economy, etc. At that, according to our hypothesis, tax measures are not considered sufficiently due to underestimation of their potential.

The purpose of the work is to determine the peculiarities of application of tax measures of stimulation of formation of information economy in modern Russia, to substantiate the perspectives of their expanded application, to develop practical recommendations, and to compile a tax mechanism of managing the process of formation of information economy in modern Russia.

2. Materials and Method

Information economy is a popular subject for conducting modern scientific research. It is studies in a lot of works of such scholars as (Bondarenko et al., 2017), (Gladilin et al., 2019), (Protopopova et al., 2019), (Vandina, 2016), and (Yudina et al., 2017).

At the same time, there's no system in studying the information economy, which leads to absence of its common treatment. Thus, scientific literature has similar terms – digital economy, Industry 4.0, Internet economy, etc. – which are either synonyms or separate manifestations of information economy (e.g. Prause, Atari, 2017; Vlasov et al., 2018).

As a result of performed systematization of existing scientific data in the sphere of studying information economy, we determined its following characteristics:

- Mass usage of new information and communication technologies (PC, mobile devices, the Internet, etc.) by population;
- full (E-government) or partial (implementation into separate business processes) foundation of business structures on new information and communication technologies;
- usage of new information and communication technologies in the process of provision of government services (E-government);
- leading development of the spheres of telecommunication infrastructure (accessibility of high-speed Internet, mobile communications, etc.);
- high level and intensive development or specialization of economy in the spheres of new information and communication technologies.

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The issues of application of tax measures for managing the process of formation of information economy are poorly studied and are viewed indirectly in scientific works (Bogoviz et al., 2017), (Gupta et al., 2015), and (Sukhodolov et al., 2018), (Abbas, 2018), (Fokina et al., 2018), (Stroeva et al., 2019), (Zaytsev et al., 2019), (Zmiyak et al., 2019). The authors use the systemic approach and methods of statistical analysis (analysis of statistical data), analysis of causal connections (logical analysis), and formalization (graphic presentation of authors' conclusions and recommendations).

3. Information economy in Russia

Normative and legal provision of formation of information economy in modern Russia consists of the Strategy of development of information society of the RF for 2017 – 2030, adopted by the Decree of the President of the RF dated May 9, 2017 No. 203 (President of the RF, 2018) and the Program "Digital economy of the RF", adopted by the Decree of the Government of the RF dated July 28, 2017, No. 1632-r (Government of the RF, 2018).

Studying these documents, we came to the conclusion that they aim the process of formation of information economy in Russia at provision of its global competitiveness with insufficient attention to practical implementation of the possibilities of optimization of economic activities and sustainable development of the domestic economic system. The results of the performed complex evaluation of the level of development of information economy modern Russia (as of 2018), based on the data of the National Research University "Higher School of Economics", IMD World Competitiveness Center, and the World Economic Forum, are presented in Table 1.

Table 1. Level of development of information economy of modern Russia (as of 2018)

Characteristics of information economy	Level of development in modern Russia (as of 2018)		
	According to National Research University "Higher School of Economics", % of selection (explanation)	According to IMD World Competitiveness Center, points 1-100 (position out of 63)	According to the World Economic Forum, points 1-7 (position out of 139)
Usage of the ICT* by population	74.8 (share of Internet users)	39	5.3 (40)
Usage of the ICT* by business	85.7 (share of Internet users)	62	3,6 (67)
Usage of the ICT* by the state	51.3 (share of electronic services obtained by users)	43	4.4 (44)
Development of ICT*-infrastructure	38.4 (as compared to other infrastructure)	38	4.7 (52)
Development of spheres of the ICT*	2.9 (share of GDP)	25	3.7 (38)
On the whole	- (data are absent)	65.207 (40)	4.5 (41)

*ICT – new information and communication technologies

Source: compiled by the authors based on: (National Research University "Higher School of Economics", 2018), (IMD World Competitiveness Center, 2018), (World Economic Forum, 2018).

The data of Table 1 show that the level of development of telecommunication infrastructure in Russia is rather high, which emphasizes large potential of formation of information economy. The level of usage of new information and communication technologies by society and business is rather high in modern Russia.

However, despite the formally high level of usage of new information and communication technologies by the state, according to the data of IMD World Competitiveness Center and the World Economic Forum, the data of

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the National Research University "Higher School of Economics" show that they are used for internal purposes with insufficient attention to provision of electronic government services to interested parties (population and business). The level of development of the spheres of new information and communication technologies is formally high, which is shown by the data of IMD World Competitiveness Center and the World Economic Forum, but their contribution into formation of Russia's GDP is very small, constituting 2.9%, according to the National Research University "Higher School of Economics".

Thus, the performed analysis showed imbalance of development of information economy in modern Russia, of which the most probably reason is state's aiming at receipt of quick formal results. Therefore, for formation of competitive, highly-effective, and sustainable information economy in modern Russia, it is necessary to pay attention to the issues of development of E-government and spheres of new information and communication technologies.

4. Tax measures that are used for managing the process of formation of information economy in modern Russia

The performed complex empirical analysis of the taxation practice in modern Russia showed that there have been intensive transformation processes, which consist in the following:

- increase of control over electronic financial operations of population (individuals), by expansion of authorities of the tax service as to inspections (with potential application of the Big data technology) for obtaining "shadow" revenues;
- planning the large growth of current tax rates and introduction of additional taxes for purchase of products in the Internet (E-commerce);
- implementation of requirements to mandatory electronic registration of all trading operations via online mechanisms with direct connection to the tax service for preventing the "shadow" revenues of business and for development of electronic tax administration.

The above tax measures, which are used for managing the process of formation of information economy in modern Russia, emphasize state's striving for usage of technological opportunities that open in the conditions of information economy, in the national interests (for increase of collection of taxes) with insufficient attention to interests of the population and business. Moreover, these measures could have a reverse effect for information economy, related to limitation of electronic payments due to voluntary refusal of population and business and to reduction of popularity of E-commerce.

At the same time, online mechanisms allow modern Russian companies to develop electronic document turnover and electronic tax accounting and will stimulate authomatization of the system of tax administration, which is a positive tendency in the aspect of formation of information economy. However, it is obvious that tax measures that are used for managing the process of formation of information economy in modern Russia are contradictory and insufficient for achieving large progress in formation of information economy and, therefore, require correction.

5. Perspectives and recommendations for improving the application of tax measures for managing the process of formation of information economy in modern Russia

The following tax mechanism of managing the process of formation of information economy in modern Russia (Figure 1) is offered for practical application.

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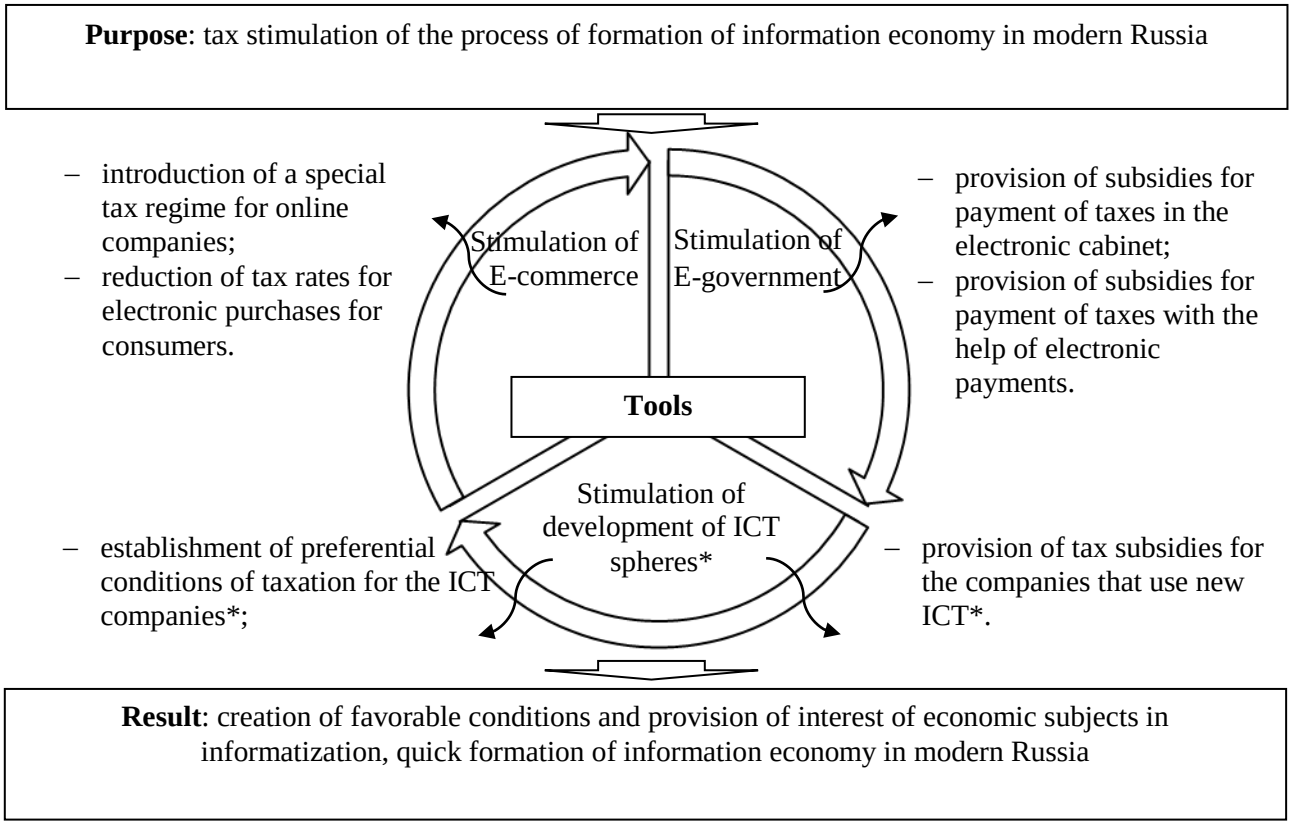

As is seen from Figure 1, the developed mechanism is aimed at tax stimulation of the process of formation of information economy in modern Russia. In view of the determined characteristics of information economy in modern Russia, we deem it necessary to use tax measures for stimulating:

– E-commerce, by introduction of a special tax regime for online companies and reduction of tax rate for online purchases for consumers;
– E-government by provision of subsidies for payment of taxes in online cabinet and provision of subsidies for payment of taxes with the help of online payments;
– development of the spheres of information and communication technologies by establishment of preferential conditions of taxation for ICT companies and provision of tax subsidies for the companies that use new ICT.

This will allow creating favorable conditions and ensuring interest of economic subjects in informatization, due to which quick formation of information economy in modern Russia will become possible.

Practical implementation of the presented tax mechanism of managing the process of formation of information economy in modern Russia (Figure 1) is to be conducted according to the following algorithm. At the first stage of this process, it is offered to conduct information and marketing support for future measures in the sphere of tax stimulation of formation of information economy in modern Russia.

Firstly, all interested parties should be informed about priority of formation of information economy for successful development of socio-economic system of modern Russia in the long-term. At that, it is expedient to focus on the current level of informatization of the Russian society and economy, its comparison to the level of informatization of socio-economic systems of leading developed countries (OECD countries), substantiation of advantages of information economy by the example of successful global experience of its formation, and

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emphasizing the necessity for formation of information economy for supporting competitiveness and sustainability of development of socio-economic system of Russia in the long-term.

Secondly, it is expedient to conduct sociological surveys and statistical studies for:
- determining the level of support for future tax measures in the sphere of tax stimulation of formation of information economy in modern Russia by society and entrepreneurship;
- evaluating the level of information awareness (mastering of new information and communication technologies at the user's level) of various categories of population and the level of information competence (level of mastering of new information and communication technologies at the professional's level) of representatives of various categories in the Russian labor market;
- determining the level of readiness, actuality, and effectiveness of infrastructural provision (material & technical and telecommunication) of formation of information economy in modern Russia;
- determining the level of readiness of entrepreneurial structures for implementing the investment and innovational projects that are aimed at formation of information economy in modern Russia;
- interest of various categories of population in formation of information economy in modern Russia and their readiness for financing of this process by the corresponding spending of tax revenues of the federal budget and purchase of products (goods, works, and services) of information economy.

Thirdly, the state has to collect feedback from all interested parties (society and entrepreneurship) regarding:
- present preconditions for formation of information economy in modern Russia;
- potential barriers on the path of formation of information economy in modern Russia;
- technical, financial, and social risks of formation of information economy in modern Russia;
- perspective solutions to current problems of formation of information economy in modern Russia.

The tools of information and marketing support for future measures in the sphere of tax stimulation of formation of information economy in modern Russia should be as follows:
- social advertising and PR: it is possible to form positive attitude and approval from society and entrepreneurship for future measures in the sphere of tax stimulation of formation of information economy in modern Russia;
- Internet marketing: it allows for highly-effective marketing communications between the state, society, and entrepreneurship with the help of marketing via state and private Internet sites, e-mail marketing, and social networks marketing.

At the second stage of this process, it is recommended to involve all interested parties in discussion of planned tax reforms in the sphere of tax stimulation of formation of information economy in modern Russia. This envisages development of preliminary projects of tax reforms in the sphere of tax stimulation of formation of information economy in modern Russia. At that, it is recommended to use outsource for access for original and perspective ideas of interested parties – though, main responsibilities for preparation of projects of tax reforms are set on the state.

Secondly, it is necessary to openly discuss projects of tax reforms in the sphere of tax stimulation of formation of information economy in modern Russia with participation of representatives of interested parts of society and entrepreneurship. For this, it is necessary to observe the following conditions:
- direct participation (personal presence) of representatives of interested parts of society in discussion of the Government of the RF of tax reforms in the sphere of tax stimulation of formation of information economy in modern Russia;

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- information support, extramural and remote consultations by representatives of the public for Government of the RF on the issues of tax reforms in the sphere of tax stimulation of formation of information economy in modern Russia;
- openness of the process of discussion by the Government of the RF of tax reforms in the sphere of tax stimulation of formation of information economy in modern Russia (informing all interested parties via web-sites and social networks).

Thirdly, it is expedient to correct the projects of tax reforms in the sphere of tax stimulation of formation of information economy in modern Russia and adopt them in the form that harmonizes the interests of all interested parties (various categories of society and entrepreneurship). All offers should be taken into account, discussed, and, if possible, accepted by the Government of the RF, with achievement of the maximum level of detalization of adopted tax reforms in the sphere of tax stimulation of formation of information economy in modern Russia.

At the third stage of this process, it is offered to implement the adopted reforms and to collect feedback from interested parties for their optimization (improvement and correction). It is recommended to implement these reforms in a test regime on certain territories of the RF (e.g., Moscow Oblast or Leningrad Oblast) and/or within special economic areas. This will allow determining gaps, contradictions, and other drawbacks of adopted tax reforms in the sphere of tax stimulation of formation of information economy in modern Russia.

All determined drawbacks should be shown to the public and discussed. After that, it is possible to implement the adopted, testes, and optimized tax reforms in the sphere of tax stimulation of formation of information economy in modern Russia in the whole country. It is recommended to implement these reforms gradually during 3-5 years, for avoiding serious social shock and timely determination and elimination of drawbacks of these reforms.

At the fourth stage of this process, it is recommended to conduct the state and public monitoring and control over effectiveness of implemented measures in the sphere of tax stimulation of formation of information economy in modern Russia, to accumulate experience, and to plan new reforms in this sphere. During monitoring, it is recommended to use the following criteria of effectiveness of implemented measures in the sphere of tax stimulation of formation of information economy in modern Russia:
- increase of the number and turnover of online companies in Russia as a result of implementing measures in the sphere of tax stimulation of formation of information economy;
- growth of the number and cost of online purchases of Russian consumers as a result of implementing measures in the sphere of tax stimulation of formation of information economy;
- growth of the share of online entrepreneurship in the general structure of Russian entrepreneurship as a result of implementation of measures in the sphere of tax stimulation of formation of information economy;
- level of development of the spheres of information and communication technologies as a result of implementing the measures in the sphere of tax stimulation of formation of information economy;
- number of companies that use new information and communication technologies as a result of implementing the measures in the sphere of tax stimulation of formation of information economy;
- share of taxes paid by population and entrepreneurship in online cabinet as a result of implementation of measures in the sphere of tax stimulation of formation of information economy;
- share of taxes paid by population and entrepreneurship with the help of online payments as a result of implementation of measures in the sphere of tax stimulation of formation of information economy.

During monitoring and control over effectiveness of implemented measures in the sphere of tax stimulation of formation of information economy in modern Russia, it is necessary to use the following principles:
- principle of objectivity: rejecting subjectivism and founding on statistical data on implementation of measures in the sphere of tax stimulation of formation of information economy in modern Russia;

- principle of complex character: consideration of all factors and future perspectives of implementation of measures in the sphere of tax stimulation of formation of information economy in modern Russia;
- principle of effectiveness: monitoring and control are to be conducted with the usage of new information and communication technologies with the help of Internet surveys and statistical research.

As a result of monitoring, drawbacks of the implemented measures are found, and perspectives of future measures in the sphere of tax stimulation of formation of information economy in modern Russia are determined. That is, the offered algorithm of implementation of the offered tax mechanism of managing the process of formation of information economy in modern Russia is cyclic, which ensures continuity and systemic character of this process.

Conclusions

It is possible to conclude that the offered hypothesis is proved – tax measures are used in modern Russia as to certain characteristics of information economy (as to usage of new information and communication technologies by population, business, and state) and have contradictory effect; very often, instead of stimulating the formation of information economy, they limit its development due to orientation at primarily state interests and damaging the interests of economic subjects (population and business).

The modern Russian tax mechanism of managing the process of formation of information economy in modern Russia could be characterized as restraining. Its drawbacks, related to insufficient attention to underdeveloped characteristics of information economy (primarily, the spheres of new information and communication technologies) and described contradiction (emergence of reverse effects), could be overcome by the developed authors' tax mechanism of managing the process of formation of information economy in modern Russia, which could be described as stimulating.

This mechanism is aimed at provision of tax stimuli (preferences in the form of tax subsidies) for development of the spheres of new information and communication technologies, as well as popularization of these technologies among population and business (in the aspect of E-commerce) and further practical development of the system of E-government. The offered mechanism showed large potential of tax measures as to stimulation of formation of information economy in modern Russia. Its implementation will allow increasing and supplementing positive effective from other measures and accelerating the process of formation of information economy in modern Russia.

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POSSIBILITIES OF BLITZ-PSYCHOGRAMS AS A TOOL FOR HUMAN RESOURCE MANAGEMENT IN THE SUPPORTING SYSTEM OF HARDINESS OF COMPANY

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Abstract. The article describes the psychogram method as a tool for human resource management. The article describes the psychogram method as a tool for human resource management, the use of which is provided by the availability of platform technologies in the modern digital economy. The presence in the market space of firms that provide platform services for complex psychological diagnosis enables the manager to adequately assess the required behavioral competencies of the applicant, using as a standard the system of basic parameters corresponding to this position. The system of basic parameters is formed on the basis of the method of blitz-psychogram after passing by professional employees of this firm professional tests based on platform technologies. This allows the company to identify the character traits, motivation, preferred activities and role in the team with efficient employees with minimal own expenses. Applicants who meet the parameters of a psychographic portrait will be internally motivated for this type of activity. This will further reduce the risk of staff turnover, increase the effectiveness of training and the effectiveness of other actions of human resources management by activating the employee's internal motivation in this type of activity.

Keywords: human resource management; psychogram; motivation; behavioral competency; platform technologies

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1. Introduction

The sustainability of the company is necessary to achieve its strategic goals and is based on it, including on a sufficient basis of human resources.

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The company's sustainability system includes as a key element strategic human recourse management (hereafter - HRM), the characteristic features of which in a modern competitive corporation are

- Functional relate from corporative strategy, which accepted in a medium or long term;
- Coordination with organizational strategies, such as cultural change, organizational changes, development of labor relations.

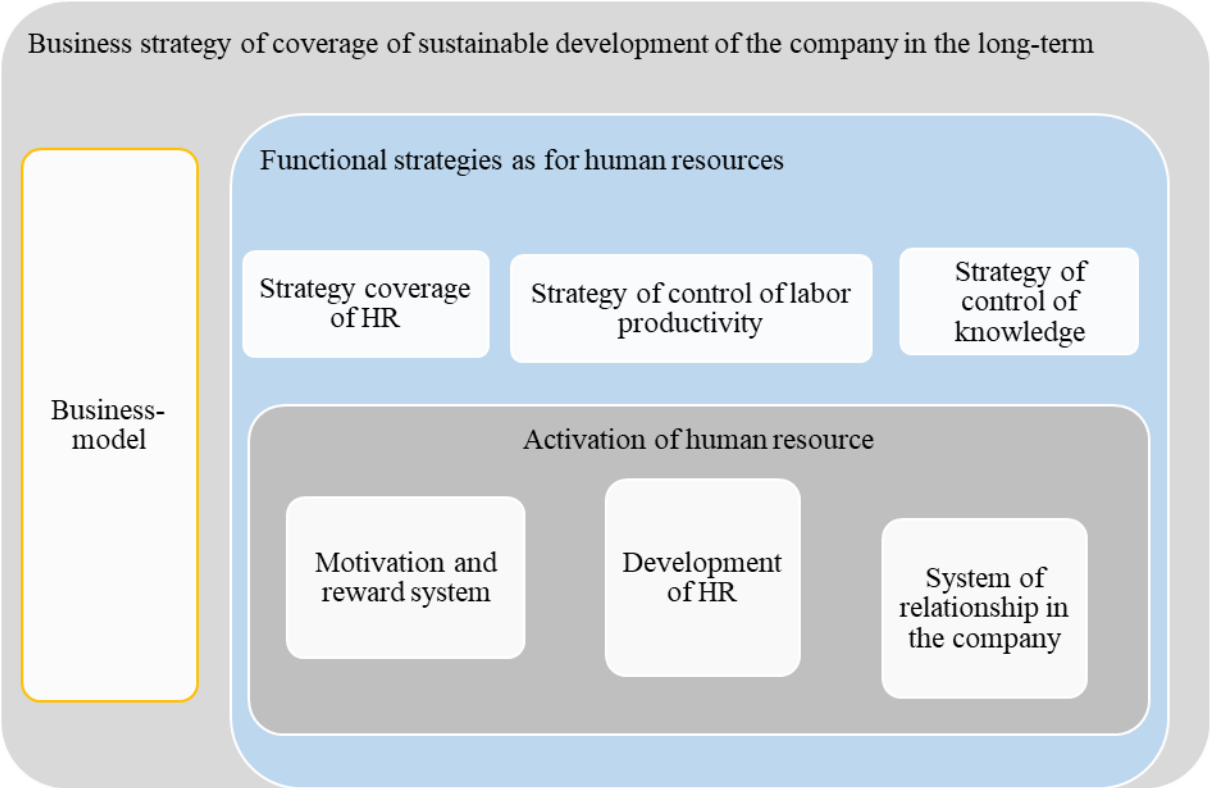

Fig. 1. Meaning of activation human resources in the system of functional strategies of HRM
Source: composed by authors

A multi-layered structure of HRM that performs important functions of providing resources, managing labor efficiency, managing knowledge, activating employees (Armstrong 2000, Sanchez 2010) (Figure 1). The main elements of the subsystem of activating human resources are: motivation and reward systems; development of human resources; system of relations in the company.

The activation of human resources is one of the most significant blocks of human resources management of the company, as the activities implemented within its framework have a multi-faceted impact on the rest of the functional strategies. By activation, we mean the process of influencing a worker's motivation for work with the help of a set of tools and mechanisms that stimulate the compliance of the employee's behavior and the results of his activities with the company's strategy.

The tools are: psychographic methods for diagnosing abilities, evaluation and certification, career development plan, horizontal and vertical rotation, and others (Chadwick, Dabu 2012). The mechanisms are the reward system, the adaptation mechanism of the new employee, the mechanism of participation in management, the mechanism for institutionalizing knowledge, and others (Gupta, Sahoo 2016).

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Psychographic methods of diagnosing abilities are important for ensuring the stability of the company in terms of the required quality of human resources. For resources, a company can turn to the labor market and select an effective employee for a particular position. At the same time, the company can also develop the necessary qualification of an already existing employee with suitable posts by psychographic characteristics. In this case, it is necessary to correctly connect his internal motivation, in time to form in him the desire to improve the qualification of the system of remuneration for skills, to make it clear that professional competencies are a value for the company, etc. (Lengnick-Hall, Rigsbee 2013; Huemann 2010; Monni et al. 2017; Borisov et al. 2018; Bogdanović et al. 2018).

To ensure the best conditions for employee productivity, it is advisable to correctly determine the place of work, where his activity will be most productive, taking into account his psychographic data. Auxiliary facility for the activation of human resources, companies appear in the conditions of the formation of the digital economy and technological platforms (Muegge 2013).

In this article we present the results of a study of a number of Kazakhstani companies, in which we concentrated on the issue of activating human resources and the method of psychography, the use of which using platform technologies provides an effect in all development processes: selection, training, rotation, career growth.

The aim of the study was to develop a method of blitz-psychography for use in the practice of human resources management based on platform technologies on the resources of professional consulting companies.

The research method was a comparative assessment of the results of testing leaders and outsiders in specific professional groups (the total number of at least 50 people per profession) and the allocation of basic characteristics of internal competencies for professional blitz psychograms**.**

Main results of the study. The activation of the company's human resources is connected with such processes as training, rotation, certification, career growth. These processes are closely related to the motivation of the employee and his ability to achieve high levels of labor productivity in a particular workplace.

Today, human resources planning rather focuses on what skills and competencies will be needed in the future, based on the company's development scenarios, but does not provide a detailed plan for quantitative long-term staffing needs. For the company it is necessary to form a solid base of human resources, endowed with relevant qualities, skills, knowledge and training potential. The principles of selection and relocation of an employee within the company play a leading role in the starting activation of his activities and further career movements based on vocational training, certification, horizontal and vertical rotations. In terms of cost savings, this also matters, because time and resources for additional vocational training can be burdensome for a company if we initially employed a person whose abilities do not correspond to this position and / or whose internal motivation is not strong enough.

If we turn to the basic factors that determine the possibility of highly productive mastering of specific qualifications and a range of skills, achievement of high performance indicators, then they are individual characteristics of a person.

To such characteristics experts attribute several basic psychological qualities of a person:
- Human abilities, for the determination of which many classifications have been developed (Vernon 2001).

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- Intellect, which in general is defined as the level of ability to think, logical reasoning, conclusions, knowledge (knowledge and comprehension) and awareness (understanding, recognition). Intellect is measured on at least three levels (low, medium, high) (Guilford 2004).

It is a specific combination of the abilities of a person and his inner motivation that underlies the formation of the level of his competence, which is the basic construction for the management of the human resources of the organization. The elements by which such a concept as "competence" is identified and described, are, in the final analysis, the basis on which actions to activate human resources are integrated.

The use of the term "competence" in the management of human resources is of a complex nature and is often identified with the notion of "competence", although there are significant differences between these concepts.

The concept of "competence" was applied in 1982 by R. Boytsis, who defined competence as "a person's ability to behave in a way that meets the requirements of working in a certain organizational environment, which in turn is the reason for achieving the desired results" (Boyatzis 1982).
Other researchers, for example, L. Spencer, understand competently the behavior of the worker (his ability to transfer his knowledge to what he does), and the competence is understood as the analysis of the functional of the work, i.e. a specific list of functions to which this profession or activity corresponds (Spencer 1993).

In modern practice, the concept of competence is most often used, as the unity of two concepts:

1) Types of behavior or the ability to behave in a certain way that the organization needs to ensure a high level of efficiency. This gives an opportunity to concentrate on personal qualities and behavioral stereotypes, desirable for performing functions in their workplace. This type of competence is assessed by a psychogram of activity that should reflect the requirements for motivational, cognitive, emotional-volitional, characterological and other professionally important qualities of the subject of labor. These are so-called internal or behavioral competences that can be reflected in a psychogram desired for a given profession.

2) The set of special professional knowledge and skills that are necessary for workers to effectively perform their duties. These competences are contained in the professional program (Delamare, Winterton 2005).

The structure of competence that makes up its elements is an integrating link for all blocks of activating human resources. (Figure 2)

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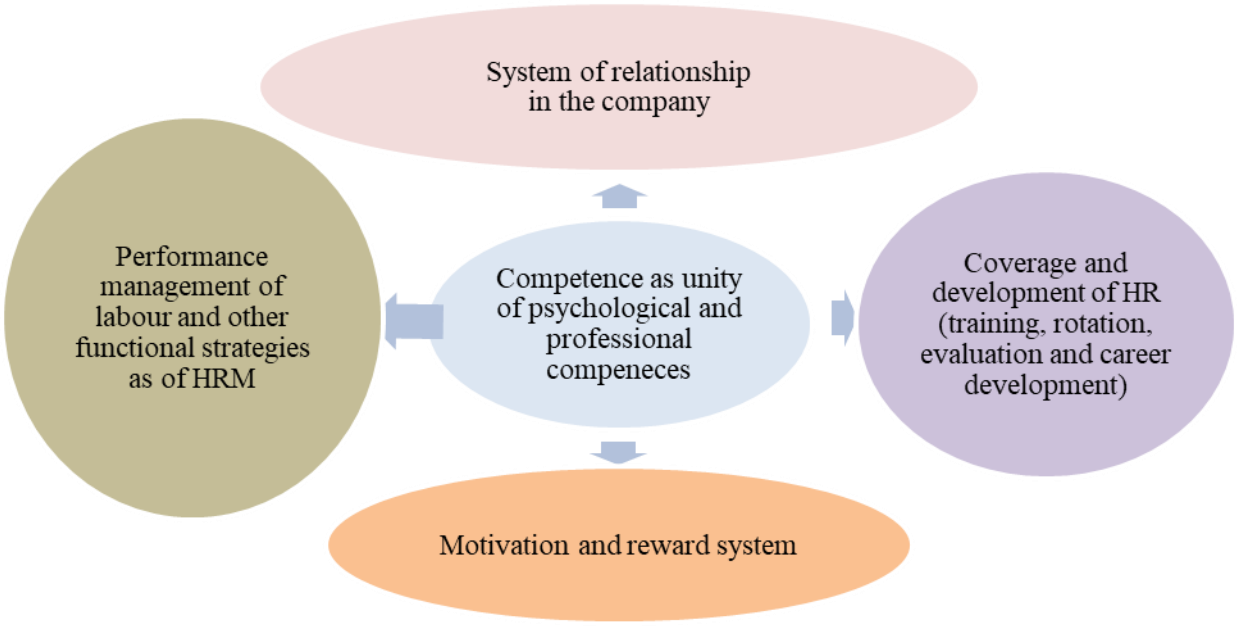

Fig. 2. Competence as a first notion linking all elements of the subsystem of activating human resources with functional strategies.
Source: composed by authors

Therefore, at the present time, a competency-based approach is one of the main ones. With this approach it is argued that the professional and psychological competencies necessary for the successful performance of the role can be used as the basis of all processes related to human resources: selection, rotation, certification, etc. (Roberts 2005).

The advantages of this approach in strategic HRM are that it improves the accuracy of forecasts of future employee outcomes, based on an assessment of the characteristics of his personality and motivation along with an assessment of professional knowledge and skills. And it helps to do this with tools that increase the objectivity of the evaluation: electronic tests, interviews, questionnaires, etc. (Wood, Payne 1998, Chandan, Rama 2016, Otoo, Mishra 2018).

The set of behavioral competencies used to assess the applicant for a vacancy or the evaluation of an active employee to promote him to a specific position is represented by the following criteria:

- A system of characteristics of the area of activity in which an employee must be productive. This is, for example, for the project manager the ability to express his thoughts, teamwork, the ability to offer original ideas, the ability to inspire employees and control the process without dominating, etc. (Liikamaa 2015).

- Diagnosis of the employee's internal motivation for determining the probability of performing tasks assigned to him and obtaining the results necessary for the company (Priyono, Rijanti 2015).

The methodology for conducting research on behavioral competence for a particular company is possible in the following variants:
First variant. The test is developed by the company itself, formulating the professional and behavioral characteristics of the employee in this position, summarizing the requirements for the employee in the measure of

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his understanding and training, sometimes largely intuitively. The applicant fills the test; the result is determined in the form of a set of qualitative characteristics or a sum of points. The results are considered by the line manager, the management of the HR department and the company and a decision is made either about an additional interview or on hiring (Taranenko 2015).

Second variant. The test is developed by experts of the consulting company taking into account the opinions of professionals working in this company. Since the creation of psychometric databases is quite a difficult task for its own solution, profile companies can be involved. Testing is carried out on the basis of the calculation of scores and candidates who do not gain a threshold value are known to be eliminated and are not allowed to the next stage. The remaining candidates are interviewed according to their place in the ranking and taking into account their strengths and weaknesses.

Third variant. The use of platform technologies as a combination of "partially or completely open technologies and additional assets that are not owned by the company and not controlled by it, but can be used by companies to develop the additional products, services and technologies necessary for it" (Gawer, Cusumano 2014).

Platform technologies are practically not used at the present stage of business development in Kazakhstan, despite the availability of online resources of online platforms for complex psychological diagnostics, for example, ProfDialog. Using platform technologies will allow the company to provide regular professional support of all issues related to the provision of human resources and their development.

We propose a method of blitz-psychogram that allows us to use the resources of the platform and on this basis to develop an additional product for the firm, taking into account the specificity of its activities.
As part of research, we developed and tested the following algorithm of actions:
Stage 1. The test for behavioral competence to fill a vacant post, presented on the platform of a specialized consulting organization, is tested on employees already working effectively in this organization in the relevant positions.

Stage 2. According to the test results, character traits and intelligence (abilities), behavioral competencies, internal motivation factors are inherent in all effective employees in this position. The evaluation of the roles that the employee plays in the team, that is, in contact with other people, is given.
Based on the results of the testing, the common features of these workers are determined by qualitative characteristics (A, B), and two scales (B, D):
A) Motivation
B) Character traits and settled mode of thinking;
C) Behavioral competencies;
D) Roles in the team.

Stage 3. The generalization of the results of leaders determines the range of values (for quantitative characteristics) or a set of characteristics (for qualitative characteristics) with which the candidate's result for the given position should coincide. The fall of the results into the "optimal" (100% coincidence) or "acceptable" (90% match) field makes it possible to make an assumption about the sufficient degree of success of the applicant's future work in the job sought.

The logical scheme for implementing the method of the blitz psychogram is shown in Figure 3.

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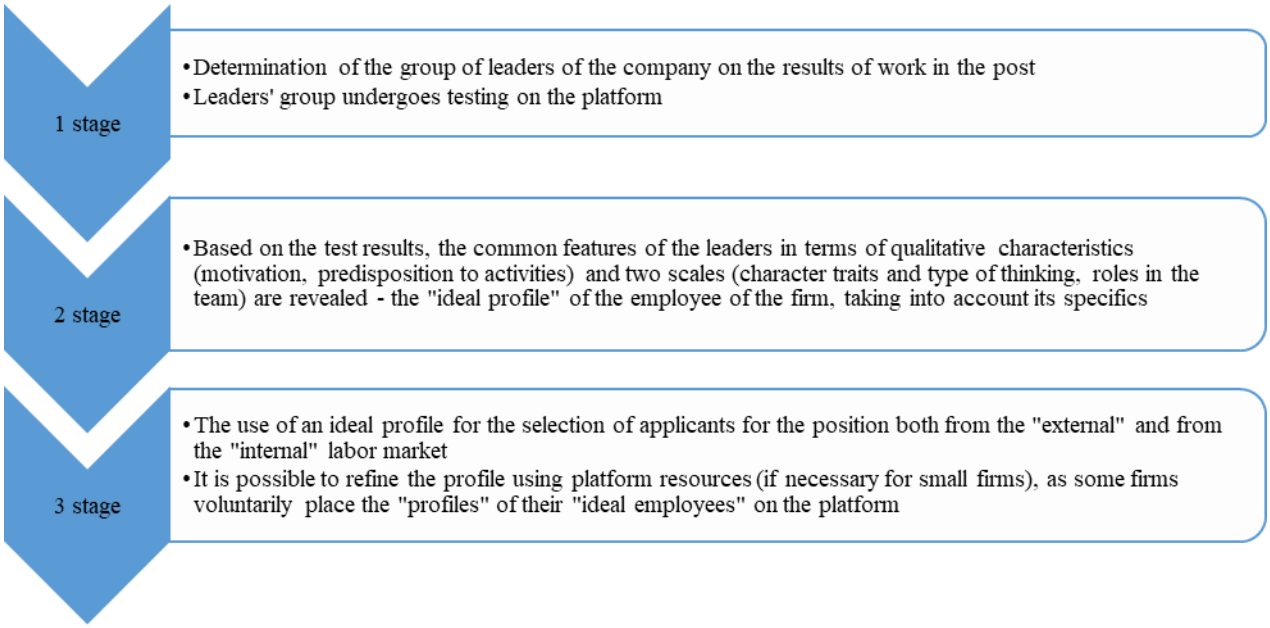

Fig. 3. Methods for developing a blitz psychogram for drawing a portrait of the "ideal worker" in terms of internal competencies.
Source: composed by authors

The test results serve as an objective basis for diagnosing the competitor's correspondence to the "ideal" job profile, and can also be used by the human resources management service to determine the type and form of vocational training that is most effective for a given employee, the construction of a career profile, horizontal and vertical rotations.

We developed and tested three psychograms:
- Project manager;
- Social worker;
- Emergency worker.

Each of them is the systematization of the psychological competencies of at least 50 successful employees who are leaders in their firms.

Psychogram "social worker". For companies providing social special services for older citizens and people with disabilities, a profile of the post of social care worker was drawn up. 90% of employees in such organizations work in this position (Pritvorova, Petrenko, Ayaganova 2017).

Given the relatively simple subject area of this activity, the requirements for the psychological characteristics of the social worker are quite specific and should be evaluated in the interests of both the employee and the client in order to ensure the highest social effect from the proposed service. In addition, the application of the psychogram method will ensure a reduction in the employer's costs for the vocational training of new employees, since only applicants with internal competencies for this type of activity will be recruited.

According to the results of the test, 77 employees of social service firms, of whom 24 are experienced employees with high client ratings, have the following profile.

On block A, the following factors of motivation should be present in the portrait of a social worker (Table 1).

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Table 1. Significant factors motivating a social worker / social worker assistant

No.	Internal factors of motivation	Content of factor
1	Protection of somebody or assistance	Motivation to provide all possible assistance and provide protection.
2	Manifestation of altruism	Motivation to be necessary and useful to someone
3	Self-actualization	Motivation to realize the personal and professional potential
4	Communication and interaction	Motivation to improve the effectiveness of communicative contacts
5	Dedication	Aspiration to be necessary and in demand

Source: composed by authors

There are no points for this block, it is sufficient that there is a factor of internal motivation in the results of testing the applicant.

For block B, it is necessary to evaluate the hit of a value in the designated interval, so within the boundaries indicated, the required quality is significant, but not excessive. (Table 2)

Table 2. Character traits (sample)

No.	Character trait (result measures in %)	Potential abilities		Notion
		Minimum	Maximum	
1	Feminity (The need to care for and care for, to provide comfort for someone)	60	80	The value above 80 is undesirable, because it is already indecisiveness, difficulties in solving minor problems
2	Sensitivity (Altruism, the ability to sympathize, sensitivity, restraint)	55	75	At the rate of 40-45, the social worker should have this quality in a state of accentuation (vivid expression).
3	Responsibility (Integrity, exacting to oneself, fidelity to the interests of the case)	50	70	The value above 70 is undesirable, because leads to "getting stuck" in problems, dramatizing the situation

Source: composed by authors

According to the block B, the applicant must have a predisposition to the types of activity that require:
- Accuracy;
- Desire to assist other people in overcoming difficulties through support, protection, rehabilitation;
- Ability to soberly and rationally perceive the events and assess the surrounding people, keep calm in all situations;
- Predispositions to monotonous activity requiring from the person multiple fulfillment of identical actions, algorithm.

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These internal competencies should appear in the results of the corresponding block after passing the test.
On the block D, the high scores should be in the job seeker for roles such as inspirer (10-8), collectivist (10-9), performer (8-7). The inspirer is distinguished by a normal type of behavior, a positive attitude towards people and events, is able to motivate the client for joint activities, enjoys communicating and interacting with others. The collectivist seeks to organize various, interesting events. The perpetrator tries to be responsible and conscientious, inclined to recheck the case he made to avoid mistakes (Figure 4).

At the same time, for the role of the Riversman (inclination to conflicts) there should be no more than 3 points. For the roles of administrator (administrator), creator, agitator, critic and strategist, the values at the bottom of the scale will be preferred: 3-5 points. For the role of the analyst, the value can be taken at the level of 4-6 points.

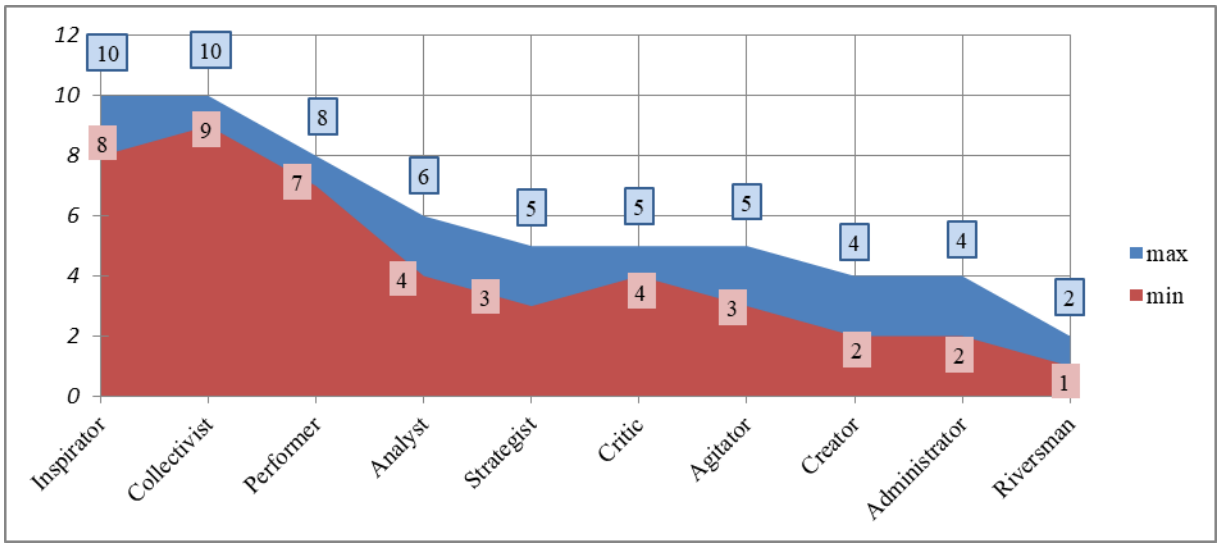

Fig. 4. Preferred intervals of the value of the scale for the role in contact with other people for the vacancy of a social worker, scores
Source: composed by the authors

Psychogram "Specialist in the provision of services in the field of sales."
The most massive positions in this area of the company are the positions of the seller, commercial agent, sales agent, sales agent, sales manager, sales representative.

For all these posts, one type of psychogram can be compiled, since the typical psychological characteristics of these activities vary insignificantly.

The totality of these psychological characteristics represents the main list of psychological competencies for trade service employees and was the result of testing 73 employees of the company, of which 23 are sales leaders. Comparison of the results obtained revealed common characteristics for successful workers and their combinations. It is on the comparison of the characteristics of leaders and all other employees of the company that the list of character traits and the interval of values in which the parameters of each specific job seeker in the company should be located were revealed.

Based on the results obtained, the following characteristics of internal competencies are derived.

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In the block A, the following factors of motivation should appear in the competitor, which are significant for this work (Table 3).

Table 3. Significant factors of employee motivation for basic sales positions

No.	Factor	Content of factor
1	Influence and manipulation	Aspiration and the ability to use manipulative means of influence to achieve meaningful situational goals
2	Communication and interaction	Motivation to improve the effectiveness of communicative contacts
3	Preservation of the immutability of the personal and professional position and status	The desire to maintain stable work without much change for a long time
4	Submission	Aspiration to obey and follow instructions caused by the desire to avoid responsibility
5	Freedom of Self-realization	Striving for freedom of professional expression; desire to solve tasks that involve activity, build new contacts and connections

Source: composed by authors

Indicators included in Block B are shown in Table 4.

Table 4. Character traits and the type of thinking for the employee in the field of sales

№		Interval		Interval
		min	min	Results measure in %
Character trait				
1	Activity (speed, mobility, intensity of actions, behavior, satisfaction with life)	55	80	Above 80 points, activity is undesirable, because it can be associated with obsession
2	The need for communication (there is interest in getting to know different people, the ability to perceive a significant flow of people)	60	85	Excessive need for communication above 85 points will tire the client
3	Demonstrativeness (the ability to show oneself, someone or anything in the right light, if it contributes to the achievement of the goal, the ability to easily and naturally capture people's attention, vigor and ingenuity in their demonstrations)	55	75	A value higher than 75 is undesirable, since such behavior is perceived by others as insincerity, "replaying" the role, a false promise, most likely with may appear artificially
4	The ability to convince (communicative, ability to determine the tactics of behavior, based on the experience of interaction with people in different conditions, it is easy to establish contacts with different people, if interested in this).	60	80	With scores above 80, expressiveness and manipulation may repel the client
5	Pragmaticity (the ability to show empathy and stand on the client's position, to understand his needs from the standpoint of common sense)	50	70	With scores above 70, it may seem too prudent and rational, which can be associated with coldness and disinterest
Settled mode of thinking				
6	Conceptual intelligence (responsible for the structuring of speech, for a clear and competent presentation of their thoughts)	50	There is no limit	From the level of 50%, the average statistical rate begins
7	Imaginative intelligence (it handles visual information well, observant)	50	80	A level above 80 is undesirable, because it is more creative abilities and emotional burnout can begin.

Source: composed by authors

For block B, the requirements for the behavioral competence of trade workers are presented in Table 5.

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Table 5. Activities to which there is a high level of predisposition

No.	Types of activity	Content
1	Communicative	Activities related to interpersonal and mass communication through various means.
2	In the team	Activities that involve the desire and ability to work in a team and communicate.
3	Competitive	Activities aimed at achieving and maintaining the best position for oneself with respect to competitors.
	Execution, role-playing	Activities to create different images, behaviors needed to achieve goals.
4	Manipulative	Activities aimed at the implicit motivation of other people to perform certain actions.
5	Requires flexibility and different directions	Activities in which you need the ability to quickly switch from one case to another, adapt to changing conditions, be included in a new job.

Source: composed by authors

In the corresponding section of the ProfDialog report, these activities should be listed in the list of activities for this subject, to which there is a high level of predisposition. For block D (roles in the team), job seekers of the position should have corresponding characteristics of the intensity of the roles in the team, the maximum and minimum values of which are shown in Figure 5.

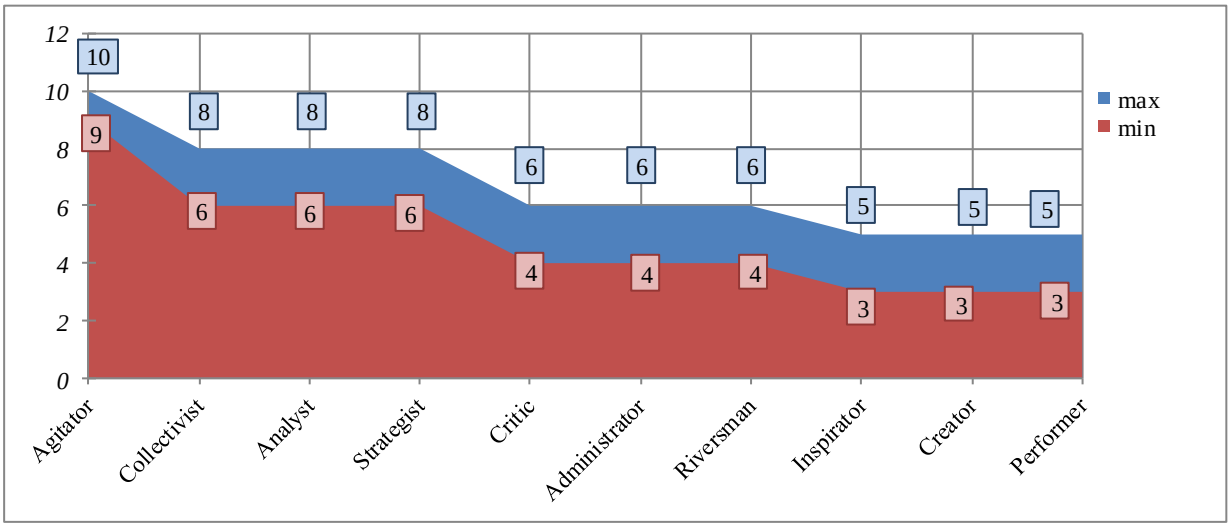

Fig. 5. Preferred ranges of the scale value for the role in contact with other people for the sales professional, scores
Source: composed by the authors

The applicant for the post will have the best rating on the psychogram if he has the following characteristics in the above intervals in the report. High values of the scale should be observed in such characteristics as agitator (9-10 points), and also for such roles as a collectivist, analyst, strategist (all three characteristics should be in the range of 8-6 points). The leading characteristic of the "agitator" means that the applicant has the expressed abilities of effective self-presentation, knows how to attract people's attention, to present various information in such a way that it becomes interesting to the listener. At the same time, the competitor is effective as a propagandist and knows how to interact with people. "Collectivist" easily builds profitable personal relations, avoids conflicts and embarrassments. "Strategist" has the ability to see the future. Being enthusiastic about the subject of discussion, can successfully speak to the audience and cause interest in people, promoting their ideas and principles.

According to the results of the four blocks, applicants who meet the characteristics by 100-90% have a sufficiently high potential for the professional activity in question.

Conclusion

Providing an organization with human resources and activating their activities is one of the most difficult tasks of maintaining the sustainability and competitiveness of any business. To solve the problem of activating human resources, the use of psychographic methods is important not only at the stage of selection of employees, but throughout the whole period of his work in the company to maintain interest in the results of his work and the company as a whole, and to prevent emotional burnout. It is advisable to accept and improve the qualification of an employee with suitable posts by psychographic characteristics, since its effectiveness will always be higher than that of an employee without an internal predisposition to this type of activity.

Platform technologies make it possible to reduce the costs of creating your own IT infrastructure for human resource management in the form of a complex of tests and diagnostics, algorithms and solution templates. Using the resources of online platforms, which, as shown in the example of services in the field of personnel selection, evaluation and development, provide qualified support for managerial decisions in the field of human resource management. At the same time, an organization can develop its product on the basis of its resources, as we have shown in the example of a psychologist's specialist. This product will reflect both the general requirements for the employee in this position, and take into account the specifics of the company's activities. It will be a tool of prescriptive analytics in the field of human resource management, since will warn about possible problems when hiring a specific job seeker, but at the same time help in the development of management decisions to activate human resources and ensure business sustainability.

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High performer can activate to creation and distribution of new knowledge, creation of sustainable communication channels for the exchange of work experience (Boxall, Macky 2007; Beltrán-Martín, Roca-Puig 2014; Sanchez 2015).

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FACTORS INFLUENCING STUDENT ENTREPRENEURSHIP INTENTIONS: THE CASE OF LITHUANIAN AND SOUTH KOREAN UNIVERSITIES

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Abstract. Today's ultra-competitive businesses pose new ambitious challenges for universities to become entrepreneurial, to promote creativity and student aspirations to start up a business, to contribute to the spirit of entrepreneurship, to provide the knowledge necessary for the development of business and to introduce new and innovative entrepreneurship programmes. The paper argues that this shift arises from factors such as the image of entrepreneurship, personal qualities and the environment, the university study process, study environment and university infrastructure, all of which should be taken into consideration. The aim of the research was to determine and compare the factors that influence students' intentions to start their own business in Dongseo University (South Korea) and in Mykolas Romeris University (Lithuania), using quantitative (a sample of 367 and 335 students) and qualitative (a sample of 6 and 10 experts) research methods respectively. The results showed that personal qualities, the image of student entrepreneurship and the environmental impact on entrepreneurship vary across cultures. However, it should be noted that students' intentions to start a business are affected by determining factors in the study process. These research results could help determine what are the expected knowledge, competences or practical skills to be acquired at university.

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Keywords: academic factors; economic development; entrepreneurial university; intention to start a business; inclination towards entrepreneurship

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1. Introduction

Today, entrepreneurship is considered to be one of the most important drivers of a country's economic growth (Harper, 2003; Landes et al. 2012; Rideout, Gray, 2013) in order to make possible and preserve a high level of competitiveness, and is also considered to be a catalyst for improving the quality of life and changes in a society (Keat et al. 2011; Ooi, Nasiru, 2015). Entrepreneurship is associated with the creation of new opportunities in uncertain and unknown environments (Neck, Greene, 2011).

With the wave of new and extremely fast-growing enterprises over recent decades, which has brought to light the creation of such globally successful start-up examples as Facebook, Amazon, Dropbox, Uber and a number of others, entrepreneurship has become one of the most fashionable keywords. The impact of such enterprises on economic growth is extremely significant (Wong et al. 2005). Fast-growing enterprises impact emerging industries and the acceleration of the structural changes necessary for a knowledge-based economy. Public, policy circles and the academic community more frequently speak about the importance of entrepreneurship, methods of implementation of entrepreneurial programmes as well as ways of ensuring their quality and results. For this reason, academic entrepreneurship has gained the attention of academics and policymakers around the world, and they are making efforts to encourage it.

The interaction between entrepreneurship, innovation and economic development has become the main theme in policy circles (Looy et al. 2011). This interaction is brought about through a number of various training courses, conferences, the introduction of state-owned and private-capital instruments, which promote the emergence of new businesses and ideas, as well as by the rapid development of the start-up ecosystem.

The existing literature on the academic entrepreneurial university puts a strong effort into explaining the entrepreneurial university approach, and what study methods, processes, university infrastructure, activities, and initiatives lead to an entrepreneurial university.

The entrepreneurial university is described as the outcome of a revolution in the university mission (Etzkowitz et al. 2000). Universities pay far more attention to the practical implementation and commercialisation of research results. Such a process of developing scientific knowledge has encouraged the entrepreneurship of universities. Etzkowitz et al. (2000), Jacob et al. (2003), Mok (2005) analyse the role of university entrepreneurship and interpret the process of developing scientific knowledge (including the development of innovations) by applying the triple-helix model described by Etzkowitz, Leydesdorff (1999), which examines the interaction between higher education, the government and industry/production by revealing the process of developing knowledge and innovations.

Thus, the role of universities remains highly important, and they must cope with the extreme challenges associated with integrating measures stimulating entrepreneurship, education for relevant competences, skills and the entrepreneurial attitude, and with the provision of knowledge to students (Galloway, Brown, 2002; Looy et al. 2011; Zhang et al. 2014; Bordean, Sonea 2018). Universities compete with each other; their main task is not only to introduce themselves as entrepreneurial universities, but also to demonstrate which measures may help them ensure the relevant study programme (Etzkowitz et al. 2000) to promote creativity, efficient team work, an innovative approach and develop students' abilities to compete in the global market by demonstrating the skills that are innovative and necessary for the modern environment (Mok, 2005; Rideout, Gray, 2013). Nevertheless, there is agreement that universities must first of all remain the nuclei of the knowledge sector (Laukkanen, 2003).

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These modifications raise an important question: what features of an entrepreneurial university promote a student's choice and decision to start a business?

The previous studies found in the literature provide some alternative explanations for this question. Some scholars focus on the perception, desirability and feasibility of new venture creation (Veciana et al. 2005), others on educational and structural support factors affecting the entrepreneurial intentions of a student (Turker, Selcuk, 2009). Keat et al. (2011) examine demographic characteristics and family business background, the entrepreneurship learning process, the entrepreneurial curriculum and content, and the role of educators or friends. The findings vary across the studies, and often indicate a link between entrepreneurial intention and study process, personality factors, the entrepreneur image, and the university role.

However, the study provides ample evidence for the influence of university activities, entrepreneurial initiatives, and the study process on students' intentions to start a business. A more focused, holistic approach to the study of the entrepreneurial university is required to determine what factors affect students' intentions to start a business.

The purpose of the research was to determine and compare the factors influencing students' intentions to start their own business in two different national and institutional business cultures: in Dongseo University (South Korea) and Mykolas Romeris University (Lithuania).

These two universities were selected for the comparison taking into consideration the attitude of students and academic experts toward different national and institutional business cultures.

This study explores the determinants affecting the intention of students to start a business from the perspective of the university study process. Four hypotheses were developed to define the impact of the various factors on students' intentions to start a business. The hypotheses were tested and results were analysed using dispersion analysis. Finally, the paper presents discussion and conclusions applicable to both researchers and university administrators.

2. Theoretical background

2.1. The University as an educator for entrepreneurial thinking, behaviour and values

Modern conditions of globalization, rapid digital technology progress, environmental challenges and political and economic instability inevitably change the attitude towards how the activity of universities should contribute to the solution of sensitive social issues and strengthen the competitiveness of states. When physical capital and an unqualified labour force had the strongest effect on economic growth, universities had greatest effect in the social and political area by applying the Humbold model, which promotes the freedom of thought, learning and research. When knowledge became the most important source of competitive advantage, the role of universities within the economy increased, since they became one of the main sources for the generation of knowledge, especially knowledge that could be commercially applied in practice (Audretsch, 2014).

This resulted in the emergence of the concept of the entrepreneurial university, according to which the university as an institution must undertake not only the two traditional missions of "teaching" and "research", but also a third mission of "knowledge and technology transfer" by promoting the development of new businesses, risk funds and commercially successful products within the academic community (Fayolle, Redford, 2014) and by assuming the leading role of educating for entrepreneurial thinking, behaviour and values within society (Audretsch, 2014).

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In its narrow sense, the entrepreneurial university may be interpreted simply as being the place where students are taught how to start and manage their own businesses, to follow the practices and values existing in the business world, or to commercialise successfully the results of research. However, from the holistic point of view, the entrepreneurial university is characterised by a much broader spectrum of features, in particular, the *artes liberales*, which stress the importance of humanities and social sciences (especially significant for the currently developing social business branch), an orientation towards the solution of important complex social problems, innovations in internal university processes and their successful implementation, attention to the improvement of the internal culture instead of to the development of new study programmes or research subdivisions, and mixed teams of academicians and businessmen collaborating both in research and educational processes (Thorp, Goldstein, 2010).

Despite the fact that, in order to survive under conditions of stressful competitive struggle among establishments of higher education, more and more universities pursue the goal of implementing the concept of the entrepreneurial university, there still exists a certain confrontation between the proponents of the traditional university and the proponents of the entrepreneurial university. The former affirm that the idea of the entrepreneurial university has a negative effect on the development of objective knowledge, and that universities no longer direct themselves towards the solution of fundamental scientific problems because only scientific orders with a solid practical hue are in a position to attract more investments (Rasmussen et al. 2006; Kalar, Antoncic, 2015). Besides, some research shows that the representatives of life and engineering sciences treat their subdivisions as being more entrepreneurial than those of their colleagues from social sciences, while universities with more extensive multidisciplinary profiles play a more significant role in the processes leading to the emergence of new businesses and the commercialisation of scientific knowledge (Bonaccorsi et al. 2013; Kalar, Antoncic, 2015).

Thus, implementing the holistic concept of the entrepreneurial university requires any university to make considerable changes in its strategy, internal culture and relations with external partners. The following section will analyse what are the required metrics for university rankings and academic performance.

2.2. Elements of traditional university transformations in the context of student entrepreneurship

The literature contains a number of various business development scenarios and attitudes towards the assessment of the level of entrepreneurship achieved. The transformation of traditional universities into entrepreneurial universities often begins from the promotion of innovation and entrepreneurship during a study process oriented towards the integration of entrepreneurship study subjects into existing study programmes, the development of new study programmes stimulating entrepreneurship, the involvement of students and lecturers in activities such as business-plan competitions, entrepreneurship clubs, and the practical training undertaken in existing start-ups or purple enterprises (Sam, van der Sijde, 2014).

Another important element in the development of the entrepreneurial university is a changing organisational structure moving from the inflexible form of governance oriented towards functional subdivisions (faculties, research centres, laboratories etc.), which is characteristic of the research university, to the development of more flexible forms of work organisation such as teams of scientists, knowledge and technology transfer divisions and external partnerships with business and public sector institutions (Pinheiro, Stensaker, 2014). This enables universities to activate their function of knowledge and technology transfer, orientate themselves towards the investigation of major social problems, effectively share their infrastructure with partners and better respond to their true needs.

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Entrepreneurial universities take an active part in national and regional economic growth promotion initiatives, which are currently manifested in such projects as the development of specialised academic complexes where the universities, together with other universities, colleges, business enterprise and non-profit organisations, implement various projects oriented towards the solution of specific community or regional problems (US Department of Commerce, 2013).

In his most recent research etzkowitz (2016) argues that the implementation of the idea of the entrepreneurial university within a traditional university consists of the following five major elements: (1) formation of a team of researchers, (2) development of a scientific base with commercial potential, (3) determination of organisational mechanisms enabling the transformation of scientific production into intellectual property products, (4) development of the academic community's skills in setting up and successfully running new businesses, and (5) establishment of research centres based on cooperation between university and industry. The first two activities generally characterise a traditional university; however, as a result of the third process the traditional university acquires the possibility to move gradually towards becoming an entrepreneurial university and later successfully to implement the last two features, which are exclusively a characteristic of the entrepreneurial university.

In order to achieve the successful implementation of these measures, it is necessary to strengthen leadership in this area, to invest in human resources and education for the specific organisational skills, to develop a positive attitude towards entrepreneurship among the students and the academic staff, to pursue internationalisation and to have a system for monitoring and assessing the entrepreneurial university (OECD, 2012; Urbano, Guerrero, 2013).

Although all prospects referred to in the scientific literature are equally significant for the development of the entrepreneurial university, if the university pursues the goal of developing entrepreneurial thinking, behaviour and values in society, as was specifically discussed in the previous section, one of the most important roles is given to the development of student entrepreneurship. Therefore, the present article will discuss in more detail which characteristics of the entrepreneurial university influence students' intentions to start a business.

2.3. Determinants of students' intentions to start a business

Entrepreneurial intentions could be defined as planned behaviour influenced by perceived self-efficacy, personal values, normative beliefs and specific desirabilities (Krueger et al. 2000). In their research, these aspects have been examined from various angles, such as the development of the entrepreneurship image at the university, personal qualities and the environment, the university study process, as well as a business-supportive environment on the university campus.

Formation of an entrepreneurship image at the university: dissemination of successful business examples at the university, education for certain personal qualities required for starting up a business

The fact that students' personal qualities (Grandi, Grimaldi, 2005) and the quality of the entrepreneurship programme contribute to the creation of new businesses was disclosed by Galloway, Brown (2002). Students' personal motivation, their understanding of the image of entrepreneurship (Keat et al. 2011; Naushad et al. 2018), self-efficacy (Kristiansen, Indarti, 2004), enthusiasm, proactive approach, wish to assume risk Sánchez (2011) all influence the implementation of the business idea, and the same needs to be said about the entrepreneurship programme, which must satisfy modern needs and comply with the current peculiarities of the business-creation process. Ooi and Nasiru (2015), Keat et al. (2011) examined how the authority demonstrated by lecturers, scientific career advisors, parents, relatives, and friends, who all surround the students, may encourage or influence them to start a business. For this purpose, the authors proposed the following hypothesis:

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H1: At least half of the factors related to the formation of a positive entrepreneurship image at the university have significant influence on the students' intentions to start their own business.

Personal qualities and the environment (examples to be followed)

Entrepreneurship education also depends on demographic factors such as gender, working experience, parental working experience (whether the student comes from a family of entrepreneurs) or environmental factors such as interactive communication between the students or their involvement and participation in other university communities or meetings (Ooi, Nasiru 2015; Keat et al. 2011; Zhang et al. 2014). On the basis of these assumptions, we advanced the following hypothesis:

H2: At least half of the personal qualities and environmental factors (examples to be followed) have significant influence on the students' plans to start their own business in the near future.

University study process: overview of the main teaching methods such as case studies, simulations, design-based thinking etc. as referred to in our questionnaire.

Entrepreneurship-oriented study programmes and teaching methods have a very positive impact on students' inspiration to start their own business, on the development of a circle of colleagues sharing similar attitudes towards business, and on heightening positive emotions towards starting a new venture (Souitaris et al. 2007). Neck and Greene (2011) identified the methods that must be applied at the university in order to promote entrepreneurship at the university. They established that the following methods help achieve better results and contribute to successful entrepreneurship education: a portfolio of practice-based pedagogies, including starting businesses as part of the coursework, serious games and simulations, design-based thinking, and reflective practice. On this basis the authors formulated the following hypothesis:

H3: At least half of the factors related to the university study process have significant influence on students' plans to start their own business in the near future.

In their research, Mok (2005) revealed that appropriate government programmes promoting entrepreneurship at universities, also fellowships (grants) or any other financial encouragement tools at university, activate the development and expansion of new prospective businesses.

The studying environment at the university, the academic inventory and the network of partners: laboratories, business camps, network of business advisors and investors, competences of lecturers to advise future businesses

An important factor for the creation of businesses at universities and in any other environment is the formation of competent teams. This requires an appropriate infrastructure and access to a search system that can search for relevant team members wishing to contribute to the implementation of a new business (Clarysse, Moray, 2004)

The importance of external communication has an effect on the emergence of new businesses (Fini et al. 2011; Todorovic et al. 2011). International and inter-institutional cooperation not only help link researchers with different competences, but also expand the attitude towards the problem under discussion. Institution-based actions (university policy) such as obligations towards innovations (initiatives and internal goals) (Grandi, Grimaldi, 2005; Todorovic et al. 2011), the commercial orientation of the university towards research and cooperation, and the preservation of intellectual property (Gregorio, Shane, 2003), the frequency of communication with the research teams and an extended network of communication as well as the external relations, contribute not only to the creation of new businesses, but also to their successful development (Grandi, Grimaldi, 2003; Jacob et al. 2003). The following also stimulate the emergence of new businesses: the university study environment (Ooi, Nasiru, 2015), the infrastructure (including the patent and intellectual property subdivision) (Looy et al. 2011), an appropriate team of experts and a network of competent specialists capable of

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sharing their experience and knowledge (Lockett et al. 2003), consultations during the process of developing a business plan or generating ideas, the ability to find the relevant experts, proper directions and assistance in attracting investments (Rideout, Gray, 2013; Rothaermel et al. 2007).

On the basis of these results, the authors formulated the following hypothesis:
H4: At least half of the university infrastructure factors have significant influence on the students' plans to start their own business in the near future.

2.4. Research methodology and design

The main research goal was to determine which factors, in the opinion of the students from both participating higher-education institutions, influence students' intentions to start their own business in the near future. In order to establish the opinion or position expressed by the university students in relation to the factors promoting the emergence of businesses at their Alma Mater, analogous surveys were conducted in January-June 2016 at Dongseo University (South Korea) and at Mykolas Romeris University (Lithuania). Both universities represent different national and institutional business cultures and traditions, therefore the data obtained are also valuable for comparing and assessing the influence of different entrepreneurial traditions on the students' opinion and their desire to start their own business.

By taking into account the number of students at the participating institutions, and in order to ensure the representativeness of the survey sample (probability – 95 per cent, error – 5 per cent), 367 students from DSU and 335 students from MRU were taken for the survey. The distribution of respondents based on gender was as follows: 225 women and 110 men were surveyed at the Lithuanian MRU, and 132 women and 235 men were surveyed at the South Korean DSU. In the case of the survey conducted in Lithuania, 235 respondents had practical working experience and 100 respondents were without any practical working experience, whereas in South Korea there were 211 respondents who had practical working experience and 155 respondents who had no practical working experience. As regards the presence of entrepreneurs within the families of the respondents, the answers distributed as follows: in Lithuania 160 respondents had entrepreneurs in their families and 173 respondents did not, whereas in South Korea there were 136 students with entrepreneurs in their families and 228 respondents without.

For preparing the survey questions for the students and the experts, the format of a five-level Likert scale was chosen, which helped assess the opinions expressed on the basis of a level of agreement or disagreement with each statement. In their answers, the respondents were asked to mark the most realistic statement, based on their point of view, and to evaluate it between 1 and 5 (1 – absolutely disagree, 2 – disagree, 3 – more agree than disagree, 4 – agree, 5 – absolutely agree).

Accordingly, when answering the question of whether they intend (by assigning 3-5 points to the intention and 1-2 points to no intention) to start a business in the near future, the respondents distributed as follows: the MRU respondents who intended to start a business comprised 39% (of them only 29% women and 58% men), whereas the numbers of DSU respondents who intended to start a business were significantly higher and comprised 63% (of which 61% women and 65% men).

The calculation of the average score enabled the authors to assess the total opinion expressed by the respondents from each institution about certain factors, and to establish which factors were given a more positive assessment. The estimated average scores between the institutions of higher education were compared by means of an ANOVA test in order to determine whether the differences between the different groups were significant or not.

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Low statistical significance (Sig.) estimates (less than 0.05) show that the average score for each factor in at least one group has a statistically significant difference from the average score for the same factor in another group.

Regression analysis was performed by applying the methodology of rejection: during the development of the regression equation, all block factors (X) were first assessed and the significance of each of these factors within the equation was estimated. This was then followed by the performance of single rejection steps (when the significance of the factor X exceeded 5 per cent) until a reliable regression equation was developed showing which of the factors influenced the "intention to start one's own business in the near future".

In the case of the survey compiled for the students, the independent variables named were divided into eight subgroups: (1) image of entrepreneurship, (2) intentions to start a business, (3) personal qualities, (4) role of examples to be followed (lecturers and friends), (5) university study process, (6) role of the university in the promotion of entrepreneurship (study environment at the university, employees, assistance, advice), (7) academic inventory, (8) experts and network. The last block "demographic characteristics" enabled the researchers to determine significant information about each respondent (gender, information about studies, working experience and availability or absence of entrepreneurs within the family). In the case of the survey compiled for the experts, the variables named were divided into six subgroups: (1) image of entrepreneurship, (2) image of student entrepreneurs, (3) university study process, (4) role of the university in the promotion of entrepreneurship (study environment at the university, employees, assistance, advice), (5) academic inventory, (6) experts and network, cooperation. The questionnaire for the experts also contained one open question allowing a personal opinion about the factors promoting the entrepreneurial university.

2.5. Analysis and interpretation of results: the cases of MRU and DSU

2.5.1. Step One. Quantitative Research – Student Surveys

Assessment of separate factors constituting the image of student entrepreneurship and comparative analysis between the universities (presented in Table 1).

Table 1. Dispersion analysis of separate factors constituting the image of entrepreneurship by conducting the ANOVA test

Question	MRU	DSU	ANOVA TEST result P
Entrepreneurs who start a business contribute to economic growth (Q1)	4.16	3.92	0.001
Business helps create new jobs (Q2)	4.54	3.94	0.000
I respect those who take up the challenge of starting their own business (Q3)	4.44	3.87	0.000
Getting a good job is much more important than thinking how to start a business (Q4)	2.55	3.09	0.000
I admire successful business examples (Q5)	4.56	3.30	0.000
One's own business is an excellent opportunity to realise oneself (Q6)	4.31	3.48	0.000
A business is good if you cannot find a good job (Q7)	2.69	2.77	0.396
TOTAL AVERAGE FOR THE QUESTIONS:	3.89	3.48	

The results of the ANOVA analysis show significant differences in the ***assessment regarding the factors relating to the image of***

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entrepreneurship at both universities in the E1 - E6 cases ($p < 0.05$) and the absence of any differences between the universities in the E7 case ($p = 0.396 > 0.05$).
It was also noted that the MRU students gave greater value to successful business examples (4.56 points in the average) and to their own business as an excellent opportunity for self-realisation (4.31 points in the average) than did the DSU students (respectively 3.30 points and 3.48 point in the average). The assessment of the other factors relating to the image of entrepreneurship was similar.

Assessment of the factors related to the image of entrepreneurship
H1: At least half of the factors related to the image of entrepreneurship (Q1-7) have significant influence on the students' plans to start their own business in the near future (Q8). The hypothesis included subgroup (1) of the questionnaire.

The regression analysis data showed that, in the case of MRU, only 3 factors related to the image of entrepreneurship (E6, E4, E1) have significant influence on the students' intentions to start their own business in the near future, therefore H1 is rejected for MRU. However, 5 factors (E7, E3, E4, E6, E5) have significant influence on the intentions of the DSU students to start their own business, therefore H1 is accepted for DSU. It should be noted that, in the opinion of both the MRU and the DSU students, E4 (Getting a good job is much more important than thinking of how to start up a business) reduces students' intention to start their own business in the near future.

On the basis of the available calculations, the H1 hypothesis is rejected for MRU and accepted for DSU.

Assessment of personal qualities and separate environmental factors (*examples to be followed*) and comparative analysis between the universities.

H2: At least half of the personal qualities and environmental factors (examples to be followed) (Q15-25) have significant influence on the students' plans to start their own business in the near future (Q8). The hypothesis includes subgroups (3) and (4).

Table 2. Dispersion analysis of the personal qualities and separate environmental factors by conducting the ANOVA test

Question	MRU	DSU	ANOVA TEST result P
I am open to challenges (Q15)	3.8776	3.5792	0.000
I am not afraid of the business being unsuccessful (Q16)	3.0663	2.6421	0.000
If the business is unsuccessful, it is always possible to start another (Q17.)	3.7246	3.2213	0.000
If the business were unsuccessful, I would return to contract employment (Q18)	3.2126	3.6749	0.000
I care what those who belong to my immediate environment think about my decision to start a business (Q19.)	3.5976	3.2951	0.000
Those who belong to my immediate environment urge me to start a business (Q20)	2.8464	2.4536	0.000
I care what university lecturers think about my intention to start a business (Q21)	2.2036	2.9342	0.000

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University lecturers urge me to start a business (Q22)	2.136	2.377	0.006
The majority of university lecturers have business-related practical experience (Q23)	2.8669	3.0301	0.032
I would like to start a business because my friends have a business (Q24)	2.2043	2.1066	0.219
I would like to start a business because my parents (or one of the parents) have (has) a business (Q25)	2.3191	2.2268	0.321
TOTAL AVERAGE FOR THE QUESTIONS:	2.914091	2.867355	

The ANOVA analysis shows significant differences in the ***assessment of personal qualities and environmental factors (examples to be followed)*** at both universities in cases 15-23 ($p < 0.05$) and the absence of any differences between the universities in cases 24 and 25 ($p > 0.05$) (Table 2).

The data from the regression analysis showed that as many as 6 out of 11 factors have significant influence in the case of MRU, therefore H2 is accepted, whereas at DSU there are only 4 factors having significant influence, therefore H2 is rejected.Only PQ 16-18 (not afraid of the business being unsuccessful; if the business is unsuccessful, it is possible to start another or to return to contract employment) are significant for the students of both universities. This shows that fear of the business being unsuccessful will not reduce the students' intentions to start their own business.

Influence of the university study process factors on student entrepreneurship

H3: At least half of the university study process factors (Q26-30) have significant influence on the students' plans to start their own business in the near future (Q8). The hypothesis included subgroup (5) of the questionnaire.

Table 3. Dispersion analysis of separate university study process factors by conducting the ANOVA test

Question	MRU	DSU	ANOVA TEST result P
The methods of lectures used by university lecturers lead to more clarity on how to create one's own business (Q26)	2.8399	2.8937	0.495
During their lectures, university lecturers analyse actual business situations (Q27)	2.9426	3.139	0.015
In the study process, university lecturers use computer games and business simulations (Q28)	2.2561	2.9098	0.000
University lecturers encourage design-based thinking and reflective practice (Q29)	2.9383	2.9725	0.649
Computer software development must be included in the list of compulsory subjects for the students in any study area (Q30)	2.8212	3.2775	0.000
TOTAL AVERAGE FOR THE QUESTIONS:	2.75962	3.0385	

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The ANOVA table shows significant differences in the ***assessment of the university study process factors*** at both universities in cases 27, 28 and 30 ($p < 0.05$), and the absence of any differences between the universities in cases 26 and 29 ($p > 0.05$) (Table 3).

On the basis of the calculated regression analysis data, only 2 out of the 5 factors have significant influence for both universities, therefore H3 was rejected. Factor UP30 (Computer software development must be included in the list of compulsory subjects for the students of any study area) coincides for both universities and has a significant influence on the students' intentions to start a business.

Assessment of the factors related to the role of the university in the promotion of entrepreneurship

H4: At least half of the factors related to the role of the university in the promotion of entrepreneurship (Q31-46) have significant influence on the students' plans to start their own business in the near future (Q8). The hypothesis included subgroups (6), (7) and (8) of the questionnaire.

Table 4. Dispersion analysis of the factors related to the role of the university in the promotion of entrepreneurship by conducting the ANOVA test

Question	MRU	DSU	ANOVA TEST result P
The university is an excellent place to learn how to start one's own business (Q31)	3.106061	2.752044	0.000
The university academic community shows great willingness to advise on any business-related issue (Q32)	2.844037	3.027248	0.017
The university is the ideal place to learn the things that are necessary before starting a business (Q33)	3.205438	2.809264	0.000
The university has a well-developed infrastructure and an environment that encourages entrepreneurship (Q34)	3.036474	2.940054	0.185
The university arranges competitions for students' business ideas (Q35)	2.80625	3.289617	0.000
The university promotes the businesses created by the students by granting uncompensated financing through special fellowships (Q36)	2.495082	3.571038	0.000
More business camps arranged at the university could encourage students to start a business (Q37)	3.427119	3.538251	0.162
Lecturers encourage participation in various projects that develop new innovative products (Q38)	2.866261	3.565934	0.000
The university provides excellent possibilities to use innovation centres and laboratories (Q39)	3.320872	3.123288	0.013
The university provides conditions for conducting research and experiments (Q40)	3.214953	2.986339	0.004
The university has a wide network of business partners (Q41)	3.15674	3.193989	0.613
The university lecturers actively encourage cooperation with business enterprises that could advise on issues arising in the process of business creation (Q42)	2.916667	3.331445	0.000

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The university offers cooperation with business angels and venture capital funds for the attraction of investments as a business startup aid (Q43)	2.696594	3.073973	0.000
I always have a possibility to consult with and use the network of university business mentors (Q44)	2.858025	3.099723	0.001
I could start a business, but I cannot find anyone who accepts and shares my idea (Q45)	2.404255	2.776567	0.000
The university has a community (club, network), where I can find a team member based on the required competence (Q46)	2.552795	3.054645	0.000
TOTAL AVERAGE FOR THE QUESTIONS:	2.931726	3.133339	

The ANOVA analysis shows the absence of any ***significant*** differences ***in the assessment of the factors related to the role of the university in the promotion of entrepreneurship*** in cases 34, 37 and 41 ($p > 0.05$), whereas the remaining cases show significant differences (Table 4). The largest difference exists when comparing factor 36 (the university promotes the businesses created by the students by granting uncompensated financing through special fellowships) and shows that the DSU students give a more favourable assessment (3.6 points) than the MRU students (2.5 points).

The regression-analysis data showed that, out of the 16 factors comprising the role of the university in the promotion of entrepreneurship, only 3 at MRU and 5 at DSU have significant influence on the students' intentions to start a business, therefore H4 for both universities was rejected.

Meanwhile, UR37 (More business camps arranged at the university could encourage students to start a business) coincided for both universities.

2.5.2. Step Two. Qualitative Research: Expert Survey

The survey data showed that **the factors related to the image of entrepreneurship** are assessed similarly at both universities. However, it should be noted that the statement "The university is an excellent environment to start a business" received a more favourable assessment from the DSU experts (3.8 points on average) than it did from the MRU experts (respectively 2.7 points on average).

A similar assessment is given by university experts to the **influence of the factors related to the university study process on student entrepreneurship**: 3.5 points by MRU, 3.25 points by DSU. Significant differences between separate factors were not observed.

When compared with the questions given to the students, the experts received more questions related to the role of the university in promoting student entrepreneurship (the academic inventory, network of experts, cooperation). The results of the survey suggest that the discussed **factors related to the role of the university in promoting entrepreneurship** received a sufficiently similar assessment from the experts at both universities, since the MRU experts gave 3.1 points and the DSU experts gave 3.6 points on average. It should be noted that the majority of the factors received a more favourable assessment from the DSU experts than from their MRU colleagues. A more significant difference was noticed in the replies to Questions 14, 17, 18 and 36 – here the representatives of MRU were much more sceptical.

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Separate attention needs to be given to the opinion expressed by the university experts concerning the image of student entrepreneurs. When assessing ***the image of student entrepreneurs,*** it should be noted that the opinions of the experts coincided only with regards to the statement "Only talented students with exceptional qualities can create their own business". Meanwhile, statements 6 and 7 received a more favourable assessment from the DSU experts (3.6 points each on average) rather than from the MRU colleagues (2.7 and 2.8 points respectively). However, the statement "Students know where to go if they need advice for the development of a business plan" received a more favourable assessment from the MRU experts (2.6 points on average) than from the DSU experts (2 points on average).

Discussion and Conclusions

Academic entrepreneurship education comes about through the implementation by modern universities of their three main missions: teaching, research, and knowledge and technology transfer. By analysing the realisation of those three missions under the conditions of the knowledge economy and the fast progress of digital technology, attempts are made to define the concept of the entrepreneurial university and to suggest various scenarios for the development of such a university. The most recent research shows that the entrepreneurial university has already been defined not only as an institution capable of successfully commercialising the results of its research and efficiently teaching students how to start and manage their own businesses, but also as the leading institution for education in entrepreneurial thinking, behaviour and values within society. Therefore, analysing how the organisation of various university activities might influence the entrepreneurial mindset of students and their intentions to start their own business is significant for the body of knowledge about the entrepreneurial university. So far this has been researched from such perspectives as the formation of the image of entrepreneurship at the university, the effect of personal qualities, influence of existing business success stories, design of the university study process, and an academic environment supportive of start-ups.

In the context of countries with different cultures, this research helped to identify what knowledge, competences or practical skills should be acquired at the universities, assess the attitudes towards the entrepreneurial environment created by the universities and how they differ. People, business and education are going global, so Lithuanian and South Korean universities were chosen as cases for this research.

This study explores the determinants related to student intentions to start a business from university study-process perspectives. Four hypotheses were developed to define the impact of the various factors on the students' intentions to start a business. The hypotheses were tested and results were analysed using dispersion analysis.

The study was conducted with the help of a two-step research process for specifying which factors influence students' intentions to start a business from two points of view: that of students and that of experts, using case-study methodology. The first step was to implement a quantitative study: surveys of 367 respondents at Dongseo University (DSU) and surveys of 335 respondents at Mykolas Romeris University (MRU). The second step was devoted to qualitative research by conducting surveys of 6 experts from DSU and 10 experts from MRU.

The results of the quantitative study and the accepted hypotheses showed that significant influence on the plans of the MRU students to start their own business in the near future was exerted by at least half of the personal qualities and environmental factors (examples to be followed), while significant influence on the plans of the DSU students to start their own business in the near future was exerted by the factors related to the image of entrepreneurship. A more detailed analysis of the effect of separate factors related to the entrepreneurship

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education process on the students' intentions to start their own business made it possible to identify several interesting observations. According to the factors related to the entrepreneurship image, the students believe that getting a good job is much more important than thinking about how to start their own business. This weakens the students' intentions to start their own business in the near future. Respondents from both universities gave more favourable answers to the statement that a business is good when there is no possibility of finding a good job. Personal qualities and environmental factors (examples to be followed) show that the students are not afraid of their business being unsuccessful, and if the business is unsuccessful, it is possible to start another business or to return to contract employment: the attitude shown by the students from both universities was favourable and they were more inclined to agree with this. This shows that the fear of their business being unsuccessful will not reduce students' intentions to start their own business.

The survey of student respondents from both universities also revealed less agreement with the statement that university lecturers, or friends and parents, who have their own business have any influence on their starting their own business. Having looked through the university study-process factors, we should highlight the fact that the students from both universities agreed with the statement affirming that computer software development must be included in the list of compulsory subjects for the students of any study areas, and it is one of the study subjects influencing the students' intentions to start a business.

While the DSU students accepted on a number of occasions the statement affirming that university lecturers use computer games and business simulations, the MRU students disagreed with this statement to a greater degree. When assessing the factors related to the role of the university in promoting entrepreneurship, the DSU and MRU university students agreed that more business camps organised at the university could encourage students to start a business.

The expert-survey data disclosed that at both universities the factors related to the image of entrepreneurship are given a similar assessment. However, the statement that "The university is an excellent environment to start a business" received a more favourable assessment from the Dongseo experts (3.8 points on average) than from the MRU experts (respectively, 2.7 points on average). A similar assessment was given by the university experts on the effect of the factors related to the university study process on the students' entrepreneurship: 3.5 points by MRU and 3.25 points by Dongseo. The research results suggest that the experts from both universities give a sufficiently similar assessment of the factors related to the role of the university in promoting entrepreneurship, since the MRU experts gave 3.1 points and the Dongseo experts gave 3.6 points on average. However, the majority of the factors and the statements saying that the university organises business camps and competitions for students' ideas and that research is conducted by university scientists together with business, received a more favourable assessment from the Dongseo university experts than they did from the MRU experts. It should be noted that the statement "Students know where to go if they need advice for the development of a business plan" received a more favourable assessment from the MRU experts (2.6 points on average) than from the DSU experts (2 points on average), who disagreed with this statement on more occasions.

The research results suggest that entrepreneurship education within the study process must change in order to keep up with the changing context. It is necessary to retain the ability to adjust and integrate the learning tools and adapt them to the peculiarities of the newly developing business world, and to become a university that is modern, competitive, marketable and entrepreneurial.

Directions for Future Research

The present study does not analyse the factors stimulating the creation of a business by taking into account its type, i.e. whether it is a spin-off (business created together with the university) or a business created without

academic involvement, such as a high-tech start-up. Therefore, any future studies could examine separately the factors relating to the creation of new businesses during studies by taking into account the type of the business. This could help broaden attitudes and examine the acts that need to be taken or the factors that especially contribute to, or promote, the creation of spin-offs. The factors determined during the study will help universities define in more detail their strategies for the entrepreneurial university, to integrate the measures that encourage and help start and develop new competitive and global businesses during studies, and to maintain their important role within society by contributing to economic growth and by providing all the knowledge and competences required to help develop the entrepreneurial university and the students' inclination to play a more active role in entrepreneurial initiatives and to start their own business.

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OPTIONS SIMULATION TOOLKIT FOR STRATEGIC EVALUATION OF CORPORATIONS' FINANCIAL POTENTIAL

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Abstract. The study substantiates the need to develop the authors' model for strategic evaluation of financial potential in corporations based on stochastic simulation, which provides for determination of an absolute indicator for sustainability of financial potential resources (i.e. strategic permanent resources for financial potential and relative strategic ratio), as well as actual and strategic indicators values deviations, the study also provides prerequisites for relevant expert conclusions. Such model implies influence of emergent (macro-, meso-) environment on financial potential of corporations. Its application is of a universal character, it contains integrated interests of different stakeholder groups (owners, financial managers, lenders, potential owners, creditors, investors, suppliers, auditors, lawyers, associations, trade unions) allowing in a short period identify internal actual and potential financial opportunities, risks and hidden potentials, takes into account emergent environment influence on financial potential condition in corporations, thus contributing to development of strategic policies for its generation.

Keywords: financial potential; strategic assessment / evaluation; corporation; permanent resources; deviations; simulation

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1. Introduction

Financial potential carrying tactical and strategic characteristics of corporations' capabilities should conceptually reflect phenomenon of their current and strategic financial performance. The process of corporations' financial potential generation and evaluation should be focused at efficient application of financial mechanisms to achieve intermediate and strategic goals. However, in most cases, generated financial potential of corporations is evaluated exclusively in the system of operational financial management where only internal factors affecting

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efficiency of financial potential are identified assessed and modified. Methodological approach to the issue reveals that most methods of corporations' financial potential evaluation characterize retrospective and current financial potential status and exclude prospective status assessments (Rashid and Jabeen 2018; Wang, Reimsbach and Braam 2018; Dungey, Tchatoka and Yanotti, 2018; Malaquias and Zambra 2018).

At the same time, despite the fact that issues of corporations' financial potential generation and evaluation have been discussed worldwide for extensive period, in finance related literature there is no unambiguous definition of corporations' financial potential concept, which makes it difficult to develop tools for its evaluation (Būmane, 2018; Masiulevičius and Lakis 2018; Kuzmin et al. 2015; Dubrovsky et al. 2016; Kuzmin 2017; Narkunienė and Ulbinaitė 2018; Subačienė et al. 2018).

N.A. Sorokina (Sorokina 2009) directly correlates assessment of corporations' financial potential with achievement of their strategic development goals, and highlights the following strategic indicators: revenue, sales profit, net assets, and capital intensity of products, capital turnover, and added value.

The aim of the research includes development of scientifically proof toolkit for assessing financial potential of corporations in the system of their strategic financial management, which should take into account influence of factors of both internal and external environment; it also implies identification of the areas for its practical implementation. Achievement of the goal determined implementation of the following tasks: study economic content of financial potential; carry out evaluation on how internal factors influence financial potential of corporations; develop and test the model of corporations' financial potential strategic assessment in the system of their strategic financial management based on simulation. Theoretical and methodological basis of the research is grounded in the works of foreign and Russian scientists and experts, cites the materials from periodicals on evaluation of corporations' financial potential in the system of their financial management, and refers to their internal regulatory framework. Methodological basis of the research includes logical, situational and scientific approaches to study the process of financial potential evaluation in the system of financial management of corporations. With the help of general scientific and special methods such as inductive, deductive, analysis, synthesis, coefficient analysis, grouping, monographic, graphic, comparative, economic-statistical, economic-mathematical, authoring software of general MS EXCEL and special EXCEL-VBA designation, etc. the toolkit for assessing strategic financial potential of corporations based on stochastic simulation was generated and tested; the results of the tests indicated basic areas for implementation.

Working hypothesis of the research is grounded in the need to develop a modern scientifically proof toolkit for corporations' financial potential evaluation based on the research of economic content of the latter; and also in the need to suggest a model for strategic evaluation of financial potential based on simulation, which would ensure efficient performance of financial management system of corporations in today's business environment. Theoretical significance of the research leads to expanding and deepening scientific understanding of toolkit development for corporation's financial potential evaluation in the system of their strategic financial management. Practical significance of the research represents development and application of specific methods, techniques, tools, models and practical recommendations that generate theoretical methodological and practical basis for development of toolkit for corporations' financial potential evaluation, establishing alternatives to implement new methods, techniques, tools and models that might ensure efficient performance of strategic financial management system.

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2. Method

2.1. Theoretical approaches to the term "financial potential" of corporation

The term "potential" derived from Latin "potentia" and means force that expresses the tactical / strategic characteristics of the organization's capabilities.

From the perspective of evaluation of corporations' financial potential factorial approach to definition becomes interesting when decisive importance is given to factors that affect financial potential of the corporation.
N.V. Kolchina (Kolchina et al. 2015), L.T. Gilyarovskaya (Gilyarovskaya and Endovitskaya 2012) are supporters of this approach.

N.V. Kolchina (Kolchina et al. 2015) evaluate financial potential of organizations through the prism of their financial grounds, i.e. provision of financial resources, revenue potentials and financial stability level, stock generation and innovations which represent the key factor and influential investment.

L.T. Gilyarovskaya (Gilyarovskaya and Endovitskaya 2012) identify the following factors that affect financial capacity of organizations: their ability to fulfil financial obligations precisely and in due time, attract additional financial resources and use investment opportunities; experience financial stability; efficient utilization of own or borrowed capital; asset management and availability of risk management policy.

Traditional financial process management seeks to manage operational factors affecting efficiency of financial potential of corporations, whereas strategic management is focused on strategic issues.

It should be noted that, unfortunately, many economists, such as: A.G. Kaygorodov (Kaygorodov and Khomyakova 2007), T.N. Tolstykh (Tolstykh and Ulanova 2004), V.I. Makarieva (Makarieva 2014), T.G. Sheshukova (Sheshukova and Kolesen 2013), O.A. Minayeva (Minayeva 2012) qualify financial potential of corporations as a category of operational financial management. P.A. Fomin (Fomin and Starovoitov 2003) consider financial potential of corporations as a category of both operational and strategic financial management of corporations. V.G. Artemenko (Artemenko and Belandir 1997), V.A. Barinov (Barinov 2005), V.V. Kovalev, (Kovalev 2016) regard financial potential of organizations as a systemic phenomenon characterized by a set of indicators describing availability and investment of funds, actual and potential financial opportunities. N.A. Sorokina (Sorokina 2009) and N.D. Stakhno (Stakhno 2010) combine definition of financial potential of organizations with their strategic development. N.A. Sorokina (Sorokina 2009) characterizes financial potential as a combination of financial resources involved in the turnover for accumulation of additional financial resources and taking into account the strategic investment attractiveness of a company. At the same time, she seeks to study financial potential as an element of strategic management in conjunction with assessment of economic security of business. N.D. Stakhno (Stakhno 2010) characterizes financial potential by means of various financial resources involved in operational activities which might be accumulated to finance business in future and establish strategic development guidelines. In our opinion (Manuylenko and Loktionova 2017) financial potential of a corporation is a combination of mobilized real current and strategic financial resources pooled in funds with particular valuation, it completely excludes various potential assets, immobilized sources which depend on macro, meso and micro levels, both in complex establishing current and strategic trends of corporation's financial activities. Corporations should seek to assess their financial potential in the system of operational and strategic financial management, which ensures creation of and streamlining for categorical gear based on characteristics of corporations' financial potential that would be a ground for development of methodological approaches to financial potential generation and its evaluation in modern environment.

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2.2. Evaluation of financial potential of corporations based on identification of internal factors that affect its efficiency; issues and prospects

Integral element of organizations' financial potential evaluation is an assessment of the factors affecting the process of its generation, which altogether depends on financial management, and – accordingly – on financial potential improvement opportunities. Factor based evaluation of hierarchical structure allows identifying significant factors influencing the final value of indicators and judge the factors and the values for gain or fall where dynamics of financial potential is estimated for the appointed period.

There were corporations selected for research field, they were business entities that impacted financial potential of other corporations in the territory accordingly.

PJSC "Interregional Distribution Net Company of the North Caucasus" – provision of electricity and technical connection to power grids (Official site of IDNC of the North Caucasus);
Non-Public JSC "Stavropolstroyoptorg" — ferrous metals wholesale trade (Official site of NAO "Stavropolstroyoptorg");
"Russky Canning Plant " LCC – processing industries (processing and canning of vegetables) (Official site of " Russky Canning Plant "LCC).
Efficiency of organizations' financial potential generation strategy embedded in relevant policies is evaluated via internal factorial assessment of its utilization by means of chain substitution method (1):

$$EOFP = NP/L \times L/OSFP \times OSFP/SFP \tag{1}$$

where – NP/L net profit / loss sales;
L/OSFP – return of own financial potential resources;
OSFP/SFP – financial independence.
Contains reference data to calculate indicators – table 1; table 2 contains results of internal factor assessment.

Table 1. Reference data for internal factor evaluation of corporations' financial potential utilization efficiency

Indicators	Public JSC "IDNC of the North Caucasus"		Non Public JSC "Stavropolstroyoptorg"		"Russky Cannery Plant" LCC	
	2010	2016	2010	2016	2010	2016
1. Revenue, in thousand rubles.	10460795	15701228	5267105	8535901	115232	159389
2. Net profit / loss, in thousand roubles.	562957	– 1234179	294386	449031	2501	88
3. Financial potential overall resources, in thousand rubles.	22713590	35640088	1674938	4067597	305832	459303
4. Financial potential own resources, in thousand rubles	15685790	15680735	1365818	3375611	44022	275533
5. Profitability/ sales loss, in units	0,0538	– 0,0786	0,0559	0,0526	0,0217	0,0006
6. Financial potential own resources turnover, in cycles	0,6669	1,0013	3,8564	2,5287	2,6176	0,5785
7. Financial independence, in units	0,6906	0,44	0,8154	0,8299	0,1439	0,5999
Public JSC "IDNC of the North Caucasus"	$\Delta EOFP_{\Delta NP / L} = (-0{,}0786 - 0{,}0538) \times 0{,}6669 \times 0{,}6906 = -0{,}0610$ $\Delta EOFP_{\Delta L / OSFP} = -0{,}0786 \times (1{,}0013 - 0{,}6669) \times 0{,}6906 = -0{,}0182$ $\Delta EOFP_{\Delta OSFP / SFP} = -0{,}0786 \times 1{,}0013 \times (0{,}44 - 0{,}6906) = +0{,}0197$					

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	ΔЭИФП = – 0,0595
Non Public JSC "Stavropolstroyoptorg"	$\Delta EOFP_{\Delta NP / L}$ = (0,0526– 0,0559) × 3,8564 × 0,8154 = – 0,011 $\Delta EOFP_{\Delta L / OSFP}$ = 0,0526 × (2,5287– 3,8564) × 0,8154 = – 0,0569 $\Delta EOFP_{\Delta OSFP / SFP}$ = 0,0526× 2,5287 × (0,8299 – 0,8154) = + 0,0019 ΔЭИФП = – 0,066
"Russky Cannery Plant" LCC	$\Delta EOFP_{\Delta NP / L}$ = (0,0006 – 0,0217) × 2,6176 × 0,1439 = – 0,00784 $\Delta EOFP_{\Delta L / OSFP}$ = 0,0006 × (0,5785– 2,6176) × 0,1439 = – 0,00018 $\Delta EOFP_{\Delta OSFP / SFP}$ = 0,0006 ×0,5785 × (0,5999 – 0,1439) = + 0,00016 ΔЭИФП = – 0,0078

Source: calculation provided by the authors V.V. Manuylenko, M.A. Loktionova with reference to financial reports of corporations (official Internet sites of Public JSC "IDNC of the North Caucasus", Non Public JSC "Stavropolstroyoptorg", "Russky Cannery Plant" LCC)

Table 2. Results of internal factor assessment for efficiency of financial potential utilization in PJSC "Interregional Distribution Net Company of the North Caucasus"

Internal Factors	Impact value					
	IDNC of the North Caucasus		NAO "Stavropolstroyoptorg"		OOO " Russky Canning Plant "	
	ед.	%	ед.	%	ед.	%
1. Variations in profit / sales loss	– 0,0610	– 102,5	– 0,011	– 16,7	– 0,00781	– 100,1
2. Variations in return of own sources for financial potential	– 0,0182	– 30,6	– 0,0569	– 86,2	– 0,00018	– 2,3
3. Financial independence alterations	+ 0,0197	+ 33,1	+ 0,0019	+ 2,9	+ 0,00016	+ 2,4
4. General influence of internal factors	– 0,0595	– 100,0	– 0,066	– 100	– 0,0078	– 100

Source: calculation provided by the authors V.V. Manuylenko, M.A. Loktionova

In Public JSC "IDNC of the North Caucasus" poor efficiency of financial potential utilization is caused by sales loss and financial independence decline. Turnover growth of own financial potential sources, which is a strategic indicator for corporation's development, unfortunately did not exclude negative impact of above two internal factors.

In Non-Public JSC "Stavropolstroyoptorg" efficiency of financial potential utilization decrease is explained with sales profitability reduction that accounts to 16.7%, deceleration rate of own financial potential resources is 86.2%, and financial independence growth did not compensate negative impact of previous internal factors.
A similar situation is noted in "Russky Canning Plant" LCC. Although influence of internal factors values to financial potential utilization efficiency decrease is different, decrease in profitability of sales is 100.1%, own financial potential resources' deceleration is 2.3%.

Among advantages of this method we can list identification of internal factors as quantitative value that affects efficiency of organizations' financial potential utilization, and among shortcomings there is exclusiveness of external factors direct influence, forecast of organizations' financial potential performance, and consideration of macro-, meso- and micro-environment factors influence. It should be noted that ignoring influence of emergent (macro-, meso-) environment on efficient utilization of financial potential complicates accurate transformation of one type of financial strategy into another, while corporations develop as the subject to complex influence of internal and external factors. All the foregoing justifies the need to develop a model for strategic assessment of corporations' financial potential that should take into account influence of emergent (macro-, meso-) environment on the latter in the conditions of uncertainty thus forming the next stage of the study.

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2.3. Development of a model for strategic assessment of corporations' financial potential based on simulation

In modern developing environment important strategic decisions must be implemented based on the forecast. It is important to consider that decisions to generate financial potential of corporations are always accepted in uncertain environment with different levels of risk in order to determine profitability and risk ratio. Insufficient level of corporations' financial potential determines risk assessment because of long uncertainty period. Forecast identifies anticipated financial resources conditions and financial processes, and feasible financial activities options considering them as prerequisite for business planning. Distinctive financial potential forecast means to characterize corporation by its interdependent links and some level of inertia described by dependence of each indicator value in the relevant period in the past and taking into account influence of particular factors. It can be optional and it is its main characteristic.

Requirements for the model of corporations' financial potential forecast:
- maximum simplicity and no secondary links;
- compliance with specific task of the study, for the purpose of the study determines the links, phenomenon angles both primary and secondary;
- real indication of financial potential essence that includes all key aspects and the links of simulation subject matter and its evaluation;
- identification of all necessary, probable parameters of the simulated process (objective function) considering ability to respond to parameters change.

In emergent (unstable, volatile, high-risk) environment stochastic static models (Monte Carlo method) as mathematical description are worth noticing since they incorporate random processes. Forecasted value contains accomplishment of clearly determined factor model that reflects interconnection of results and affecting factors. Achievement of the forecast accuracy for corporations' financial potential requires sufficient and complete amount of information characterized with high level of reliability and its availability for reference as per time periods versus quantitative and qualitative indicators. In order to make management decisions for financial potential generation and its assessment constant business awareness is required for result oriented selection, evaluation and concentration of information along with a thorough investigation of initial data that implies awareness about the tasks for financial potential evaluation and generation.

Monte Carlo method implementation for selection of a random variable during 2012 – 2016 implied a study of various indicators describing strategic resources of financial potential in corporations. It is obvious that in the system of strategic financial management a standard instrument for corporations' financial potential regulation is accumulation of own and long-term resources. Accordingly, strategic assessment of corporations' financial potential should be based on a combination of tools for its current own and long-term permanent investments. Forecast of corporations' permanent resources in conditions of uncertainty will determine adjustment of the policies for corporations' financial potential generation including a strategic component.

High volatility of the indicator for stability of corporations' financial potential sources from one period to another makes it possible to be a random variable. Accordingly, there is a non-zero probability of it to exceed acceptable level. Defining strategic indicators of corporations' financial potential is carried out applying Excel-VBA approved software "Software for determining strategic indicators for assessing the financial potential of corporations" (Manuylenko and Loktionova 2018).

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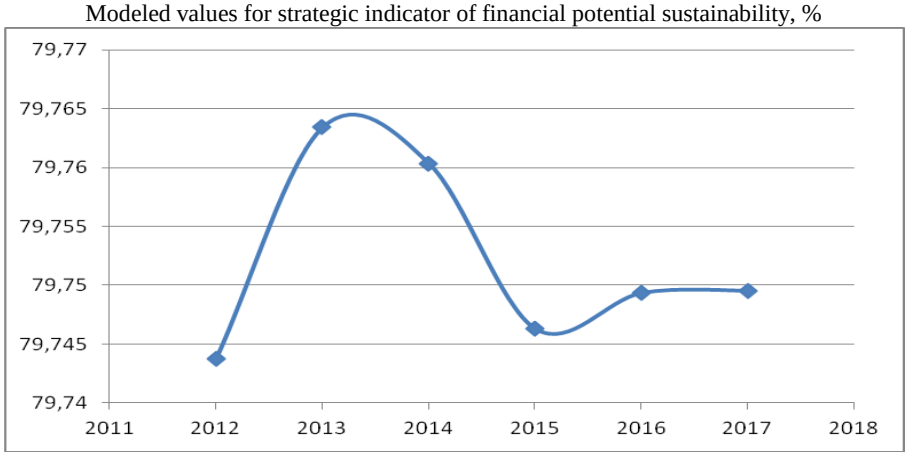
Empirical distribution function for a random variable is derived by the following actions:
1. Random number generator generates a random value on the interval [0,75 - 0,8], since indicator for stability of resources for corporations' financial potential should be <75% and = /> 80%.
2. According to the distribution function F (s) probability that a random variable will reach the value </ = s with a confidence level of 95% determines strategic permanent resources for financial potential.
3. The inverse distribution function Fs-1 (quantile of distribution is 95%) (according to the established argument c, the value s is determined, the random variable is </ = s with probability c), strategic permanent resources for financial potential are calculated.
Basic parameter of the recommended method is indicator of stability for corporations' financial potential resources, its variability which serves as the basis for calculating strategic permanent resources for corporations' financial potential. Relative strategic indicator for sustainability of corporations' financial potential resources contains parts of the absolute indicator – strategic permanent sources and, conversely.
4. The procedure is repeated 20,000 times.
5. Variation series for strategic permanent resources and strategic indicator for stability of financial resources for 6 years are prepared; the 6-th year is forecasted by extrapolation, i.e. stirring average with effective observation period 2012 – 2017.
6. Empirical function for distribution of strategic permanent resources for corporations' financial potential and strategic indicator of their stability is concluded according to analytical results of 20,000 Monte Carlo experiments (figure 1 – 5).

Modeled values for strategic indicator of financial potential sustainability, %



Modeled values for permanent strategic resources for financial potential, in thousand roubles

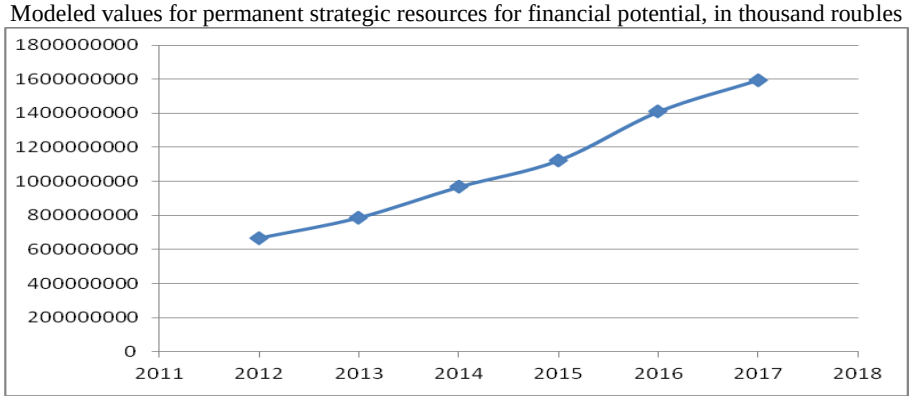


Figure 1. Modeled values of strategic indicators for assessing financial potential in corporations
(developed by authors V.V. Manuylenko, M.A. LoktionovaModeled values for strategic indicator of financial potential sustainability, %

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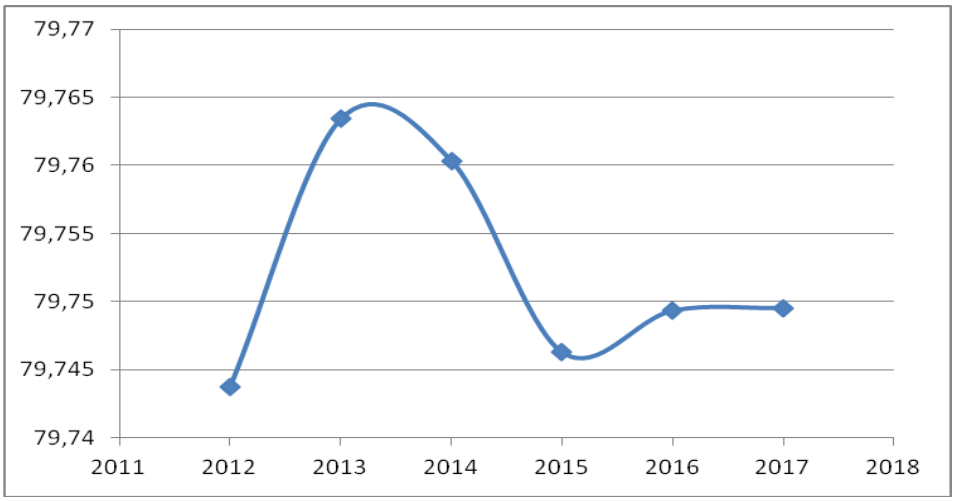

Modeled values for permanent strategic resources for financial potential, in thousand roubles

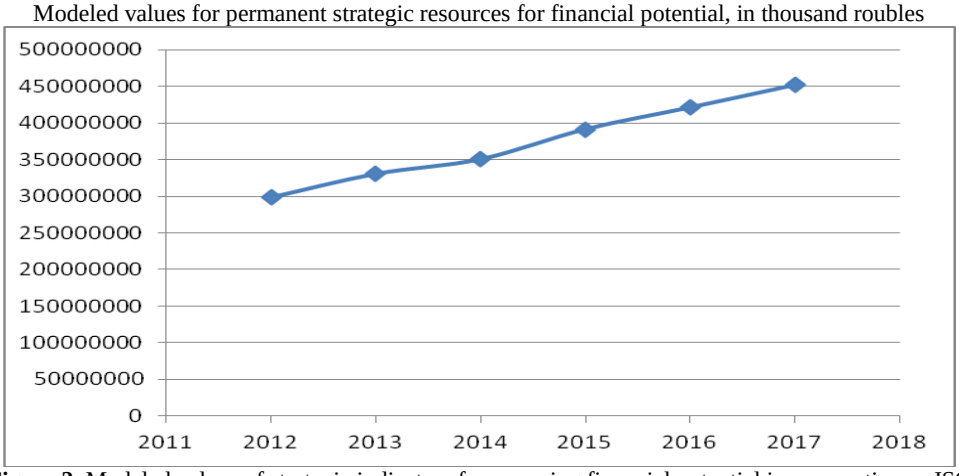

Figure 2. Modeled values of strategic indicators for assessing financial potential in corporations - JSC (developed by authors V.V. Manuylenko, M.A. Loktionova)

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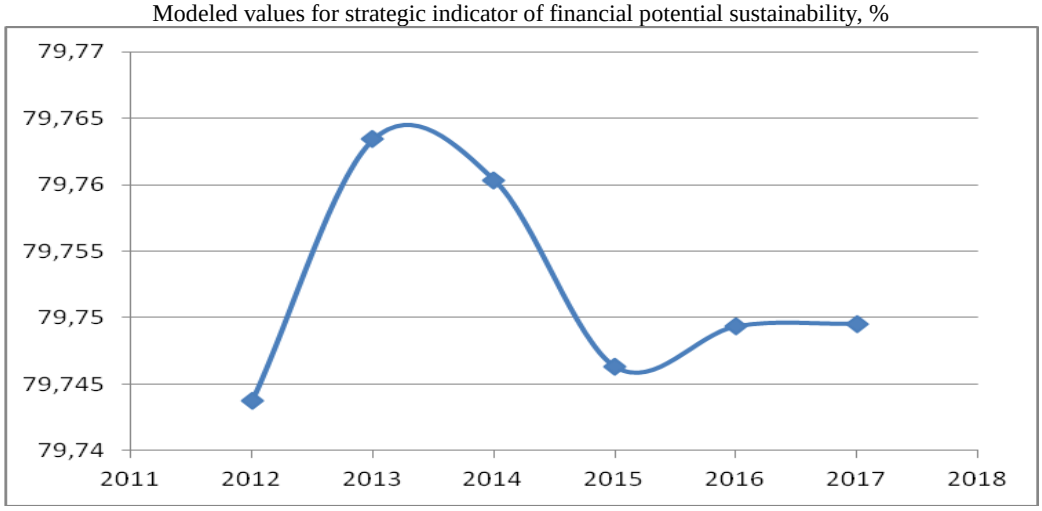
Modeled values for strategic indicator of financial potential sustainability, %



Modeled values for permanent strategic resources for financial potential, in thousand roubles

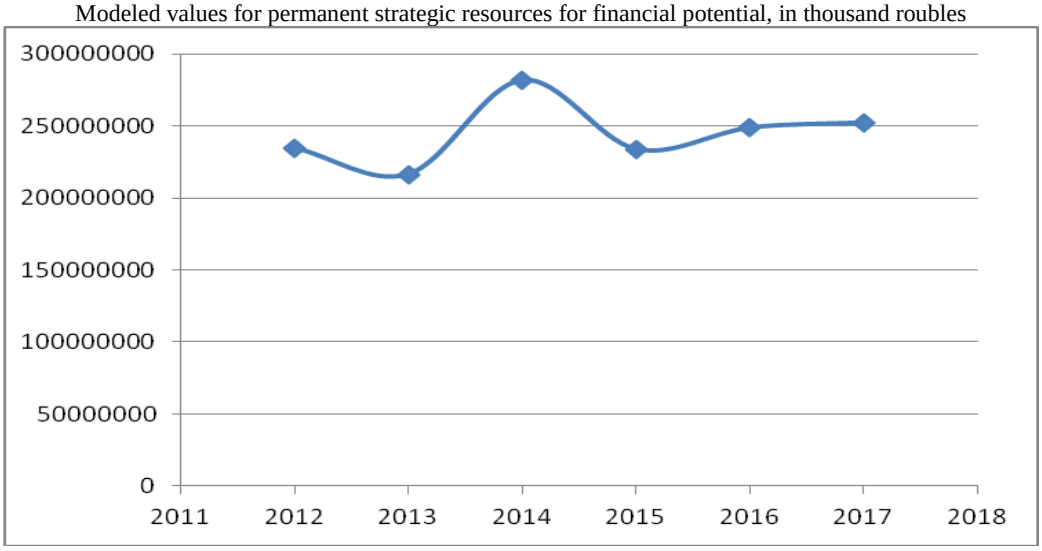


Figure 3. Modeled values of strategic indicators for assessing financial potential in corporations – Public JSC (developed by authors V.V. Manuylenko, M.A. Loktionova)

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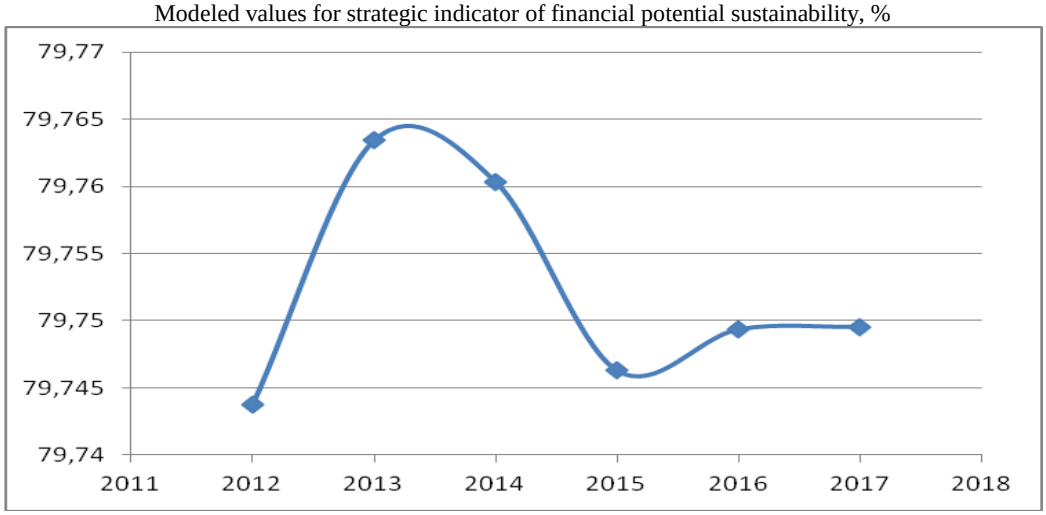
Modeled values for strategic indicator of financial potential sustainability, %



Modeled values for permanent strategic resources for financial potential, in thousand roubles

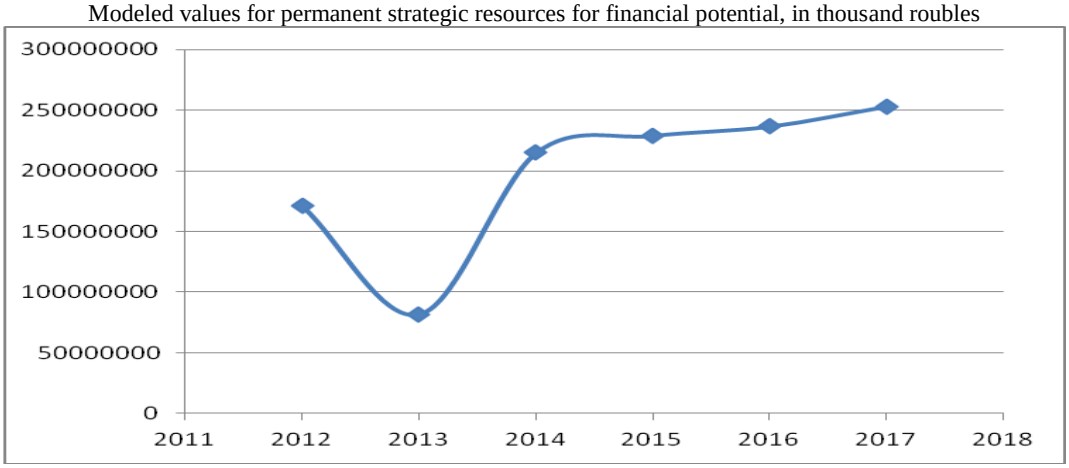


Figure 4. Modeled values of strategic indicators for assessing financial potential in corporations processing and distributing electricity,gas and water
(developed by authors V.V. Manuylenko, M.A. Loktionova)

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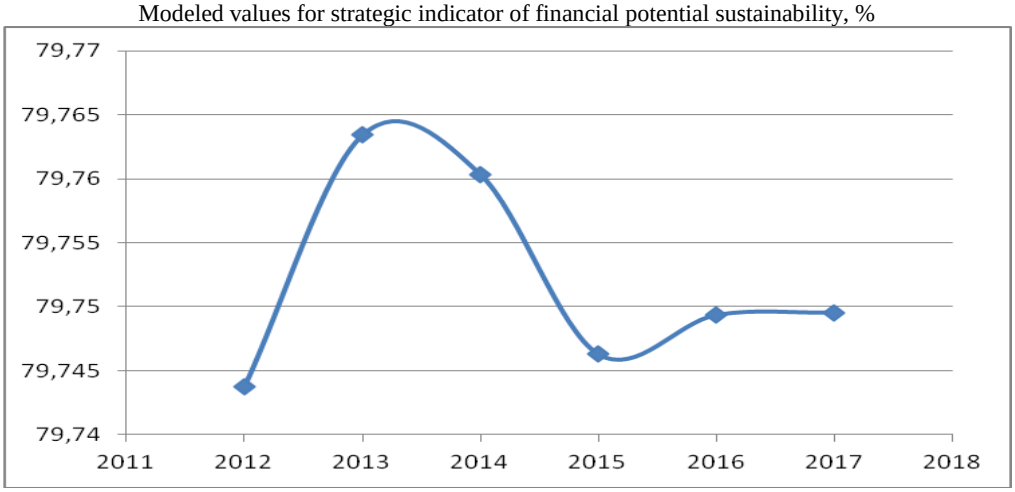
Modeled values for strategic indicator of financial potential sustainability, %



Modeled values for permanent strategic resources for financial potential, in thousand roubles

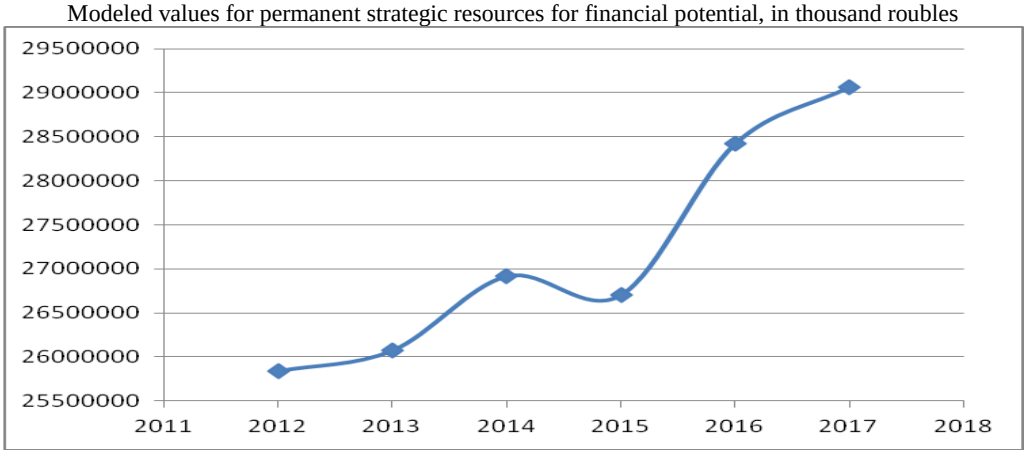


Figure 5. Modeled values of strategic indicators for assessing financial potential in PJSC "IDNC of the North Caucasus" (developed by authors V.V. Manuylenko, M.A. Loktionova)

7. Comparison of strategic assessment indicators' values for absolute (actual and strategic permanent resources) and relative (actual current and strategic coefficients) for sustainability of corporations' financial potential resources.

It is believed that projected corporations' financial potential increase should correlate with progression of funds sources where their ratio may vary.

8. Identification of indicators' value deviations, desk work with deviations. Table 3.

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Table 3. Identification of deviations between actual and strategic values for indicators, in corporations (Stavropol territory cases)

YY	Absolute Index			Relative Index		
	Permanent actual resources in thousand rubles	Permanent strategic resources in thousand rubles	Deviations, %	Actual sustainability of financial potential resources in thousand rubles	Strategic sustainability of financial potential resources in thousand rubles	Deviations, %
1	2	3	4	5	6	7
Corporations						
2012	473511395	668374181	– 29,2	56,5	79,7	– 23,2
2013	566437126	788390894	– 28,2	57,3	79,8	– 22,5
2014	677525985	967963995	– 30,0	55,8	79,8	– 24,0
2015	746631037	1123403573	– 33,5	53,0	79,7	– 26,7
2016	677766090	1409792250	– 51,9	38,3	79,7	– 41,4
$2017_{strategic.}$		1595138816			79,7	
Corporations - JSC						
2012	239883015	298326555	– 19,6	64,1	79,7	– 15,6
2013	317718423	330322509	– 3,8	76,7	79,8	– 3,1
2014	321877877	350451544	– 8,2	73,3	79,8	– 6,5
2015	332470901	391323258	– 15,0	67,8	79,7	– 11,9
2016	341678863	420966836	– 18,8	64,7	79,7	– 15,0
$2017_{strategic.}$		451622734			79,7	
Corporations – Public JSC						
2012	202458220	234680918	– 13,7	68,8	79,7	– 10,9
2013	257701128	216374889	+ 19,1	95,0	79,8	+ 15,2
2014	267269001	281900839	– 5,2	75,6	79,8	– 4,2
2015	216890465	233770528	– 7,2	74,0	79,7	– 5,7
2016	215467875	248736849	– 13,4	69,1	79,7	– 10,6
$2017_{strategic.}$		252247304			79,7	
Corporations – Non Public JSC						
2012	37424795	63645638	– 41,2	46,9	79,7	– 32,8
2013	60017295	113947620	– 47,3	42,0	79,8	– 37,8
2014	54608876	68550705	– 20,3	63,5	79,8	– 16,3
2015	115580436	157552730	– 26,6	58,5	79,7	– 21,2
2016	126210988	172229987	– 26,7	58,4	79,7	– 21,3
$2017_{strategic.}$		199375430			79,7	
Corporations - LTD						
2012	211334571	348348889	– 39,3	48,4	79,7	– 31,3
2013	222623487	434588815	– 48,8	40,9	79,8	– 38,9
2014	330217649	593337674	– 44,3	44,4	79,8	– 35,4
2015	384459036	703885415	– 45,4	43,6	79,7	– 36,1
2016	300639992	956646787	– 68,6	25,1	79,7	– 54,6
$2017_{strategic.}$		1108717781			79,7	
Corporations for production and distribution of electricity, gas and water						
2012	93774828	170844478	– 45,1	43,8	79,7	– 35,9
2013	95758553	81478725	+ 17,5	93,7	79,8	+ 13,9
2014	122590033	214979717	– 43,0	45,5	79,8	– 34,3
2015	101896451	229042076	– 55,5	35,5	79,7	– 44,2
2016	64197915	236762927	– 72,9	21,6	79,7	– 58,1
$2017_{strategic.}$					79,7	
Public JSC “IDNC of the North Caucasus ”						

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2012	22790992	25844815	– 11,8	70,3	79,7	– 9,4
2013	24593657	26079581	– 5,7	75,2	79,8	– 4,6
2014	23803550	26921156	– 11,6	70,5	79,8	– 9,3
2015	19396913	26707046	– 27,4	57,9	79,7	– 21,8
2016	21486678	28422731	– 24,4	60,3	79,7	– 19,4
$2017_{strategic.}$		29066824			79,7	
Corporations for wholesale and retail trade and others						
2012	49293727	99270133	– 50,3	39,6	79,7	– 40,1
2013	73106564	62059066	+ 17,8	94,0	79,8	+ 14,2
2014	66496668	163318202	– 59,3	32,5	79,8	– 47,3
2015	69192857	179117726	– 61,4	30,8	79,7	– 48,9
2016	104797097	225252857	– 53,5	37,1	79,7	– 42,6
$2017_{strategic.}$		256747404			79,7	
Non Public JSC "Stavropolstroyoptorg"						
2012	1948743	1808324	+ 7,8	85,9	79,7	+ 6,2
2013	2194527	1990022	+10,3	88,0	79,8	+ 8,2
2014	2519177	2349669	+ 7,2	85,5	79,8	+ 5,7
2015	2956580	2893401	+ 2,2	81,5	79,7	+ 1,8
2016	3375611	3243881	+ 4,1	83,0	79,7	+ 3,3
$2017_{strategic.}$		3602747			79,7	
Manufacturing Corporations						
2012	83574712	109476692	– 23,7	60,9	79,7	– 18,8
2013	36443841	30269251	+ 20,4	96,0	79,8	+ 16,2
2014	104308782	158894605	– 34,4	52,4	79,8	– 27,4
2015	99048522	187944214	– 47,3	42,0	79,7	– 37,7
2016	118728613	188900987	– 37,1	50,1	79,7	– 29,6
$2017_{strategic.}$		208755633			79,7	
"Russky Canning Plant " LLC						
2012	276265	324990	– 15,0	67,8	79,7	– 11,9
2013	335423	298984	+12,2	89,5	79,8	+ 9,7
2014	309499	320992	– 3,6	76,9	79,8	– 2,9
2015	278153	314381	– 11,5	70,6	79,7	– 9,1
2016	288308	366291	– 21,3	62,8	79,7	– 16,9
$2017_{strategic.}$		*376612*			*79,7*	

Source: compiled by the authors V.V. Manuylenko, M.A. Loktionova

9. Preparation of expert conclusions.
Thus, Monte-Carlo stochastic simulation method in its essence concludes a forecast for corporations' financial potential and takes into account external environment influence considering uncertain environment.

3. Results

3.1. In practical block of the research

– factor evaluation of corporations' financial potential allows depicting only pre-emptive part of its generation policy and excludes strategic component;
–significant internal factors that affect financial potential efficiency were distinguished in factor hierarchical structure; they require special regulation and monitoring in corporations' financial management systems (viability / sales loss, turnover of own financial potential resources);
– it is recognized that in operational financial management system of corporations' internal factors that influence efficiency of financial potential utilization are identified, evaluated and monitored; that demands development of an author's model for strategic evaluation of the potential that should be founded on Monte Carlo simulations which consider influence of emergent environment factors (i.e. macro - and meso-).

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3.2. In the theoretical and methodological field of research

– definition of corporations' financial potential is suggested based on an eclectic approach, which integrates elements of multitude approaches (resource, structural, resource, factor, efficiency, etc.) and suits most to characterize corporations' financial potential in the system of operational and strategic financial management;
– author's model for strategic assessment of financial potential based on stochastic simulation was developed and tested; it identifies absolute indicator for sustainability of financial potential resources (strategic permanent sources of financial potential and relative strategic indicator) as well as determines deviations of actual indicators' values from strategic ones (table 3) and implies appropriate expert conclusions.

Significant deviations of indicators' actual values from strategic ones are noted in all corporations which include the types: JSC, Non-Public JSC, LLC, corporations for production and distribution of electricity, gas and water, wholesale and retail trade, processing industries, PJSC "IDNC of the North Caucasus", LLC "Russky Cannery Plant". It is notable that only in the Non-Public JSC "Stavropolstroyoptorg" actual values of absolute and relative indicators exceed the strategic ones during the entire retrospective period, which is a better result comparing to those in wholesale and retail trade corporations, as well as in others.

Few cases where actual values f indicators exceed their strategic landmarks are noted in 2013 in corporations of PJSC type, corporations that produce and distribute electricity, gas and water, wholesale and retail trade, processing industries, and LLC "Russky Cannery Plant".

Considering the fact that the normal value of the indicator for stability of corporations' financial potential resources is 80%, critical value is 75%, then at its value <75% - high risk, 75% - 80% - medium,> 80% - low risk, volatility of indicator is applied as a measure for the level of risk. Strategic values of the indicator for stability of corporations' financial potential resources generally correspond to the average level of risk, and the actual ones to some extent relate to high level of risk; that excludes Non-Public JSC "Stavropolstroyoptorg" which shows low actual level of risk.

Analysis of deviations between forecasted indicators' values and actual ones is an instrument of financial potential adjustment in the system of strategic financial management, the content of analysis is presented in the form of logical classification (figure 6).

It should be noted that involvement of all level managers into analysis of deviations allows determining the level of consequent contribution into overall financial outcome. PJSC "IDNC of the North Caucasus" case showed involvement of special Audit Board that controlled generation and utilization of reserved and other special funds, monitored efficiency of resource utilization, revealed causes for non-production losses and expenses, controlled reserved funds for improvement of financial situation.

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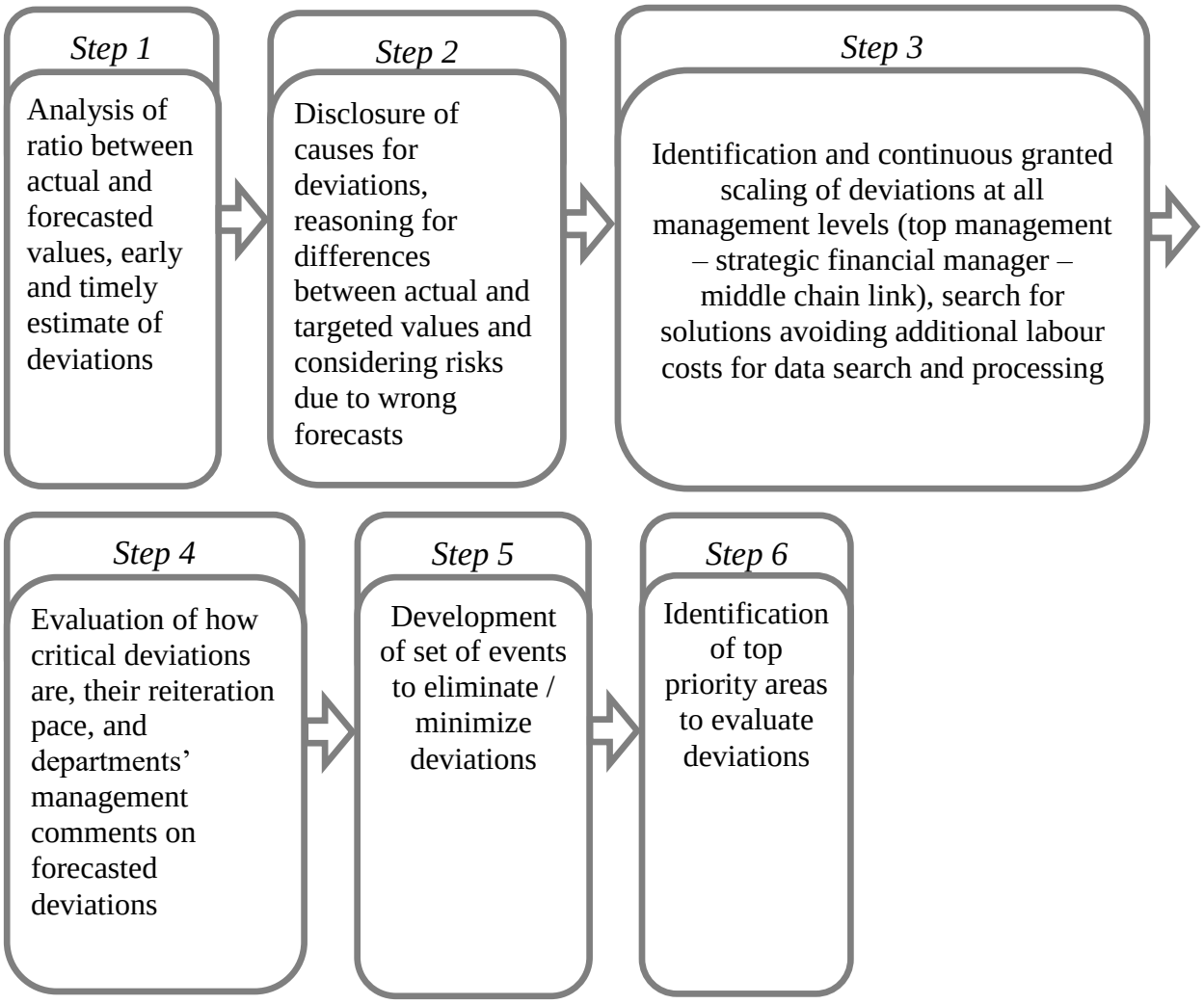

Figure 6. Consequence of steps to assess deviations (developed by authors V.V. Manuylenko, M.A. Loktionova)

Exceeded strategic values of indicators over the actual ones should be considered for determining risk-oriented strategies for organizations' financial potential generation.
The forecast data is applied by organizations for development of guidelines in accordance with strategic goals.
The suggested toolkit for strategic evaluation of corporations' financial potential incorporates the benefits for different groups of stakeholders (Table 4)

Table 4. Practical application of corporations' financial potential strategic evaluation results for stakeholders

Stakeholders	Areas for strategic evaluation results application
Owners	Evaluation of appropriate growth / decrease of own financial potential resources, return on investment, profitability, financial risk level and development prospects
Financial Managers	Efficiency of taken decisions, utilized financial potential resources and financial results
Creditors	Feasibility of loan prolongation, loan terms, return guarantee
Lenders	Essential prolongation of long-term credit /bonds, credit terms/ bond terms, return guarantees

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Potential owners, creditors and investors	Investments profitability
Suppliers	Solvency assessment
Auditors, lawyers, associations, trade unions	Analytical goals

Source: compiled by authors V.V. Manuylenko, M.A. Loktionova

Stakeholder interests' inclusion aims to generally improve financial management system quality, where the criteria for efficient performance of the latter include observance and protection of the stakeholders' rights.
The suggested toolkit for strategic evaluation of corporations' financial potential carries a significant practical value, namely:
— it promptly identifies internal potentials of organizations, their weaknesses, undiscovered abilities opt to improve performance, thus it enhances their financial potential;
— it is a key element in development of their activities, which later may become a supporting element of business planning for other key financial indicators;
— it accumulates a significant number of resources for a long-term operation, allowing to accumulate a full range of possible scenarios to advance permanent resources for financial potential;
— it allows building a model to enhance strategy for financial potential generation, and contributes to development of a more efficient supporting strategic policy.

Developed toolkit for strategic evaluation of corporations' financial potential based on imitation simulation was tested in financial management system of PJSC "IDNC of the North Caucasus", Non-Public JSC "Stavropolstroyoptorg" and LLC "Russky Cannery Plant".

4. Conclusions

Thus, a model for strategic evaluation of corporations' financial potential based on imitation simulation reinforced with a special author's software product was developed and implemented, development implied also identification of deviations between actual and target indicators' values, their analysis and formulating expert conclusions for all levels of financial management. Its practical application incorporates interests of different groups of stakeholders.

Completion of the research, namely the results of the evaluation, subsequently become the ground for management decisions arising in the process of corporations' financial potential generation and evaluation, they will also serve to lay theoretical and methodological foundation for further research in corporations' financial potential evaluation, namely:
Completed research, and namely evaluation results subsequently become the ground for management decisions in the area of generation and evaluation of corporations' financial potential, they allow building a theoretical and methodological foundation for further research in the area of corporations' financial potential evaluation, namely:
- conduct strategic assessment of corporations' financial potential in the medium and long term (3 to 5 years) in conditions of uncertainty;
- creation of a modern toolkit for assessing financial resources of corporations in conditions of uncertainty;
- development of financial policy, corporations' financial potential generation policy that incorporates strategic and risk components for conditions of uncertainty;
- development of multiple scenarios of corporations' financial potential performance in conditions of uncertainty;
- development of financial strategies and strategies for risk-oriented corporations' financial potential generation;
- development of new methods and instruments for financial risks insurances associated with corporations' financial potential generation in the insurance market: E.A. Rusetskaja (Rusetskaja et al. 2016);

- provision of connection between financial and intellectual potential; a separate study on intellectual capital of companies was conducted by S.S. Galazova (Galazova and Manuylenko 2017).

5. Discussions

The authors believe that suggested author's model for corporations' financial potential generation evaluation can be modified with a different forecasting period as part of corporations' financial potential generation policy implementation. Given specifics of different corporations' performance in uncertain environment, each corporation can develop its own model. At the same time, necessary consideration of emergent (macro-, meso-) environment factors influences efficient utilization of corporations' financial potential and leads to development of perspective trends for corporations' financial potential generation and evaluation.

Thus, a universal toolset for corporations' financial potential long-term evaluation was suggested and tested; the tollset incorporates absolute and relative indicators in the system of strategic financial management functioning under conditions of uncertain environment.

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IMPACT OF SPATIAL DEVELOPMENT ON SUSTAINABLE ENTREPRENEURSHIP

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Abstract. The article considers the factors that impede the sustainable development of entrepreneurship. The results of the studies are presented that prove that spatial development based on the growth of agglomerative formations with time can start to hamper the innovative development of entrepreneurship in the regions. The change of the consolidated innovation index is studied depending on the size of the agglomeration zone and the scope of works in terms of the number of city inhabitants. The reasons limiting prospects of the agglomeration growth of large formations, in particular, the mass outflow of the population to large cities and low natural growth of the population, are researched. The compensatory possibilities of migratory flows have been studied and the expediency of ensuring sustainable entrepreneurship based on the new scheme of spatial development of Russia on the basis of agglomeration transformations, and primarily the formation of non-urban agglomerations, has been proved.

Keywords: sustainable entrepreneurship; nonurban agglomerations; rural agglomerations; agglomerative transformations; spatial development

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JEL Classifications: R11, R12

1. Introduction

At present, problems of social and economic sustainability of entrepreneurship come to the forefront of all subjects of the world community. The growing pressure of globalization, penetrating all spheres of entrepreneurial activity and trying to unify them with the simultaneous diversification of existing devices of economies of different countries and uneven spatial development aggravate this problem (e.g. Mikhaylov 2018). The need to find a comprehensive solution to the problem of sustainable development of entrepreneurship causes the growing interest in managing the development of territories and improving the practice of spatial planning.

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Many scientists devoted their work to the study of the essence and content of economic sustainability of entrepreneurship, methods and mechanisms of its sustainable development: Coase R. (1992), Leontief W. (1977), Tateisi K. (1990), Fagerberg J., Srholec M. (2007), Jonkutė G., Staniškis J. K. (2016), Ravago M.-L., Balisacan A., Chakravorty U. (2015), Abrham J.; Strielkowski, W.; Vošta, M.; Šlajs, J. (2015), Bolis I., Morioka S., Sznelwar L. (2017), Singh S., Olugu E. U., Musa S. N. (2016), Jia X., Foo D. Tan R., Li Z. (2017), Tvaronavičienė M. (2018), Tvaronavičienė, M., Tarkhanova, E., & Durglishvili, N. (2018), Shi L., Wu K.-J., Tseng M.-L. (2017), Ehrenfeld J. R. (2004), Garetti M., Taisch M. (2012), Dobrovolskienė, N., Tvaronavičienė, M., Tamošiūnienė, R. (2017) and others. They studied the theoretical aspects of the essence of sustainable development of entrepreneurship and the issues of formation of sustainable development strategies, including the ones used during the period of economic reforms in various countries of the world, taking into account their national characteristics.

The term "sustainability" became widely used after the speech by the Prime Minister of Norway, Gro Harlem Brundtland, at the United Nations, in which she identified sustainable development as "meeting current needs without compromising the ability of future generations to meet their needs" (United Nations, 1987). Awareness of the role of spatial development as one of the decisive factors for the sustainable development of entrepreneurship led to a shift in the emphasis in research from purely economic instruments to the management of the spatial development of territories.

At the present stage of human development, agglomeration is the most popular form of organizing settlement within the territories. Widespread urbanization comes with the territorial intergrowth of settlements into interconnected systems. Currently, in the world, there are 512 cities with the population of more than 1 mln. people, and by 2030 their number is expected to increase by 30% (United Nations, 2016). According to the forecasts, the proportion of the population living in megacities will increase from 6.8% up to 8.7% by 2030, and by 2050 about 66% of all people of the planet will live in urban agglomerations.

The issues on forming urban agglomerations were studied by representatives of various economic schools in the XIXth – early XXIst century. The role of economic differentiation of the territory and its specialization in production as prerequisites of agglomeration formations was studied (Cities in a World Economy, 2006; Glaeser, 2005; Glaeser, 2011). Representatives of the German school of spatial analysis I. Thünen (1850), V. Christaller (1960), A. Lösch (1940) studied the issues on forming an optimal structure for the region resettlement in terms of the minimum transportation costs. According to F. Perroux (1954) (within the center and periphery paradigm), the growth of the urban agglomeration is a consequence of the development of various industries – “growth poles”. T. Hägerstrand (1985), the Swedish researcher, considered agglomerations as the center of innovations’ spread and diffusion.

As for Russian researchers, the theme of the spatial structure of settlement in the agglomeration was studied by E.N. Pertsik (1999), G.M. Lappo (Lappo, & Selivanov, 2010), Yu.L. Pivovarov (1999), V.G. Davydovich (Davidovich, Gutman, & Lappo, 1964), etc. The most advanced studies in the study of agglomerations include the works of G.M. Lappo who defined this concept as follows: “the agglomeration is a compact territorial grouping of urban and rural settlements united in a dynamic system by multiple connections” (2007).

Despite the seemingly active development of agglomerations, some researchers believe that the trend for large agglomerations is outdated and reflects the industrial type of development. Due to this, in their opinion, by 2030 neither Europe nor North America are expected to increase the number of large metropolitan cities. In general, the purposeful development of agglomerations is an important area in solving the problem of regulating the growth of large urbanized centers and managing settlement systems.

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Many authors (Neshadin, & Gorin, 2001; Neshadin, & Tulchinsky, 2011 and others) note the paradigm shift in the development of strategies for the spatial development of developing countries, including Russia, which are actively influenced by two interrelated and complementary processes: the development of agglomeration (as a concentration of residents of large cities), occurring in parallel with the formation of clusters (as a dense network of mutually complementary economic entities, united by participation in the value chain and localized in a certain territory) (Shmidt, Antonyuk, & Franchini, 2016).

At the same time, the phenomenon of the countries of the Russian agglomeration lies in the fact that the concentration of financial, economic, scientific, innovative and other resources in urban agglomerations is carried out against the background of the decline of small cities, especially monocities and the cities located on the periphery, outside of the agglomerations (Animitsa, 2012). This causes the desolation of nearby territories and the emergence of demographic, production and other imbalances, as well as the loss of control over significant territories. Therefore, the complex and contradictory processes of spatial development of modern states are the dominant factor affecting the stability of business structures, which predetermines the further feasibility of research in this field.

2. Methods

The research is based on Russian and foreign scientists' works in the field of economics, including the modern achievements in the field of entrepreneurship sustainability provision and spatial development of territories. The analysis of the degree of entrepreneurship sustainability and the state of agglomeration processes in different countries is based on the results of statistical studies of two levels: national and regional. In this regard, the authors note the following difficulties related to the need to compare all the studied data: methodological differences in the definition of the set of indicators and the calculation of identical indicators in different countries, the irregular and selective nature of the studies, the selection of various characteristics that do not coincide from year to year, the lack of data on small settlements, etc.

Nevertheless, the accepted methodology of the study allowed the authors to obtain reliable results and ensure the adequacy of introducing the study object, which was confirmed by the results of practical realization of the theoretical conclusions.

The practical significance of the results of this study is that they will allow ensuring the formation of network structures of non-urban agglomerations in the economic space as the basis for a new framework of the organization of the economic space of the world economy that provides the prerequisites for the formation of sustainable entrepreneurship.

3. Results

The performed analysis of the state of the entrepreneurial climate in the world allowed the authors to state its deterioration and, as a consequence, the decrease in the stability of business structures in developed countries. The Doing Business rating (Doing Business, n. d., the indicator of creating favorable business conditions) formed by the World Bank and the International Finance Corporation made it possible to establish that in only 7 years (from 2010 to 2017) many developed countries have lost their leading positions. For example, in 2010 Singapore was ranked first, New Zealand – second, Hong Kong – third. The top ten also included the US, the UK, Denmark, Ireland, Canada, Australia and Norway. Russia was ranked 120, and on the Central African Republic was put in the last place. In 2017, New Zealand replaced Singapore, and the top ten included Denmark, Hong Kong, South Korea, Norway, the UK, the US, Sweden and Macedonia. Russia rose to the 40th place. Extrusion of the traditionally leading countries from the leading positions of the world rating and their shift to the lower levels

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confirms the aggravation of the problem of sustainable development of entrepreneurship. One of the leading factors in the current situation is the exhausted structure of the spatial development of their territories.
Investigating the world experience of development of the existing spatial development, it is possible to single out 2 directions, determined by historically formed conditions (population density, natural, climatic and resource conditions, terrain, waterways, etc.): the existence of a relatively stable network of agglomerations in the territory of the country or their uneven distribution.

The first direction of spatial development is characterized by the presence of a relatively stable network of agglomerations in the country. For example, in Europe, the settlement has a clearly distinguished seaside nature, and the largest cities gravitate toward the central economic space. In general, the urban population prevails, and the level of urbanization is one of the highest in the world: on average, 75% of the population lives in cities (Fig. 1).

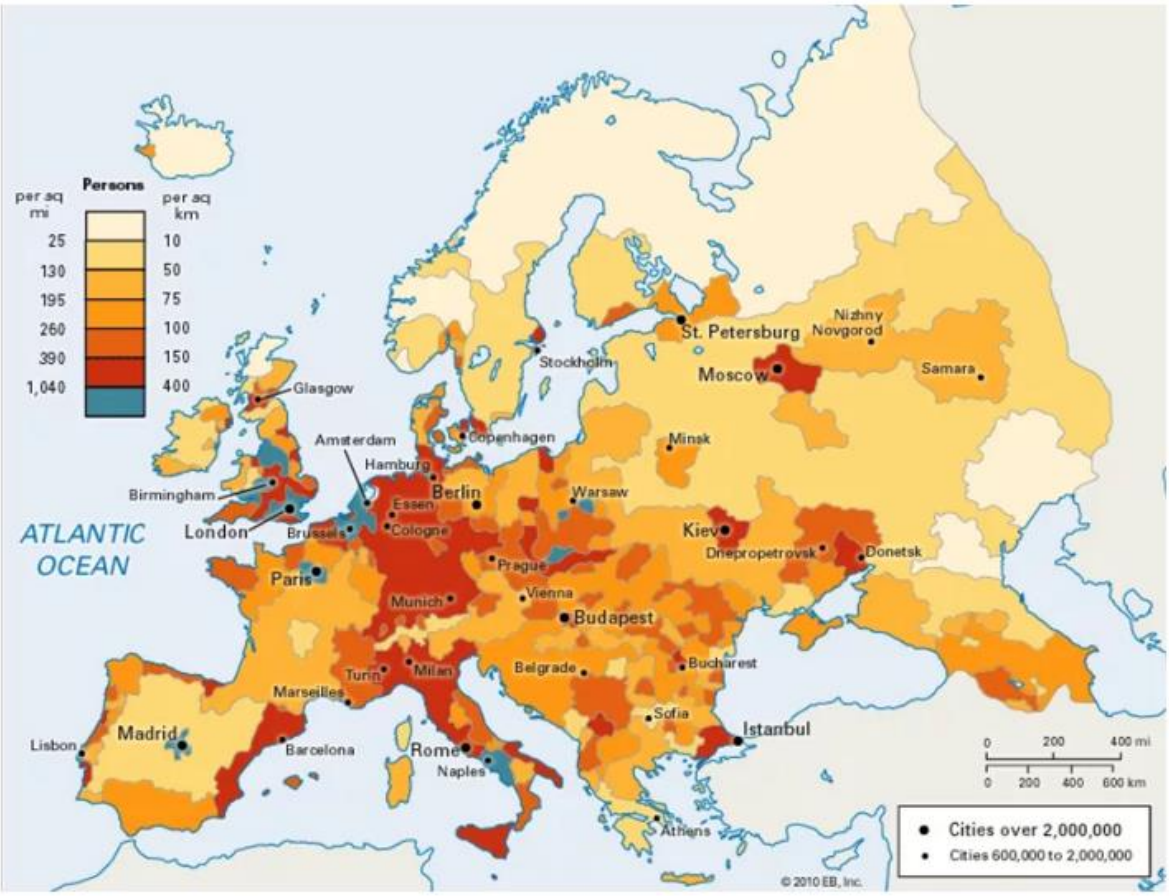

Fig. 1. Spatial development of Europe

In the United States, the population density decreases as getting farther from the Atlantic coast and reaches its minimum in the Mountain states (on average, 5.6 people/sq.km., and in Wyoming – 1.3 people/sq.km.). It again increases on the coast of the Pacific Ocean (on average, 35 people/sq.km., including California – 50 people/sq.km.) (Fig. 2).

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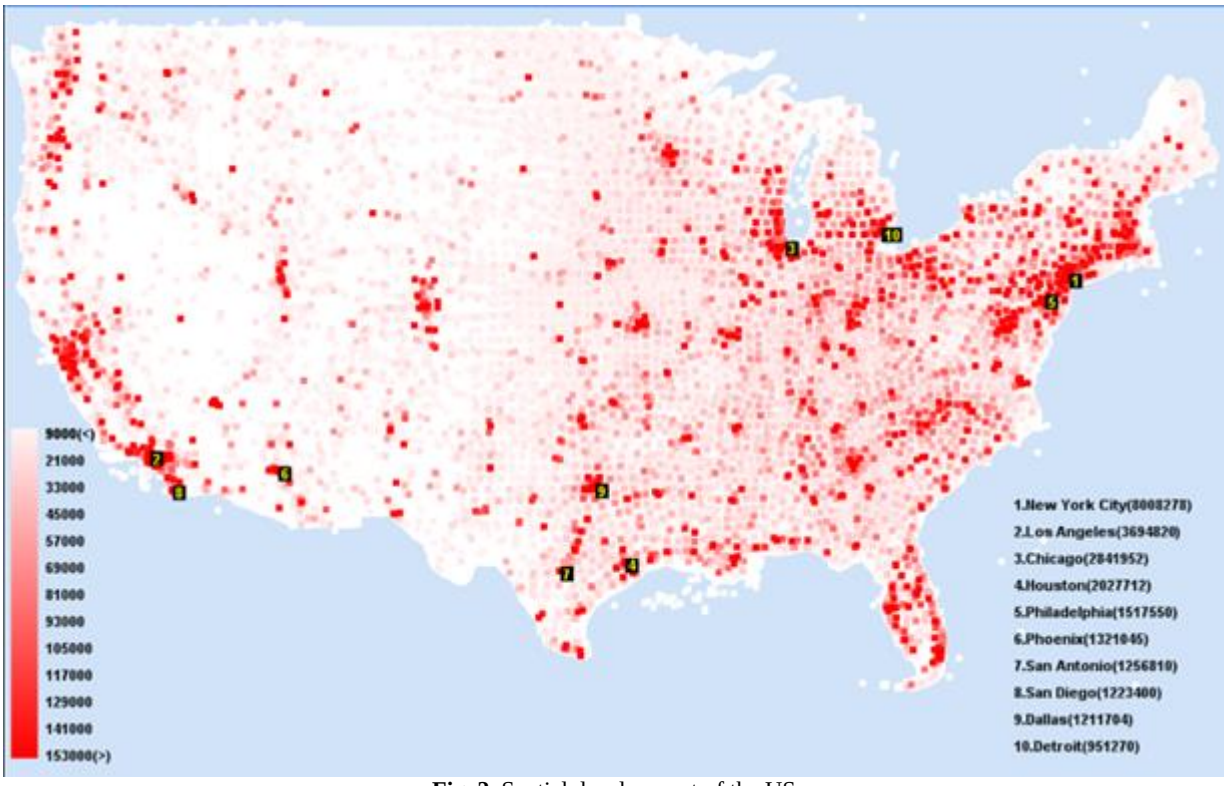

Fig. 2. Spatial development of the US

There is another nature of settlement in countries with lower population density and difficult natural and resource conditions: Canada, Australia, China and Russia. Canada is characterized by the extremely uneven allocation of the population: 90% of the population lives on 10% of its territory (Fig. 3).

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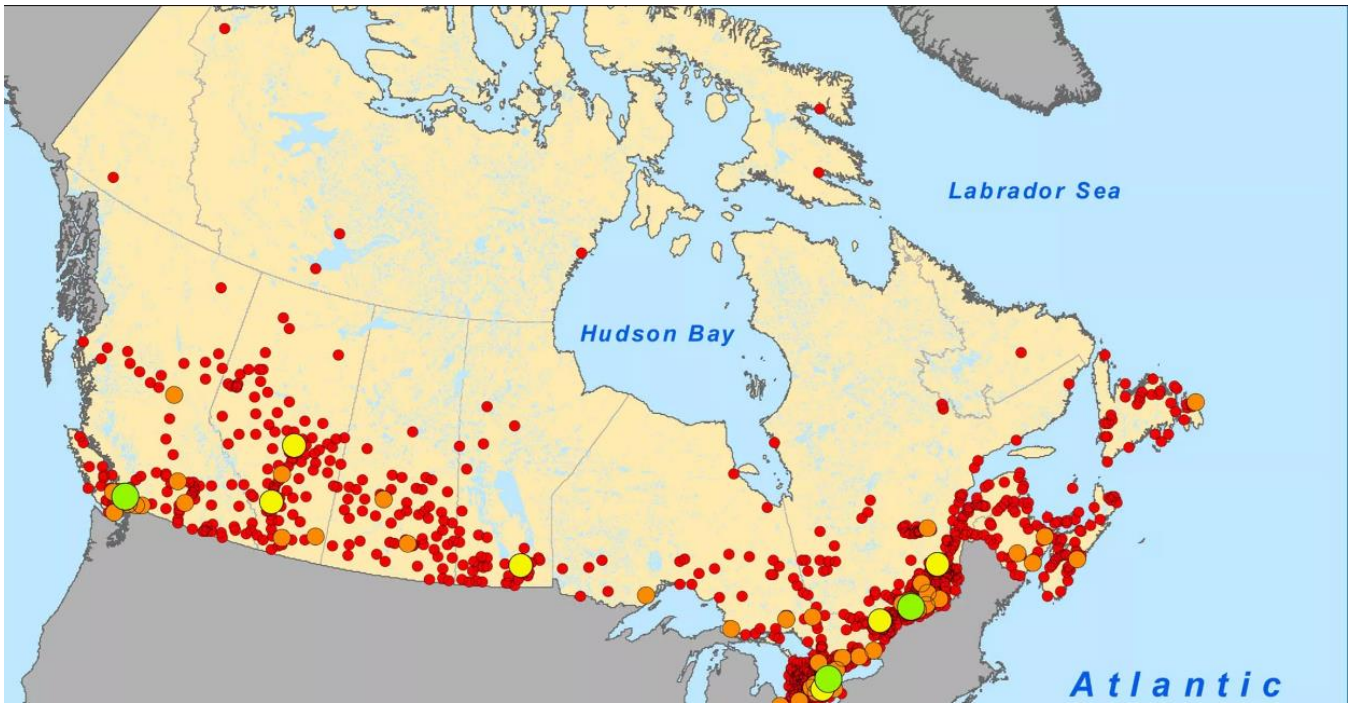

Fig. 3. Spatial development of Canada

Formally Canada is a country with rather low population density – 3.7 people/sq.km. However, the southern part of the country is densely populated, because the majority of the population lives in the "tape" formation, no farther than 160 km from the US border.

The settlement of inhabitants in Australia is similar (Fig. 4).

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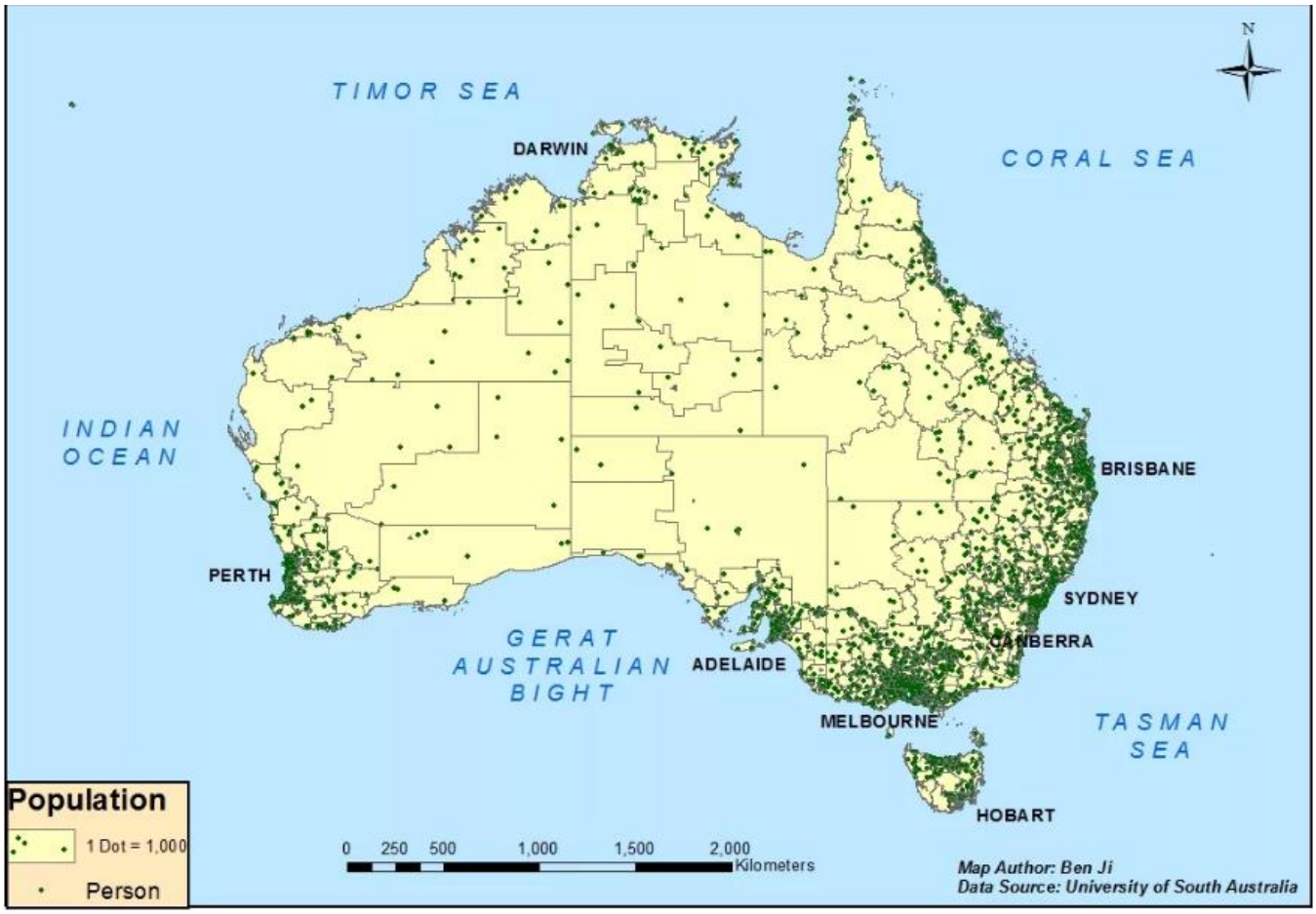

Fig. 4. Spatial development of Australia

The population in Australia is unevenly distributed, and mainly concentrated along the coast, in the east and northeast the population density is 25-50 people/sq. km. The central territory is populated slightly, with the density of less than 1 person/sq. km.

The density of population in China is 144 people/sq. km. However, about 90% of China's total population lives in its southeastern part, accounting for only 40% of the country's total area, mainly in the east of the country. The most densely populated areas are the lower part of the Yangtze River Delta and the North China Plain, the vast peripheral areas are almost deserted (Fig. 5).

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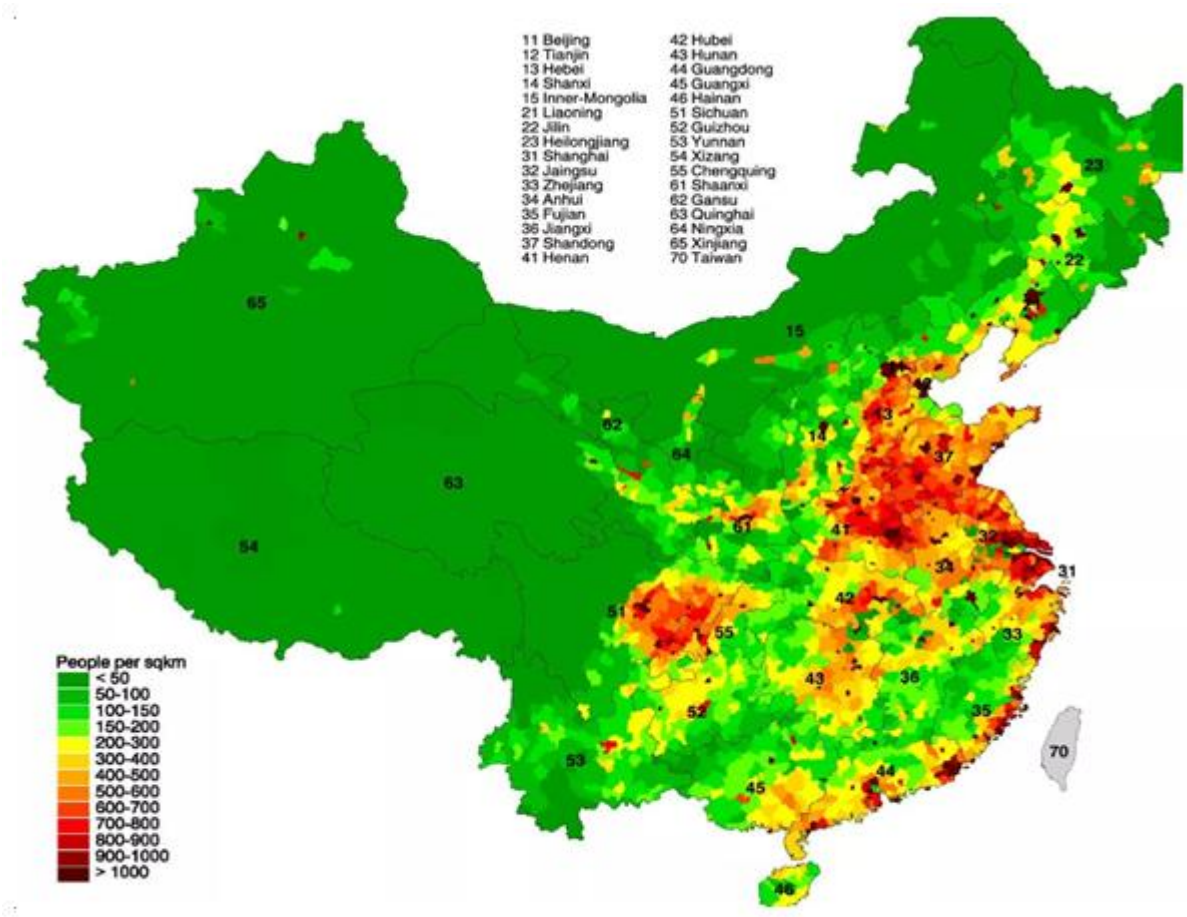

Fig. 5. Spatial development of China

A specific feature of Russia is the scale of the territory – 17.7 mln. sq.km. (Fig. 6).

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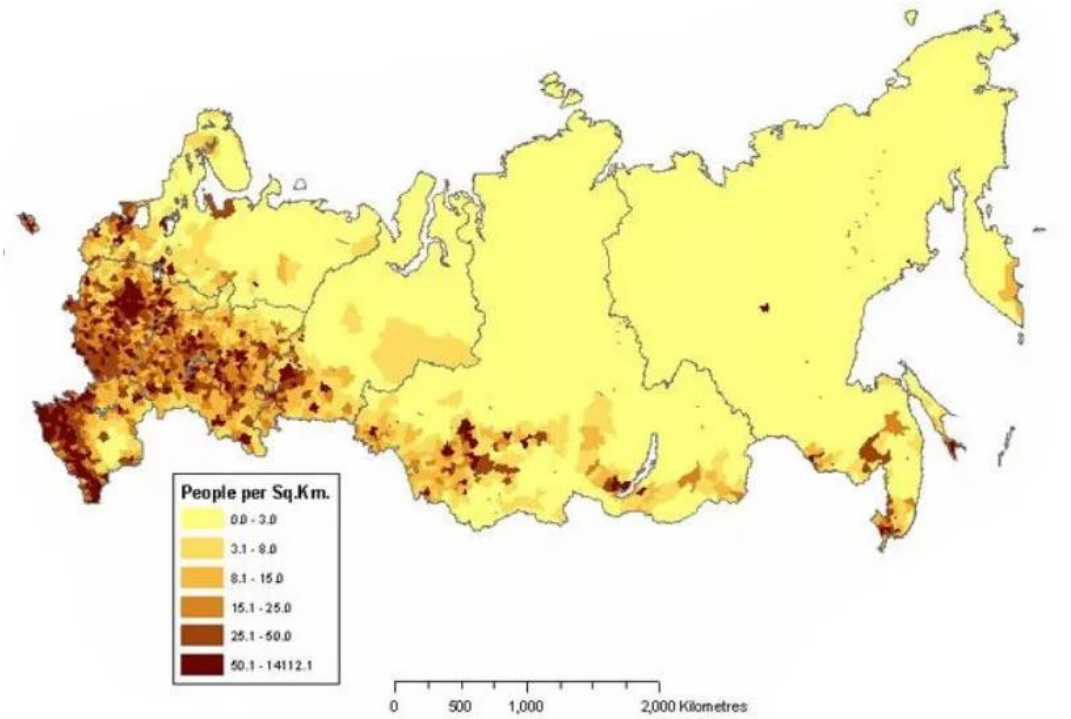

Fig. 6. Spatial development of Russia

In the European part, cities cover almost the entire space, and form agglomeration clusters, while in the rest of the country there is a specific spatial pattern of settlement – along with the transport arteries: railways, river and sea routes.

The majority of the Russian territory has not been inhabited by now. Since 1990, the number of Russian settlements has decreased by 23 thousand, the number of inhabitants has decreased in more than 800 cities (out of 1,128), and about 200 cities have lost more than a quarter of their population (The data, RBC). Migration of the population to large cities caused the degradation of small settlements. The number of cities with the population of fewer than 12 thous. people (one of the criteria for assigning the status of a city) grew from 157 to 246.

The loss as compared to 1989 was recorded in 67 regions of Russia (The data, RBC). The most disbanding cities are located in the central and northwestern parts of Russia: Tula (-22%), Leningrad (-21%), Ivanovo (-19%), Tver (-18%), Pskov (-16%) and other regions. The desolation of the rural territory, abandoned villages are quite common in the Non-Black Earth Region. Only 20% of its territory in the suburbs preserve areas with the population density of more than 10 people/ sq.km, and 41% of the territory has the population density of fewer than 5 people/sq.km (in 1959, there were 17% of such territories).

The attractiveness of agglomerative formations and their active growth are explained by the advantages of their creation, and, first of all, by tightening of the economic space around the "growth points" of the region, the effect of localization and concentration of enterprises and organizations that have high technologies within innovatively developed territories. However, innovative advantages are of a rather short-term nature and require systematic support. Moreover, agglomeration formation may eventually slow down the innovative development of some firms and districts. That is why theoretically there can be a situation when the total agglomeration effect is negative, but the geographic concentration continues to exist.

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Due to this, the study of Kutsenko E.S. (2012) is interesting. According to its results, the positive impact of urbanization was found only in 45% of cases; both positive and negative significant impact – in 10%; and only negative – in 7%. Insignificant effects of urbanization were found in 37% of cases. It is substantiated by the completion of the intensive development of the urban agglomerations' network due to the fact that the phase of growth and the formation of innovative advantages have been completed. Thus, recently the agglomeration processes on the territory of developed countries and Russia have changed and have a qualitatively different character.

The studies carried out by the authors (Statistics Canada, n. d.; GOV.UK, n. d.; DESTATIS, n. d.; Insee, n. d.; Semantic Community, n. d.; Eurostat, n. d.; Federal State Statistics Service, n. d.) show that simple quantitative growth comes with a decrease in the efficiency of the agglomeration formation functioning, and as a result, the deterioration of conditions for sustainable development of entrepreneurship. Based on the results of surveying 20 agglomeration zones of Europe and Northern America, it has been revealed that the size of the agglomeration has a considerable impact on the change in the consolidated innovation index (Fig. 7).

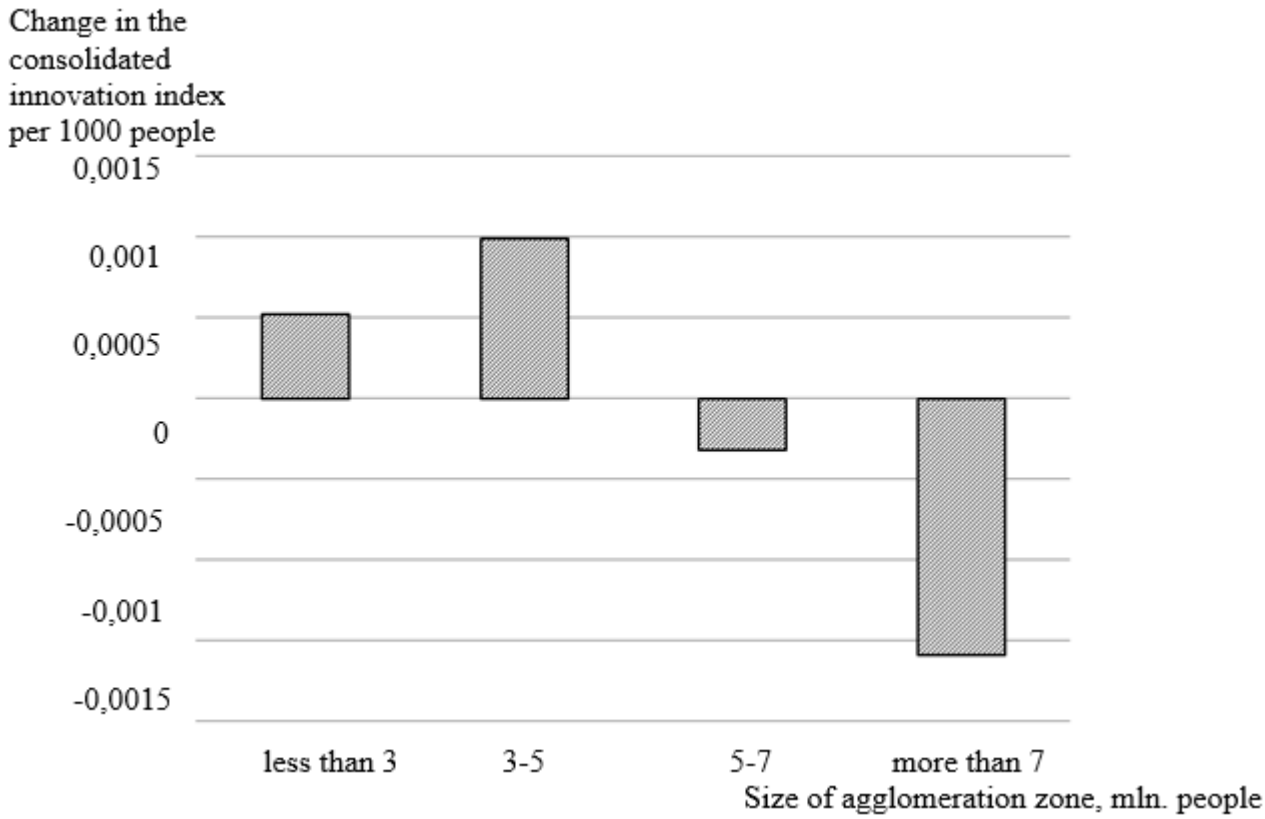

Fig. 7. Change in the consolidated innovation index depending on the size of the agglomeration zone in developed countries

In an agglomeration zone where the population is up to 3 mln. people, the increase in the population by 1 thous. people causes the growth of the consolidated innovation index by 0,00052. In the cities where the population is from 3 to 5 mln. people, a similar change in the population causes an increase in the consolidated innovation index by 0,00099. In larger cities, there is the opposite effect: the increase in the population by every thousand

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people causes the reduction of the consolidated innovation index in the cities with the population of 5 to 7 mln. people by 0,00032, and in the cities with more than 7 mln. people - by 0.00074.

In developing countries that adhere to the industrial development path, the reserve of the efficiency of agglomeration zones is not exhausted so clearly. For example, based on the results of surveying 20 agglomeration zones in Russia, it has been revealed that the size of the agglomeration has a considerable impact on the change in the consolidated innovation index, but the curve is more gradual (Fig. 8).

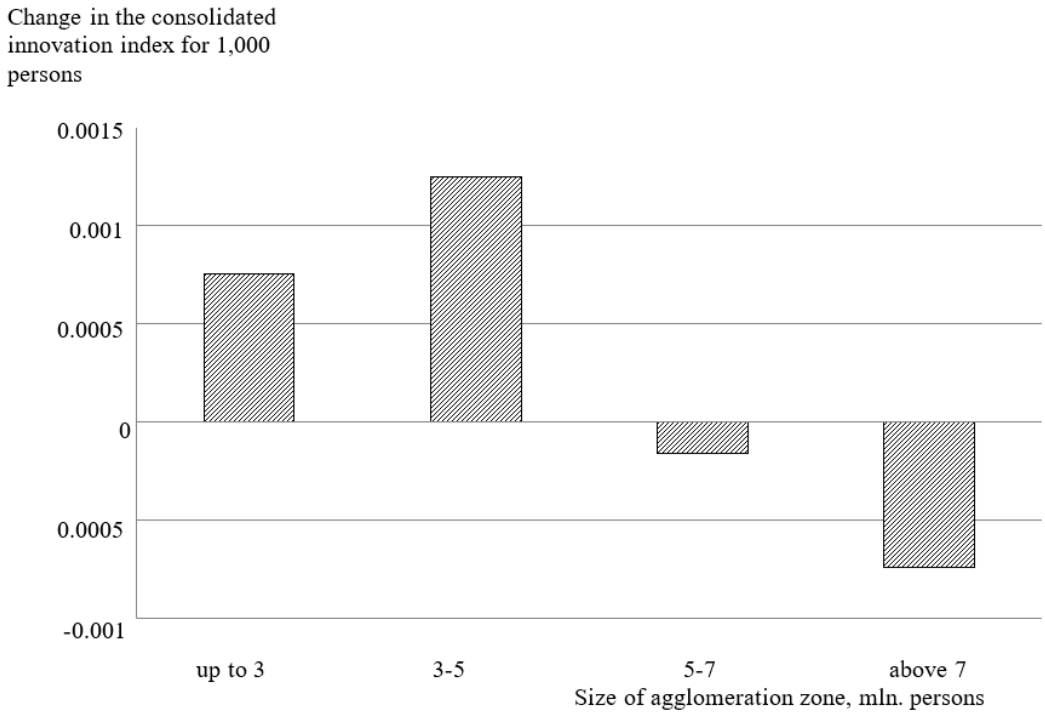

Fig. 8. Change in the consolidated innovation index depending on the size of the agglomeration zone in Russia

In an agglomeration zone where the population is up to 3 mln. people, the increase in the population by 1 thous. people causes the growth of the consolidated innovation index by 0.00075. In the cities where the population is from 3 to 5 mln. people, a similar change in the population causes an increase in the consolidated innovation index by 0.0125. In larger cities, there is the opposite effect: the increase in the population by every thousand people causes the reduction of the consolidated innovation index in the cities with the population of 5 to 7 mln. people by 0.00016, and in the cities with more than 7 mln. people - by 0.00074.

Further, the authors studied the possibilities of agglomeration transformations and their implications for the development of sustainable entrepreneurship for large cities in Europe and North America as potential areas of agglomeration growth, which, officially, they are not (Semantic Community, n. d.; Eurostat, n. d.). The dependence of the change in the volume of gross domestic product per capita on the number of inhabitants of these cities was investigated (Fig. 9).

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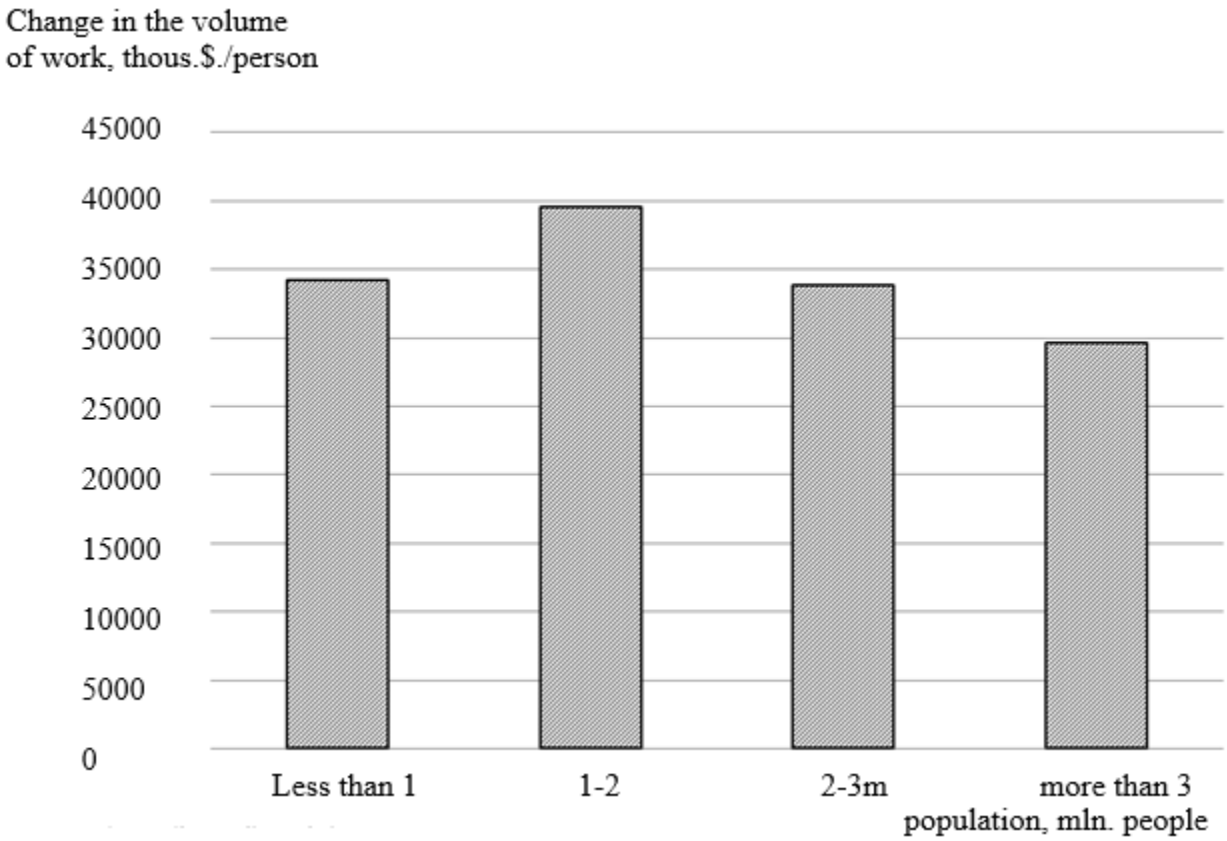

Fig. 9. Change in the volume of work, depending on the number of city residents in developed countries.

It is determined that the increase in the number of inhabitants considerably defines the increase in the volume of the performed works. At the same time, its maximum value is achieved in the cities with the population of 1-2 mln. people – 39548 thous.$./person, and then, as the number of inhabitants in larger cities increases, the growth for every additional inhabitant decreases, and makes up 33822 thous.$./person in the cities with the population of 2-3 mln. people, and 29644 thous.$./person – in the cities with the population of more than 3 mln. people. Thus, cities with the population of 1-2 million people have the greatest potential for urban growth, which provides good conditions for the development of sustainable entrepreneurship.

Similarly, the authors investigated the possibilities of agglomeration transformations and their implications for the development of sustainable entrepreneurship for large cities of Russia as potentially possible agglomeration growth zones, which, officially, they are not (Federal State Statistics Service, n. d.). The dependence of the change in the volume of shipped goods of own production, self-performed works and provided services on the number of inhabitants of these cities was studied (Fig. 10).

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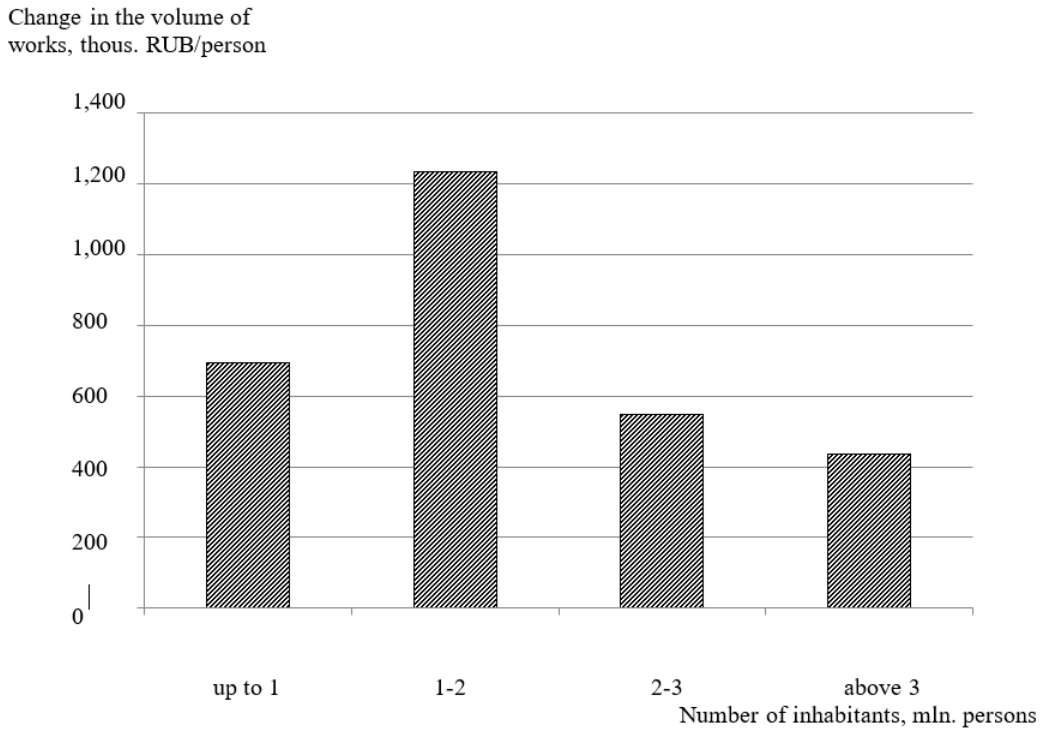

Fig. 10. Change in the volume of works depending on the number of the city inhabitants in Russia

It is determined that the increase in the number of inhabitants considerably defines the increase in the volume of the performed works. At the same time, its maximum value is achieved in the cities with the population of 1-2 mln. people – RUB 1,235.7 thous./person, and then, as the number of inhabitants in larger cities increases, the growth for every additional inhabitant decreases, and makes up RUB 547.5 thous./person in the cities with the population of 2-3 mln. people, and RUB 437.2 thous./person. – in the cities with the population of more than 3 mln. people. Thus, cities with the population of 1-2 million people have the greatest potential for urbanization providing good conditions for the development of sustainable entrepreneurship.

However, their opportunities are rather limited: the mass outflow of the population to large cities and low natural growth of the population have limited the prospects of the agglomeration growth. Recently the population has mainly increased due to migration flows. On the example of Russia, a migrant's contribution to the volume of work was studied depending on the number of inhabitants of the city. In Russia, the structure of migrants is as follows: the number of those who come “to work” from the CIS is approximately 3.8-3.9 mln. people, and about 170-180 thous. people are labor migrants from the far abroad (Florinskaya, 2017). However, migrants do not exceed their innovative potential because the level of education is quite low – 2 times lower than the average for the Russians - and fluctuates on the level of 14-17% as against 28% (on average in Russia). Fig. 11 shows the structure of foreign citizens’ employment by occupational categories.

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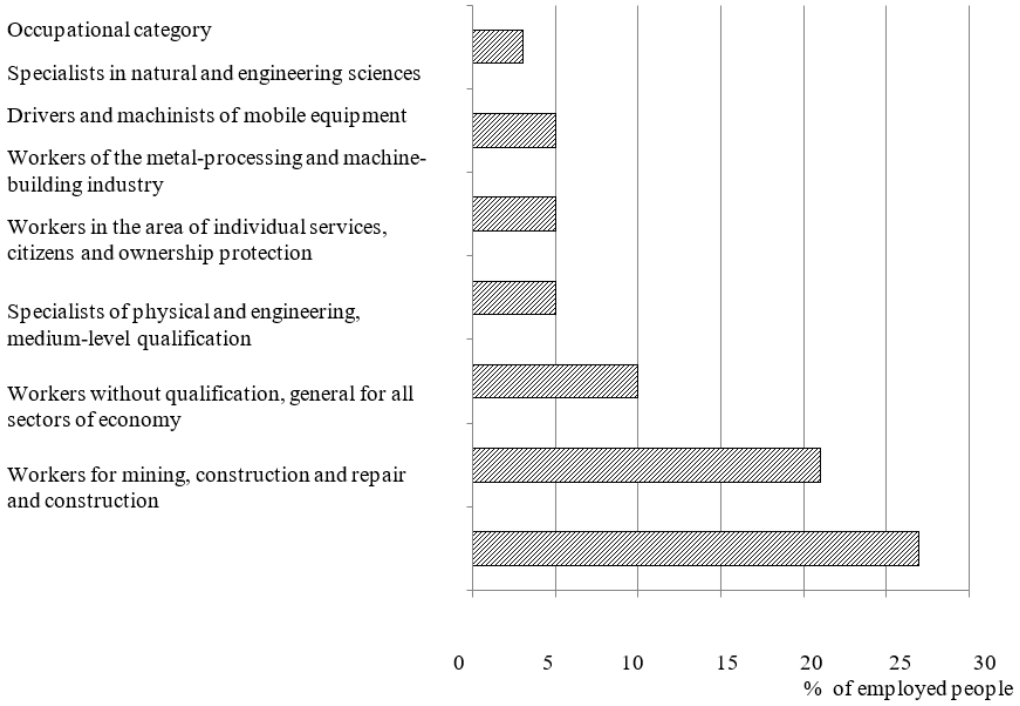

Fig. 11. Structure of foreign citizens' employment by occupational categories

Above 50% of migrants are employed as mining, construction and repair and construction workers, as well as in other sectors of the economy, and less than 5% are specialists in the area of natural and engineering sciences.
Due to this, the authors studied the contribution of migrants to the Russian production (Fig. 12 (Federal State Statistics Service, n. d.)).

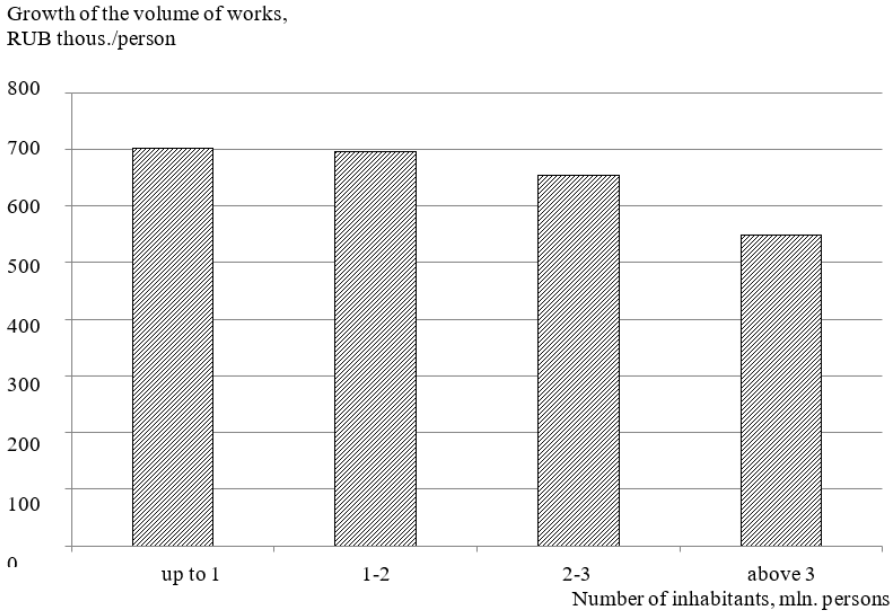

Fig. 12. The growth of the volume of works provided by 1 migrant depending on the number of the city inhabitants.

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The performed analysis of the growth of the volume of work provided by 1 migrant, depending on the number of inhabitants of the city made it possible to define the decrease in the return on migrants' labor as the city grows from RUB 702 thous./person in the cities with the population of up to 1 mln. people up to RUB 549 thous.– in the cities with the population of more than 3 mln. people. In terms of the contribution of their labor to the creation of an innovative product, it is even lower. Partially this is due to the growth in the share of innovative products as the city grows, for example, in the regions with large cities the average volume of innovative products (Kiselitsa, & Shilova, 2016, Kiselitsa, Shilova, & Liman, 2017) is 5.1% of the total GRP, and in the regions where there are cities with less than 1 mln. people it is already 2.9%. However, to a greater extent, this is due to the low qualification of this type of labor resources. Thus, the current structure of migration flows introduces an additional imbalance in the formation of favorable conditions for the development of sustainable entrepreneurship.

In this regard, the modern strategy of European spatial development, aimed at the formation of a polycentric decentralized settlement system with the gradual transfer of functions from metropolitan cities to a network of dynamic regional centers while limiting the process of suburbanization, is the only right one. While developing countries stimulate agglomeration growth of territories, using the effect of agglomeration transformations to develop entrepreneurship, the developed countries have reached a different stage of development, in which the new spatial structure of settlement is the guarantee of sustainable development of entrepreneurship.

These issues are especially relevant for countries with uneven population density: Canada, the US, Russia, Australia, China, etc. In the "subject" approach, which is opposed to the national strategic approach, there are adequate management mechanisms in regional politics, characterized by the peculiarities of inclusion in the country's entrepreneurial turnover of not all the potential that each state entity really possesses, but the one that for certain reasons has developed to the present time. Such uneven development of the territories, coupled with an overabundance of the able-bodied population and the specificity of the existing migration flows, negatively affect the stability of business structures in the modern world. Reserves lie in changing the scheme of spatial settlement and involving in the active economic activity of underdeveloped territories, including hard-to-reach lands. Of particular interest in this regard are the vast territories of Canada and Australia, and in Russia - the deserted territories of the Urals, Siberia, the Far East and the North. Their role in the development of the whole world can not be overemphasized, first of all, due to the wealth of hydrocarbon raw materials and other resources, and also based on the advantages of geographical location and geopolitical role in the world.

Differentiation of the levels of social and economic development of the regions has a significant effect on sustainable entrepreneurship, so it is important to implement a policy of equalization. In this regard, we can distinguish three promising areas of spatial development of the territories, depending on the existing structure of settlement:

1. Formation of a polycentric decentralized settlement system for developed, densely populated countries, for example, in Europe.
2. Development of hard-to-reach territories: development of the Arctic and northern lands, as well as provincial immigration in Canada; the development of the Liverpool Plains and other lands in Australia, Western China, etc.
3. Development of territories in Russia. For example, the new strategy for the development of Siberia and Primorye suggests resuscitation of rural areas, programs are being developed to relocate labor resources from overpopulated areas (some regions of Central Russia, the Southern Federal District and the North Caucasus) to areas with a deficit. Similar processes are observed in other territories.

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Such a spatial development of the territories will significantly alleviate differences in the levels of social and economic development of the regions and create conditions for the development of additional entrepreneurial structures in them.

Due to the fact that the strategy for developing sparsely populated areas can be effectively implemented on the basis of agglomeration processes, the role of non-urban agglomerations as interrelated groups of rural entities with similar socio-economic conditions and development prospects (land resources, production opportunities, etc.) significantly increases. The non-urban agglomerations will become an effective tool for ensuring sustainable development of agriculture not only in individual regions but also in whole states.

The studies by the authors of the potential opportunities for developing agglomeration formations made it possible to state that small cities (up to 1 mln. people) have much higher agglomeration potential than cities with the population of more than 2 mln. people (Fig. 9, 10). The growth in production in these countries is 34,252 thousand dollars per person in the developed countries versus 33,822 thousand dollars per person. in cities with more than 2 million people and 29644 thousand dollars per person in cities with the population of more than 3 million people. In Russia - about RUB 696 thous./person against RUB 547.5 thous./person in the cities with more than 2 mln. people, and RUB 437.2 thous./person in cities with more than 3 mln. people.

The authors studied the potential opportunities for the agglomeration development of small territorial entities (Federal State Statistics Service, n. d.). Due to the limited nature of the available information, the increase in the products' volume depending on the change in population was studied in relation to rather large settlements – cities with the population of up to 20 thous. People in Russia (Fig. 13).

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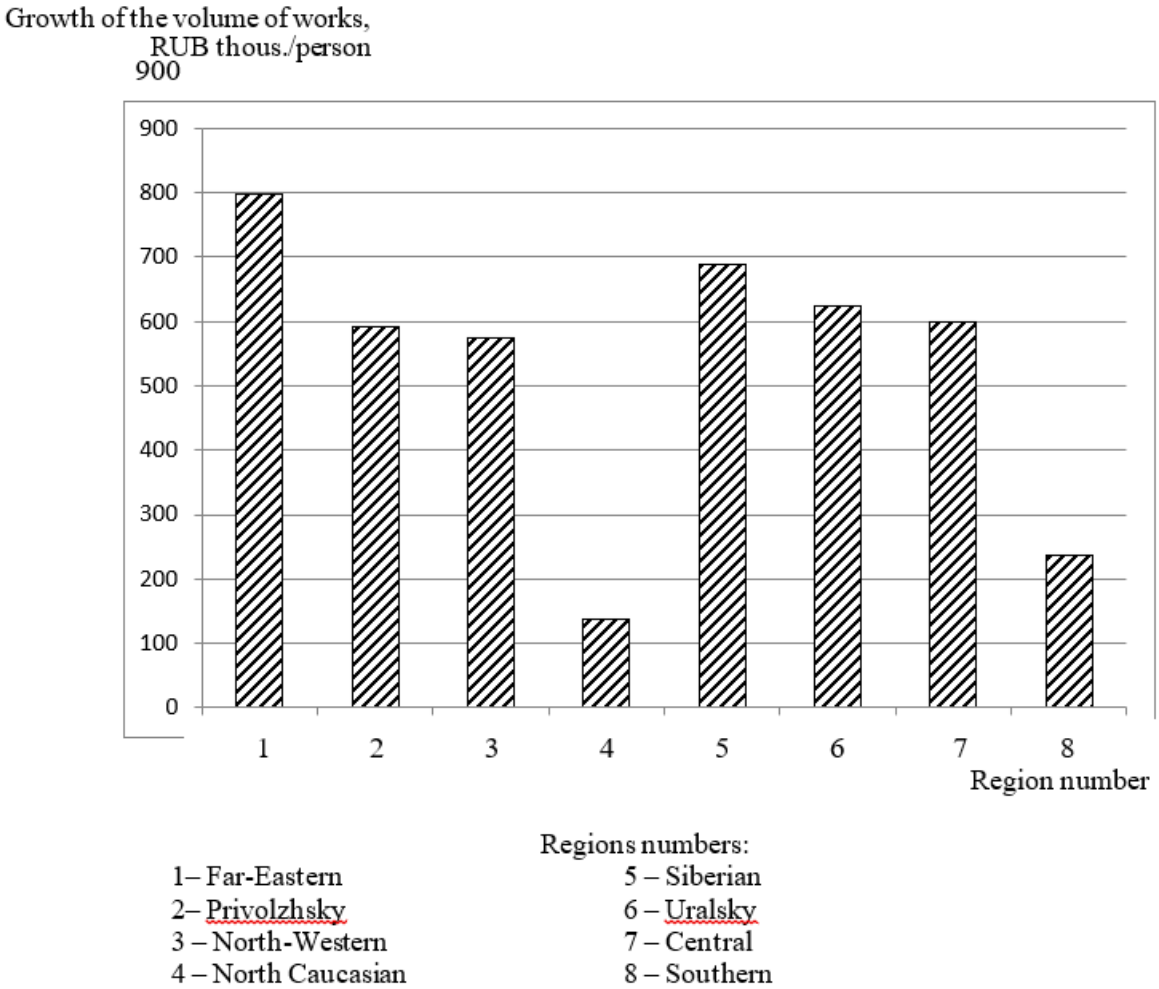

Fig. 13. The growth of the volume of works as calculated for 1 person in cities with the population of up to 20 thous. people.

The increase in the volume of works depending on the change in the number of people in various regions has a wide range: from the lowest level in the North-Caucasian Region (RUB 138.5 thous./person) to the highest one in the Far East (RUB 787.3 thous.). The average increase is RUB 531.2 thous./person, and in 6 regions it is higher than the same indicator for the cities with the population of more than 2 mln. people. It is reasonable to assume that the revealed regularity will be observed in settlements with a smaller number of people living in them. Agglomeration processes in rural areas have the same features as in cities: the spatial expansion of the construction causes contingency and "merger" into a single array of the built-up area of closely located settlements.

Due to this, the authors believe that the nonurban agglomeration can be an efficient form of organizing the territorial and economic system of rural settlements based on intensive interactions within it. As a result of the study conducted by the authors, the following specific features of nonurban agglomerations of the seizure zones have been revealed:

- The lower number of inhabitants of central nuclei and satellite zones,
- Lack of basic production and infrastructure,
- A small number of satellites of agglomerations, due to the weak population of territories,

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• These agglomerations should be closely related to larger agglomeration urban and rural formations located in the access zone for marketing products and meeting the needs of the population: medical, educational, cultural, etc.

•

In developed countries, there are all prerequisites for forming two types of the rural agglomerations development: monocentric – within one settlement, and polycentric as a unified formation consisting of several interconnected settlements. The most efficient transition to the development of nonurban agglomerations means the unification of rural entities around one or more centers or urban settlements where it is reasonable to organize processing industries, repair and transport facilities, etc. They can include small villages or regional centers that are basic and form a social infrastructure for servicing the surrounding rural population. Along with this, they will make up the interrelated systems of municipal entities that are the basis for activating economic activity and reviving the disappeared rural settlements.

The authors believe that in the future nonurban agglomerations will be of great importance both within their region and in the country, as a whole. Their formation will allow obtaining the following results: reduction of the number of abandoned territories, increase in the agricultural land, reduction of costs for the formation of new infrastructure, decrease in the uneven distribution of the tax base, and narrowing of the income gap between territorial entities located at the periphery and in the center, etc. All this together will create favorable conditions for the existence of old and the development of new entrepreneurial structures and significantly increase their stability.

4. Discussion

The research carried out by the authors made it possible to prove empirically the expediency of ensuring sustainable entrepreneurship at the expense of Russia's spatial development of territories on the basis of agglomeration transformations, and primarily the formation of non-urban agglomerations. Such applied studies are not frequent enough in the world, although they are of great interest both in terms of developing methodological instruments and forming practical mechanisms.

It has been revealed that, as a rule, agglomeration processes are studied in relation to large territorial formations. However, the formation of agglomerations does not depend on the size of the settlement. Rural settlements, in which similar socio-economic patterns, tendencies and prospects for development, include land resources, agricultural production, resource provision, living conditions, customs, specialization and cooperation determine the growing role of rural agglomeration. Therefore, in the authors' opinion, it is necessary to study and develop all types of agglomeration processes, and, first of all, nonurban agglomerations.

The world practice proves the efficiency of interaction among several rural settlements. For example, the French experience in creating rural agglomerations is of high research and practical interest. Its value is related to the possibility of uniting resources, coordinating management, availability of a joint infrastructure for the efficient development of the territory, as well as achieving the synergy effect from uniting opportunities of all settlements (Volchkova, Podoprigora, & Ufimtseva, 2015).

The Russian studies of nonurban agglomerations are characterized by insufficiently developed issues of methodological aspects of their formation. Thus, P. Krugman (1999) developed a model of two-sector regions with a center and periphery space structure introduced rather generally. The works of M.V. Shemyakina M.A are devoted to studying rural agglomerations (2011). The authors made deep studies and suggested methodological recommendations for studying the range of rural settlements within geographic studies. However, when structuring rural agglomerations, it is necessary to study the existing structure of production branches, levels of

specialization and cooperation, and the state of the processing industry, the availability of enterprises or bases that make it possible to unite several settlements, as well as other factors and conditions.

In the conditions of the global economy, the spatial development of the regions is supposed to be considered as one of the most effective instruments to strengthen Russia's economic security to enhance the sustainability of entrepreneurship. According to the authors, the priority of the countries' economic policy should be the agglomeration transformation of small towns and rural settlements, which will allow creating self-sufficient territories on the basis of network structures in the agro-economic space. The new structure of the world economic space will be possible, first of all, by realizing the positive opportunities of agglomeration development of small cities and rural settlements, which will allow to form a multifunctional structure of the economy of the countries and ensure sustainable development of business structures.

Conclusion

The obtained results have allowed the authors to form areas for the future studies.

1. It is necessary to study and form a new concept of organizing the spatial development and territorial settlement of the country – "Large agglomerations – nonurban agglomerations". The modern conditions predetermine the close interconnection of economic activity of certain settlements and regions, and the activity of other similar territorial formations and higher-level entities. Due to this, it seems reasonable to consider rural settlements as some subsystems that are integrated into larger territorial formations and are a serious economic potential for any country, as a whole.
2. The development of applied economic and mathematical models for creating measures to use the economic potential of rural settlements with similar resources, conditions and development prospects based on allocating geographic and economic subsystems with identical structural elements and connections among them.
3. Methodological aspects of forming and developing rural agglomerations as a form of organizing settlements in the suburbs, around ports, railway stations, along river routes and roads, taking into account the availability of agricultural and other types of resources, which will ensure their independent efficient economic development, and as a result, will create sufficient conditions for sustainable entrepreneurship. Due to this, special interdisciplinary studies in this area are rational.

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IMPROVING THE SYSTEM OF LABOR INCENTIVES AND STIMULATION IN OIL COMPANIES

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Abstract. The article addresses the issues related to improving the efficiency of the incentives' system at the level of oil-producing structures through the improvement of its financial component. It refers to improving the grading system, which is a fairly semipolar remuneration plan in oil companies. The problem of reaching the maximum wage level for employees in the grading system and reducing its incentive function has been considered in its entirety. The development of an efficient, transparent system of personnel incentives is a relevant problem for many companies. The paper reveals the causes of this problem and possible ways to solve it, and also considers the technology of the grading system formation at an oil-producing enterprise. Expansion of grade levels is one of the priority areas for improving the grading system. The pay range is justified with the purpose of ensuring a competitive pay level for different groups of positions. The need for regrading – the revision of the system of ten-tier wage structure of grades to a larger scale, with a large number of pay ranges – is confirmed by the estimated efficiency of the measure. Besides, the paper considers the expediency of shifting oil field employees to grading system payments.

Keywords: incentives; grade; oil company; method; regrading; personnel

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JEL Classifications: M5, M54

1. Introduction

In the context of a complicated economic position of the country without labor incentives, high discipline and good organization, the enterprises find it difficult to operate efficiently. According to Korsik A.L., President of one of the Russian oil companies, the competition in the existing market assumes that companies benefit not from technology and techniques, but rather from people, their knowledge and enthusiasm. People today are the key competitive advantage (Annual Report of JSC JSOC Bashneft 2012). The decisive factor in people's performance is their motivation.

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Despite the fact that the pay level at oil-producing enterprises is somewhat higher than in other industries, certain difficulties arise in the development of a system of labor incentives and stimulation. There are situations of reaching the maximum wage level in a certain category of employees and the lack of viewing further progress toward higher pay levels within the current system of incentives. A grading system is the most common pay system at oil companies.

The official documents of oil companies state that a grade is a group of positions with approximately similar values for the company. Each grade corresponds to a certain salary, or "salary brackets," which can be reviewed from time to time, though the grading system remains unchanged. The practice of using the grading system at oil companies has also unveiled some problems, primarily with the definition of the so-called "salary brackets". Insufficient elaboration of the grading system at the company can act not as an incentives' mechanism for an employee, but, on the contrary, as a deterrent to obtaining a high synergetic effect from the implemented system of incentives.

The relevance of the topic is due to the need to address a number of problems in the use of the grading system in the system of labor incentives and stimulation for employees at industry-specific enterprises, where wages are higher than at enterprises in other industries.

2. Literature review

There is a heightened interest from both representatives of academic science and representatives of the business environment to the solution of the problem of improving the incentives' system efficiency at the moment. The general issues of the formation of a system of labor incentives and stimulation are widely discussed by array of authors (e.g. Kibanov et al. 2010; Chekmarev 2013; Pink 2012; Spivak 2013; Scheer 2012; Huselid et al. 2007; Borisov et al. 2018). Various aspects, specifically, of the grading system formation are disclosed in the papers of Konyukova N.I., Artamonov B.V., Stepanenko E.V., Vereshchagina L.S., Slipachuk S., Stepanov M.V. and others (Konyukova 2013; Artamonov and Stepanenko 2015; Vereshchagina 2016; Slipachuk 2010; Stepanova 2012). Practical implementation of the grading system is covered in the annual reports of industry oil companies, as well as in the publications of representatives of the business environment, managers of various levels – for example, articles by Saifieva G., Zhvakin A. (Saifieva 2008; Zhvakin 2013) are dedicated to this issue.

3. Materials and methods

3.1 Information and methodological support of evaluating the efficiency of the system of labor incentives and stimulation

The payroll management in large oil companies is a difficult problem; besides, an unfair and/or "non-transparent" remuneration plan can significantly reduce the productivity of employees (Plenkina et al. 2018). Therefore, the development of an efficient, transparent system of personnel incentives is an acute problem for many companies. Economists offer numerous methods for developing corporate remuneration plans, but the grading system remains one of the most popular. The most well-known grading systems were offered by Watson Wyatt and Hay Group, but other options were also used. The grading (position posts) system is a kind of corporate "table of ranks", where each position grade corresponds to its pay level. Grading is a method of creating a universal hierarchy of positions (ranks) for all the company's personnel; an evaluation system that allows to determine reasonable levels of remuneration for all employees based on comparison of relative value of different parts of work (positions) for the company. The main advantage of grading is "measuring the immeasurable" – translating an intangible indicator, such as "the value of an employee's work", into a monetary equivalent (Mesropyan et al. 2016).
The main objectives of grading are the following ones:

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- to find the objective value of each employee of a large oil company in each business segment;
- to increase the transparency of the potential career growth in the company for each employee;
- to increase the efficiency of the payroll usage;
- to qualitatively assess the potential of the company's personnel; and
- to attract the attention of potential candidates in the labor market.

Grading allows to systematize all the positions in the company, set the upper and lower pay limits for each level (grade) and create a tool for payroll accounting. After grading, each employee can see the relationship between their work and the company's revenues.

This system enables the employee of the company to:

- realize the place their position has in the existing career hierarchy and assess its role for the company;
- receive fair remuneration for work – depending on the level of complexity, responsibility of the work performed, etc.;
- assess the prospects for their professional and career growth;
- get the opportunity for "flat" career development (advancement in the levels of mastery within one position through more complicated tasks, expanding the range of responsibilities and authorities) – changing the grade or subgrade and the relevant pay level; and
- consistently acquire new professional knowledge and skills necessary for efficient work on a higher position (Lavrov 2008).

After shifting to the grading system, large companies need to adjust it from time to time and constantly monitor its functionality. Over time, the grading system loses its functionality and does not allow achieving the previously set goals and act as an incentive. The company is experiencing a regrading stage. At this stage, the expected effect of the grading system development and the goals of the regrading project are specified. The company must determine its needs: to optimize the payroll costs, to "equalize" the pay for similar positions in different company divisions, to indicate "key" posts and develop a policy of attracting and retaining the best specialists, to audit the pay level in the company and to adjust it in accordance with the market realities.

Tasks that can be set by an operating oil producing enterprise that implements a grading system in its practice, are the following:

- ranging the career hierarchy;
- determining the value of all positions in the company and the pay range ("brackets") for each group of positions; and
- optimizing the organizational structure and staffing.

The company's social policy, incentives' programs and career development programs are also developed based on the grading system (employees are aware of the change in income levels in case of various career movements). The main thing is that the company can choose the right people for key activities and reasonably pay better money to its best employees.

Both the introduction of the grading system and regrading are carried out in several stages. At these stages, the information is collected necessary for creating the basic wage structure:

- position analysis – provides key information about the nature and level of the work performed;
- position documentation – reflects the written information about the position content and its functions, as well as the necessary knowledge and skills. The position analysis and documentation provide the information necessary to complete the process of evaluating the position. The process of evaluating the position and building the career hierarchy provide the information necessary to build the wage structure. Evaluation of the position allows to obtain the data necessary to build the career hierarchy. Two main approaches are used: based on the market data and based on the position content.

The stages of introducing the grading system and regrading are presented in Figure 1.

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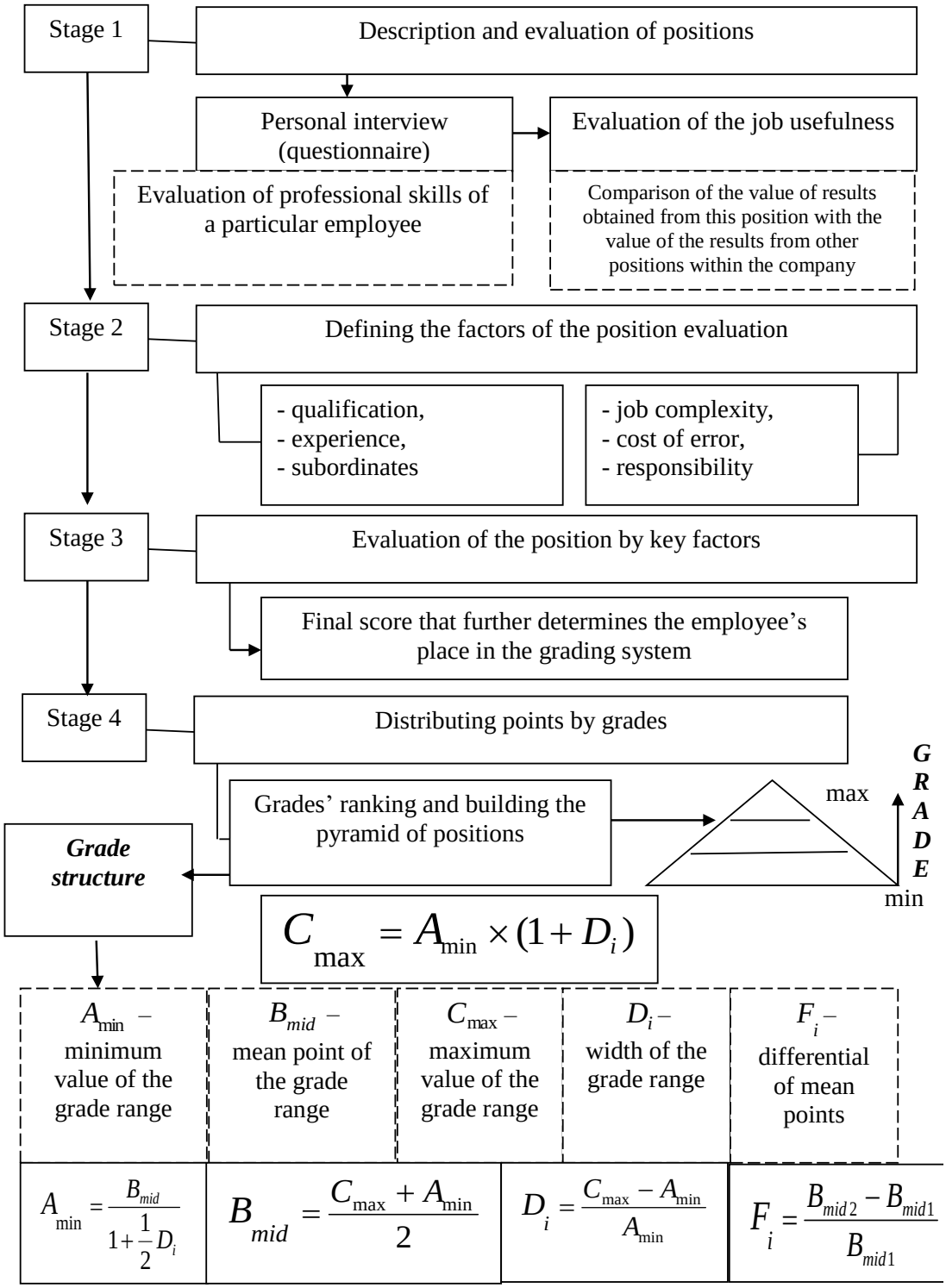

Fig. 1. Stages of introducing the grading system

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Evaluation of positions is a systemic approach expressed as a process of determining and comparing the relative value of one position in relation to others. The result of position evaluation is the creation of a career hierarchy in the organization (Tsymbalyuk 2011).

Oil and gas production enterprises use grade-factor method of evaluation based on assigning a certain score to each position in the company. This score reflects the importance of the position for the company. The score assigned to each position determines the remuneration for this position. Internal objectivity is a priority when using the grade-factor approach.

Position grades are formed here on the basis of specific data of grade-factor analysis. The method is based on the evaluation of positions – in other words, on their intrinsic value. The integrated approach is based on the use of the position evaluation system adopted in the organization with the addition of a market component. The key factors are used to form a final score at the stage of position evaluation, which subsequently determines the employee's place in the grading system. It is determined by multiplying the score obtained during the assessment by points of significance of these factors. Points of significance depend on the importance of the position for the company.

The next stage is the points' distribution by grades. All positions are put into a hierarchical pyramid following calculations, depending on the final score. Then this pyramid is divided into grades by obtaining approximately equal number of points, based on the functions performed and depending on the degree of significance of this position for the enterprise. After the grades' formation, the "bracket" ranges of the base wage are set for the positions included in each grade. The enterprises are often guided by the market wage values when setting the "brackets" for wages in each grade. In this case, the lowest and highest wages in the grade can be set, respectively, 15% lower and 30% higher than the average market value (Tsymbalyuk 2011).

In its turn, each grade has an internal structure, also shown in Figure 1.
The wage range is set with the purpose of offering competitive wage levels for groups of positions (Chemekov 2010). The wage range includes maximum wage, average (or central) value and minimum wage. Usually, there is a maximum wage level for each position, both in the external market and inside the company. This is why it is very important to monitor the market fluctuations and the market salary fluctuations. For example, if an employee receives the maximum wage in their range, this means that this employee will not get a raise until the range adjustment or until the employee acquires new skills or gains promotion.

The middle of the range (mean point), or the average wage for the range, usually corresponds to a competitive market salary for a given position or a group of positions. It is determined based on the assessment of the current market salary and is often called the payroll policy line. This line shows the pay level in the organization in comparison with the market level.

Usually, there is also a minimum wage level for each position. The minimum wage level is the wage, which is estimated to represent the lowest level of pay for a given position possible in the market or in the organization. It is important not to forget about the minimum range of the employees whose wages are close to this minimum. The range width is the distance from its minimum to the maximum. It is necessary to approach the range width establishment with all responsibility. Suppose that the mean point of the range is constant, but if the width is changed, then the minimum and maximum of the wage range will also change. Table 1 provides examples of wage ranges corresponding to organizational levels, and Figure 2 shows an example of the grade range width.

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Table 1. Examples of wage ranges corresponding to organizational levels

Positions	Range width
Services, production and technical support	20% to 30%
Secretaries, technical and administrative personnel	30% to 40%
Specialists and supervisors	40% to 50%
Managers and executives	50% and more under certain circumstances

Figure 2 shows the components of the grade range.

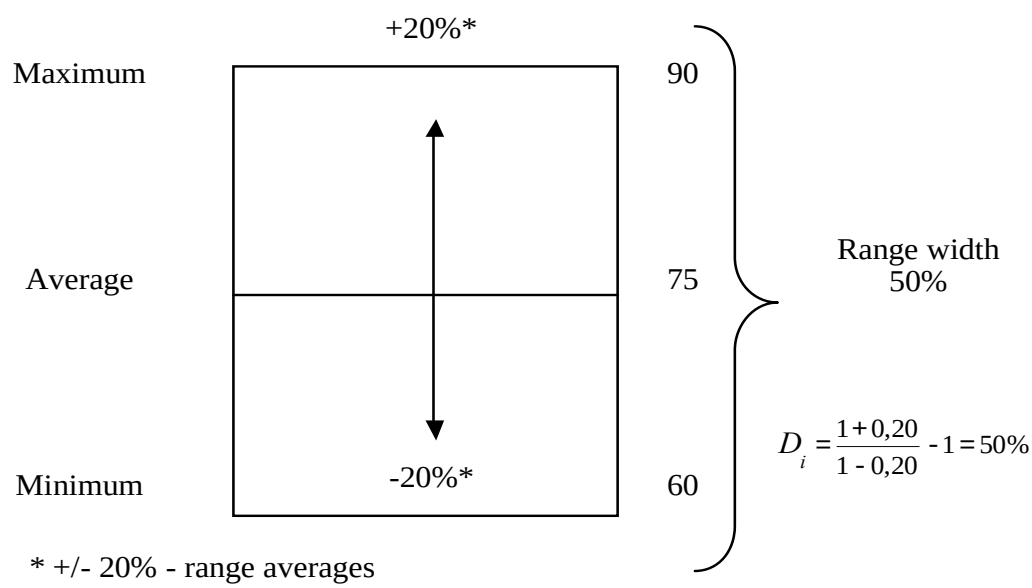

Fig. 2. Grade range width

The grade range width is calculated in two ways:

1) Width from minimum to maximum:

$$D_i = \frac{C_{\max} - A_{\min}}{A_{\min}}$$

2) Width is calculated as the distance from the average up and down:

$$L_{i\downarrow} = \frac{A_{\min} - B_{mid}}{B_{mid}} \quad \text{or} \quad L_{i\uparrow} = \frac{C_{\max} - B_{mid}}{B_{mid}}$$

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The following formulas are used to translate the distance from the average to the distance from minimum to maximum:

$$D_i = \frac{1 + \%L_{i\uparrow}}{1 - \%L_{i\downarrow}} - 1$$

Differential of mean points is the difference between the salaries corresponding to the mean values of the two adjacent grades.

The following main factors taken into account in calculation are worth noting:
– level of detail of the position evaluation method does not provide for detailed differences between levels, which results in fewer levels;
– market competitiveness (market salaries from the lowest to the highest position in the structure). In this case, the mean points should be coordinated with the adopted salary policy line; and
– cost of career promotion. The percentage difference between the mean points should be consistent with the promotion policy adopted in the organization. For example, if the promotion policy limits the wage raise in promotion to 8%, and the differential of mean points is 15%, the salaries of some employees after the promotion may appear below the minimum of their main job grade.

The following formula is used to find the differential of mean points for adjacent grades:

$$F_i = \frac{B_{mid2} - B_{mid1}}{B_{mid1}}$$

Ranges may overlap during the formation of a grading system, which will allow to move along the wage structure (within grades and ranges) due to efficient work, promotion, demotion, change of the position class, market adjustments, etc.

As a rule, the ranges overlap largely due to the philosophy of the organization and the position evaluation system. There are more significant overlaps if a grade-factor system is used. The ranges will not overlap much if the market information-based approach is applied, which will allow to routinely change the ranges. Usually, there are very small ranges' overlaps in organizations for executive grades due to unique positions. However, some overlap is acceptable due to the talent pool planning. Ranges' overlapping is also important for internal promotions. Problems may arise if there are significant overlaps in the structure.

Some organizations use the method of consolidation of wage categories, which leads to the adoption of a wage structure, where a large number of wage grades and salary ranges are combined into a smaller number of categories with relatively wide salary ranges. The typical difference between the minimum and maximum in the consolidated categories is 100% or more.

3.2. Developing a set of measures to improve the efficiency of the labor incentives and stimulation system based on the grading system

One of the relevant problems existing at the level of oil and gas producing structures is the discrepancy between the current employee incentives' system consisting of a 10-tier wage structure of grades and the scale of the oil and gas producing enterprise. The research of various positions revealed that the adopted grading system lacks sufficient incentives to increase the efficiency of the specialists' work because their wages are the highest within the limits of a certain grade.

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In other words, the grading system adopted at such enterprises does not actually achieve the goals of grading:

- to establish the objective value of each employee for the company;
- to increase transparency of career prospects for employees; and
- to conduct qualitative assessment of personnel.

This is why regrading is required – a revision of the system of 10-tier wage structure of grades to a larger scale, with a large number of wage ranges.

Besides, it is proposed to shift the field workers, whose job was previously remunerated in accordance with salaries and hourly tariff rates approved by the personnel chart, to the grading system. This measure is determined by the necessity to switch the entire enterprise to the uniform grading system with the purpose to allow each employee to clearly understand what level of hierarchy in the company their position belongs to and why. Besides, if such a system is introduced, the company excludes the chance of subjectivity in remuneration – a request from employees who simply ask the management to raise wages for some important (in their opinion) reasons.

A grade-factor approach was used to switch to a 21-tier wage structure, where the following steps were taken:

- checking the differentials of the final score values by groups of related positions;
- ranking positions from high to low;
- grouping positions based on logic, i.e. logical groups of positions based on their values were specified;
- building score categories (on the basis of absolute or percentage values), in this case they were built with some pattern in the range width; and
- checking the relationship within related groups and the relationship between the positions of the supervisor/subordinate.

The following criteria were used for position evaluation:
- knowledge and skills, which include the degree of special knowledge and skills, breadth of management, communication skills;
- problem resolution (scope of problems to be solved, complexity of problems to be solved (evaluation), complexity of problems to be solved (%); and
- responsibility (freedom of action (authority), importance (magnitude) of impact, type of influence).

4. Results

Approbation of the presented method resulted in the final structure of the proposed 21-tier system of grades, which looked as follows (Table 2):

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Table 2. Proposed 21-tier system of grades

GRADE	Grade minimum value, $	Grade median, $	Grade maximum value, $	Differential of mean points, %	Grade range width, %	Hay score
21	3,120	4,135	5,149	17	65	901 and more
20	2,713	3,528	4,342	30	60	805-900
19	2,125	2,710	3,294	13	55	634-804
18	1,915	2,393	2,872	12	50	519-633
17	1,710	2,137	2,564	12	50	451-518
16	1,554	1,904	2,253	11	45	393-450
15	1,400	1,715	2,030	11	45	333-392
14	1,284	1,541	1,798	9	40	282-332
13	1,177	1,414	1,650	9	40	252-281
12	1,101	1,294	1,487	9	35	199-251
11	1,029	1,184	1,338	7	30	175-198
10	962	1,106	1,251	5	30	160-174
9	916	1,054	1,191	4	30	140-159
8	881	1,013	1,145	10	30	120-139
7	799	919	1,039	3	30	110-119
6	776	892	1,008	2	30	less than 109
5	761	875	989	2	30	
4	746	857	969	2	30	
3	731	841	950	2	30	
2	717	824	932	2	30	
1	703	808	913		30	

Table 3 shows the distribution of positions (based on the evaluation results) in accordance with the new 21-tier system of grades

Table 3. Distribution of positions in the 21-tier system of grades following the evaluation results

Grade	Positions of the office employees at the enterprise	Positions of the oilfield workers at the enterprise
21	Director General	–
20	Deputy Director General	Head of oilfield
19	Heads of bureaus	–
18	Heads of departments	Heads (of workshops, plots, oil acceptance station, chemical analysis laboratory, etc.)
17		
16	Chief specialists	Chief specialists (for construction supervision, labor protection and occupational safety, etc.)
15		

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14	Senior (specialists, engineers)	Senior (engineers, specialists, geologists, land surveyors, technologists, etc.) Lead (mechanics, foremen, etc.)
13		
12	Specialists (engineers, assistants of the director general and the chief engineer)	Engineers (maintenance and test, pre-production, occupational safety, etc.) Operators, mechanics, technologists, etc.
11	–	Occupations of the 6th category (operators for oil and gas extraction, equipment mechanics, motorists, WO operations drillers, etc.)
10		Occupations of the 5th category (bulldozer drivers, operators of refueling stations, etc.)
9		Occupations of the 4th category (gas equipment maintenance and repair locksmiths, pipeline walkers, etc.)
8	–	Occupations of the 3rd category (process pump operators, loading operators, etc.)
7	–	Drivers, progressmen
6 -1	–	–

The above tables allow to track the expected changes in the pay of the positions under review:
- Director General – this position corresponded to the 10th grade and had almost the maximum value in this grade range. In the new 21-tier system of grades, the position of Director General falls within the 21st grade range. The estimated monthly income is $3,788. The range of the 21st grade has the minimum value of $3,121 and the maximum value of $5,149. Thus, the incentives are clearly seen for improving the performance of the director general. In other words, the salary has a room to grow (within the relevant grade range);
- heads of departments – 7th grade. Again, the estimated monthly income is at the maximum of the grade range. Under the new system, this position corresponds to the 17th and 18th grades with a range of values from $1,710 to $2,872. The estimated monthly income of the head of department is $1,995, which also assumes a room for growth. Besides, there are different departments at the enterprise. It is no surprise that the salary of the Documentation Management Department Head and the Production Department Head, whose positions correspond to one grade, differ in their values in accordance with the importance of their units for the enterprise and labor contribution.The same picture (in Table 4 and Table 5) can be seen by the example of other positions. As such, with the widening of the range of grade values, the incentives for employees to increase labor efficiency grow accordingly.

Table 4. Distribution of positions in the 21-tier system of grades for the office employees at the enterprise

Positions of the office employees	Salary, $	Estimated monthly income of office employees, $	Grade	min	mid	max	Differential of mean points	Grade range width
	max							
	min							
Director General	2,635	3,788	21	3121	4,135	5149	17%	65%
Deputy Director General	1,932	2,778	20	2714	3,528	4342	30%	60%
	1,897	2,727						
Heads of bureaus	1,528	2,197	19	2125	2,710	3294	13%	55%
	1,484	2,134						

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Heads of departments	1,388	1,995	18	1915	2,393	2872	12%	50%
	1,317	1,894	17	1710	2,137	2564	12%	50%
Chief specialists	1,300	1,794	16	1554	1,904	2253	11%	45%
	1,142	1,576	15	1400	1,715	2030	11%	45%
Senior (specialists, engineers)	1,054	1,454	14	1284	1,541	1798	9%	40%
	966	1,333	13	1178	1,414	1650	9%	40%
Specialists (engineers, assistants of the director general and the chief engineer	878	1,162	12	1101	1,294	1487	9%	35%
	843	1,115						

Table 5. Distribution of positions in the 21-tier system of grades for the oilfield workers at the enterprise (fragment of research)

Positions of the oilfield workers at the enterprise	Salary, $ max	Salary, $ min	Bonus %	Regional premium rate. Northern allowance	Estimated monthly income of oilfield workers, $	Grade	min	mid	max	Differential of mean points	Grade range width
Head of oilfield	1,098		15%	2.2	2,778	20	2,714	3,528	4,342	30%	60%
Heads (of workshops, plots, oil acceptance station, etc.)	782		15%	2.2	1,978	18	1,915	2,393	2,872	12%	50%
	782		27%	2	1,978						
	738		15%	2.2	1,867	17	1,710	2,137	2,564	12%	50%
	738		27%	2	1,867						
Chief specialists (for construction supervision, occupational safety, etc.)	703		10%	2.2	1,700	16	1,554	1,904	2,253	11%	45%
	703		21%	2	1,700						
	650		10%	2.2	1,573	15	1,400	1,715	2,030	11%	45%
	650		21%	2	1,573						
Senior (engineers, specialists, geologists, land surveyors, etc.)	597		10%	2.2	1,445	14	1,284	1,541	1,798	9%	40%
	597		21%	2	1,445						
Lead (mechanics, foremen, etc.)	545		10%	2.2	1,318	13	1,178	1,414	1,650	9%	40%
	545		21%	2	1,318						
Engineers (maintenance and test, etc.) Operators, mechanics, technologists, etc.	474		10%	2.2	1,148	12	1,101	1,294	1,487	9%	35%
	474		21%	2	1,148						
	457		10%	2.2	1,105						
	457		21%	2	1,105						

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As a result, it can be stated that the oil and gas producing enterprise does not stand still, it develops, and the earlier adopted priorities can be changed. These changes should be reflected in the composition and number of factors of labor evaluation.

5. Discussion

So far, the problem of high staff turnover remains relevant for many Russian oil companies, as evidenced by the data of annual reports published on official websites of oil companies. The headcount in the oil and gas sector does not show the required general trend to grow and changes both upwards and downwards. In order to solve the problem of staff turnover, the oil and gas enterprises introduce many programs aimed at personnel motivation and retaining. They also improve the existing incentives' systems from time to time, including the grading system. When considering the established level of average salary in the oil and gas industry in general, it can be concluded that the level is slightly higher than in other industries in Russia, but it is significantly lower than the same in foreign companies. This fact is proved by the results of analytical agencies' research and official research results published in the open press. The Society of Petroleum Engineers annually conducts research on annual salaries in the oil industry. For example, the average salary of oilfield workers in Russia ranges from $2400 and more. For example, employees of Gazprom Neft earns $ 5600-5700 per month and employees of Rosneft - from $ 2200. Fairly high salaries of top managers significantly affect the employees' salaries. There are also enterprises where employees receive much less than in the above-mentioned companies. The average salary in Russia in the oil industry is $ 2500. As a comparison, salaries of employees involved in oil and gas production sector in other countries (on the basis of the position salary amount): Norway - $ 12700, New Zealand - $ 10600, the Netherlands - $ 10300, the USA - $ 10100, France - $ 7700.

In order to maintain the developed remuneration plan based on grades in the relevant state, a regular "upgrade" of the system is required. First of all, the frequency of monitoring is defined: the system adequacy is usually verified once a year: on the one hand, it allows not to get important changes both inside the company and the labor market out of control, and on the other hand, this frequency will not allow to change it beyond recognition.

Adjustments can be either soft or hard. Soft changes in the grading system include changes in the weights of the compensable factors. For example, it used to be important to focus on such factor as "labor content", but the focus may shift after some unification of activities – for example, to "work experience". Hard methods of system adjustment usually refer to the change in the number or content of the factors or the scale of the degree of an individual factor. In this case, all positions and professions have actually been reassessed for new factors, which means almost complete reconsideration of the system. This requires certain resources, both labor and financial.
The Hi-Tech Group is the most well-known company in this field of services, specializing in human resource & organization development consulting. It is recommended to use its services to solve the regrading tasks at the enterprise in this case.

The advantages and drawbacks of the grading system that arise in the practice of Russian companies are actively discussed in various publications – for example, on the leading HR portal (Tsimbalyuk 2017; Sorokina and Bespalova 2017).

The remuneration plan based on grades has the following advantages:
- it helps manage the wage pool and makes the payroll system flexible;
- it allows to quickly analyze the structure of the wage pool and official salaries and track their dynamics;
- it is a convenient tool for determining the base salary for a new position;
- it allows to define levels and units with inconsistencies in payroll;
- it allows to determine how much a job of any level costs for the company;

- it is an efficient way to integrate various company departments into a single structure; and
- it optimizes the distribution of labor resources.

6. Conclusion

Based on the analysis of the existing incentives' system at the industry-specific enterprise (10-tier wage structure of grades) intended for office employees, it is clear that after the review and switch to the 21-tier grading system, which is uniform for the entire organization, each employee will clearly understand what level of hierarchy in the company their position belongs to and why. Besides, if such a system is introduced, the company excludes the chance of subjectivity in remuneration – a request from employees who simply ask the management to raise wages for some important (in their opinion) reasons.

It makes sense to assume that after the new 21-tier grading system is introduced in all departments of the enterprise, as proposed, the wage fund should be optimized. However, a goal of the reduction in the wage fund is not set when revising the current grading system. At the same time, a detailed analysis of positions will allow not only to evaluate the need for the existence of a specific position, but also to determine its costs, which will result in more efficient planning of personnel costs.

Regrading at an enterprise entails both changes in the labor organizational conditions and improvement of the employees' performance due to an increase in the incentive to work. Aside from the organizational formalities of the grading system in papers, it is required to implement the system in the minds of the personnel, demonstrate all its advantages and to teach heads of departments who have not previously encountered grading to work in this system.

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ANALYZING REGIONAL DIFFERENCES IN THE CONDITION AND DEVELOPMENT OF TRADE IN RUSSIA

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Abstract. Taking into account the importance of trade in general, determined by its functions, and the important role of trade in the Russian economy, the urgent task is to ensure the sustainable development of trade in Russia, given the peculiarities and needs of each region. As such, the study is devoted to the analysis of regional differences in the condition and development of trade in Russia. The goal of the study is to group Russian regions based on the results of estimating the condition and development of trade, and to identify the regions that need state support for trade most, as well as those that can serve as examples of the best practices in the trade industry development. The method of the study is based on a combination of indicators of condition and changes in trade, which are found taking into account nine statistical indicators that comprehensively describe different aspects of the trade industry. The outcomes confirm the existence of regional differences in the Russia trade and indicate that most of the Russian regions are described by a low level of trade development against its growth, while only a few regions demonstrate intensive development of trade, which continues to grow. State support for trade is fundamental for the Republic of Sakha (Yakutia), the Republic of Dagestan, the Chukotka Autonomous Region, the Jewish Autonomous Region, and the Republic of Ingushetia. The highest level of trade development and growth is characteristic of Moscow, the Moscow region, and the Novosibirsk region. The latter is recognized as the region with the best practices of trade development, which other regions can adopt. The results can be used by the statistics bodies and state authorities to monitor the condition and development of trade in Russian regions and will contribute to better accuracy and feasibility of managerial decisions in trade.

Keywords: trade; Russian regions; regional differences

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1. Introduction

Trade is important in the socioeconomic development of states and regions. As a form of the commodity circulation, trade allows to reimburse the production costs and obtain a surplus product, as well as create the conditions for new reproduction cycles. As a branch of the economy, trade delivers goods to consumers or provides access of the population to material goods produced by numerous industrial and agricultural enterprises in different territories and at different times.

Trade enterprises interact with other sectors of the economy (industry, agriculture, transport, construction, communications, utilities, etc.) in the course of their economic activity and influence their development. Given that the population spends most of their incomes on purchasing consumer goods, trade is inextricably linked with the financial stability of the state. Being a major borrower, trade closely interacts with the state lending system (Bragin, Ivanov & Stukalova, 2009). Trade is also an important budget revenue generating industry and provides employment for the population (Ivanov, Mayorova & Nikishin, 2016, Malgas, Khatle & Mason, 2017).

Trade creates 15.9% of the gross domestic product and 11.1% of the revenues of tax payments and fees to the budget system in the modern Russia, provides jobs for 18.9% of the employed population, and is a type of activity of 33.3% of organizations and 36.7% of private entrepreneurs (Rosstat, 2017). Trade outstrips most other types of economic activity by these indicators, in some cases trailing only mining, processing industries and operations with real estate.

At the same time, the regional trade is described by significant regional differences, which are manifested in the level of consumer prices, provision of the population with trade facilities and retail space, development of network and distance trade, development of small enterprises and private entrepreneurship in trade, condition of the logistics and transport infrastructure, etc. (Perevyshin, Sinelnikov-Murylev & Trunin, 2017; Kuznetsova, 2015; Ivanov, Mayorova & Nikishin, 2016; Strategy for trade development in the Russian Federation for 2015-2016 and the period until 2020, 2014). Taking into account the importance of trade in general, determined by its functions, and the important role of trade in the Russian economy, the urgent task is to ensure the sustainable development of trade in the territory of Russia, given the peculiarities and needs of each region. As such, the study is devoted to the analysis of regional differences in the condition and development of trade in Russia.

The goal of the study is to group Russian regions based on the results of estimating the condition and development of trade, and to identify the regions that need state support for trade most, as well as those that can serve as examples of the best practices in the trade industry development.

2. Literature review

Transformation of the state-planned economy into a market economy, which began in Russia in the 1990s, had different impact on the development of its regions. Some regions have successfully adapted to the new conditions, while others have faced economic decline or stagnation. Multiple studies that analyzed differences in the value of the gross regional product, production and consumption volumes, income and expenditures of the population in the regions (Lavrovsky, 1999, Mikheeva, 1999, Hanson, 2001, Fedorov, 2002, Bradshaw & Vartapetov, 2003) indicate that the economic inequality among the Russian regions has increased after the collapse of the Soviet Union. As a result, the Russian economy is currently described by high spatial differentiation and regional inequality (Miroliubova & Biryukov, 2015).

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Regional differences in trade are manifested in various aspects. The Strategy for the trade development in Russia (2014) notes the heterogeneity of the trade formats development across the state territory. The share of Moscow and St. Petersburg accounts for about 50% of retail space of modern formats, the share of other cities with a million-plus population accounts for another 30%. As such, the remaining residents, accounting for 75% of the population, have only 20% of supermarkets and hypermarkets. At the same time, remote and hard-to-reach territories often experience a shortage of retail properties or even their absence.

Kuznetsova (2015) proves the existence of regional differences in Russian chain retailing and identifies the factors that influence their establishment, such as remoteness from the European part of the state and low transport accessibility, nature of foreign economic relations with neighboring countries, sociopolitical situation, features of the administrative territorial division, natural and climatic conditions and lifestyle of the population.

The results of the evaluation of the social efficiency of trade based on indicators describing its impact on consumers, employees and the state allowed to distinguish four groups of Russian regions with the level of social trade efficiency from "below average" to "high" (Ivanov, Mayorova & Nikishin, 2016).

Based on the official statistics, Perevyshin, Sinelnikov-Murylev & Trunin (2017) argues that the cost of the consumer goods basket in different Russian regions can differ more than twofold. At the same time, the differentiation of prices among some Russian regions exceeds the price differences among the US states, as well as among the countries of the Eurozone.

The detailed studies of trade in some Russian regions are also very important. They include works devoted to the evaluation of the resource potential of retail trade in the regions of the Far Eastern Federal District (Noskova, 2016), the development of retail trade as a competitive factor in the Voronezh region (Chudakova, 2015), the trade condition and development trends in the Central Black Earth region (Agaeva & Vasilchenko, 2014), the Trans-Baikal region (Shnorr, 2014), the Republic of Crimea (Komissarova, Mayorova & Mayorova, 2018), the Novosibirsk region (Petrochenko, 2015), the Ivanovo region (Vasilchuk, 2017), the Kirov region (Cheglakova, 2017), and the Leningrad region (Nikonorov, 2017). Despite the different scale of studies, their results indicate the peculiarities of trade development in some Russian regions and confirm the presence of strong regional differences.

Given the outcomes of earlier studies, the approach to analyzing regional differences in Russian trade is modified in the following aspects in this study: firstly, it is based on a set of indicators that comprehensively describe various aspects of trading activity; secondly, it ensures the comparability of data across regions, which enables a systemic analysis; thirdly, both the current condition of trade in the regions and its changes are assessed.

3. Methods

When analyzing regional differences in Russian trade, it is proposed to apply a combination of the factors related to the condition and change found using the following indicators:
x1 - Turnover of retail trade per capita, rub.;
x2 - Index of physical volume of retail turnover, % to the previous year;
x3 - Share of retail trade networks in the formation of goods turnover, %;
x4 - Sale of goods in retail markets and fairs, mln rub.;
x5 - Number of trade enterprises and organizations, pcs.;
x6 - Number of small trade enterprises, pcs.;
x7 - Investments in trade fixed assets, mln rub.;

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x8 - Retail area of modern formats per 1,000 people, sq.m.;
x9 - Share of online sales, %.
The selected indicators must be reduced to a single measurement scale to find the regional trade condition factor, i.e. their normalized values must be found (1):

$$N_i = \frac{x_i - \min x_i}{\max x_i - \min x_i} \quad (1)$$

where Ni is the normalized value of the i-th indicator;
Xi is the value of the i-th indicator.
The normalized indicators are comparable and allow to find the coefficient of the regional trade condition using the following formula (2):

$$S = \sqrt{\frac{\sum_{i=1}^{n} N_i^2}{n}} \quad (2)$$

where S is the coefficient of the regional trade condition;
Ni is the normalized value of the i-th indicator;
n is the number of indicators.

The coefficient of the trade condition describes the level of its development in the period under review. In general, the condition coefficient above 0.5 indicates a high level of trade development in the region, while the condition coefficient below 0.5 indicates a low level of trade development.

Intermediate coefficients for each selected indicator must be found to determine the coefficient of trade change in the region (3):

$$K_j = \frac{x_j * (m-1)}{\sum_{j=1}^{m-1} x_j} \quad (3)$$

where Kj is the coefficient of the indicator change in the j-th period;
Xj is the indicator value in the j-th period;
m is the number of periods under review.

The coefficient of change in the regional trade in a particular period can be found, based on the intermediate coefficients for each indicator (4):

$$D = \sqrt{\frac{\sum_{i=1}^{n} K_i^2}{n}} \quad (4)$$

where D is the coefficient of trade change in the region in the period under review;
Kij is the coefficient of change of the i-th indicator in the period under review;

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n is the number of indicators.

The coefficient of change describes the dynamics and indicates either the development of trade in the region (if the value is more than 1) or its decline (the value is less than 1).

The initial data for the analysis of regional differences in the trade condition and development in Russian regions were the materials of the Federal State Statistics Service of Russia (Federal State Statistics Service, n. d.) presented in the statistical yearbooks "Regions of Russia. Socioeconomic indicators" 2014-2017, "Trade in Russia" 2014-2017, as well as in the section "Technological Development of the Economy Branches". As of May 2018, the most recent data were for 2016. This is why the coefficient of the trade condition in the regions was calculated based on data for 2016, and indicators for 2013-2016 were used in the calculation of the coefficient of change in regional trade.

4. Results

The highest level of trade development is typical for Moscow. Aside from Moscow, regions with a high level of trade development in Russia include the Moscow region, the Novosibirsk region and Saint Petersburg. Most regions (94%) demonstrate a trade condition coefficient of 0.1 to 0.5. The lowest level of trade development in 2016 was recorded in the Republic of Ingushetia, where the value of the corresponding coefficient was 0.01.

Trade in the Republic of Crimea shows the highest development paces in the Russian Federation. The trade sector is developing in most regions (93%), as evidenced by the coefficient of its change exceeding 1. Trade declines in 5 Russian regions: the Jewish Autonomous Region, the Republic of Sakha (Yakutia), the Republic of Dagestan, the Chukotka Autonomous Region, and Saint Petersburg (Table 1).

Table 1. Grouping of Russian regions based on the coefficients of the trade condition and change, 2016 (Federal State Statistics Service, n. d., authors' calculations)

Region	S*	D**	Region	S*	D**
S>0.5, D>1			Yaroslavl region	0.29	1.18
Moscow	0.89	1.19	Republic of Mordovia	0.29	1.40
Moscow region	0.59	1.37	Ulyanovsk region	0.28	1.06
Novosibirsk region	0.52	1.06	Republic of Buryatia	0.28	1.01
S>0.5, D<1			Saratov region	0.28	1.09
Saint Petersburg	0.53	0.96	Volgograd region	0.28	1.58
S<0.5, D>1			Kurgan region	0.28	1.01
Tomsk region	0.47	1.31	Kirov region	0.26	1.76
Nizhny Novgorod region	0.45	1.15	Mari El Republic	0.26	1.27
Chelyabinsk region	0.45	1.31	Ivanovo region	0.26	1.40
Republic of Tatarstan	0.44	1.14	Kursk region	0.25	1.37
Kemerovo region	0.42	1.04	Belgorod region	0.25	1.39
Leningrad region	0.41	1.24	Komi Republic	0.25	1.88
Arkhangelsk region	0.41	1.86	Republic of Bashkortostan	0.24	1.05
Perm region	0.39	1.21	Smolensk region	0.24	1.64
Kaliningrad region	0.38	1.76	Udmurt Republic	0.24	1.08
Kostroma region	0.37	1.89	Chuvash Republic	0.24	1.61
Sverdlovsk region	0.37	1.15	Tambov region	0.23	1.02
Tyumen region	0.37	1.04	Amur region	0.23	1.17

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Vologda region	0.36	1.32	Kamchatka region	0.23	1.79
Omsk region	0.35	1.23	Magadan region	0.23	1.19
Pskov region	0.35	1.35	Irkutsk region	0.22	1.16
Lipetsk region	0.35	1.03	Orenburg region	0.21	1.38
Bryansk region	0.34	1.14	Stavropol region	0.21	1.65
Penza region	0.34	1.31	Astrakhan region	0.21	1.01
Republic of Karelia	0.34	1.34	Primorsky region	0.20	1.07
Krasnodar region	0.33	1.14	Sevastopol	0.20	1.25
Samara region	0.32	1.10	Trans-Baikal region	0.19	1.11
Republic of Adygea	0.32	1.29	Republic of Khakassia	0.18	1.16
Rostov region	0.32	1.05	Karachay-Cherkess Republic	0.18	1.18
Vladimir region	0.32	1.17	Republic of Crimea	0.15	2.14
Novgorod region	0.32	1.27	Republic of Kalmykia	0.15	1.02
Kaluga region	0.32	1.55	Republic of North Ossetia – Alanya	0.14	1.50
Altai Republic	0.31	1.18	Kabardino-Balkaria Republic	0.13	1.06
Tula region	0.31	1.17	Tyva Republic	0.10	1.45
Ryazan region	0.31	1.42	Chechen Republic	0.10	1.18
Tver region	0.31	1.06	Republic of Ingushetia	0.01	1.75
Khabarovsk region	0.31	1.30	***S<0.5, D<1***		
Voronezh region	0.30	1.51	Jewish Autonomous region	0.23	0.97
Altai region	0.29	1.20	Republic of Sakha (Yakutia)	0.22	0.97
Sakhalin region	0.29	1.55	Republic of Dagestan	0.22	0.76
Krasnoyarsk region	0.29	1.04	Chukotka Autonomous Region	0.14	0.76

**S is a coefficient of the trade condition in the region*
***D is a coefficient of the trade change in the region*

As such, there are only three regions in the group of regions where trade has a high level of development and at the same time continues to grow: the Moscow and Novosibirsk regions and Moscow.

The only region of Russia where trade shows a high level of development while declining is Saint Petersburg. The Jewish Autonomous Region, the Republic of Sakha (Yakutia), the Republic of Dagestan and the Republic of Ingushetia are the most problematic regions, where trade has a low level of development and continues to decline.

Most Russian regions are described by the low level of trade development with its growth to a different extent. The latter include the Republic of Ingushetia, where trade currently has the lowest level of development but shows significant growth, and the Republic of Crimea – a region with the highest paces of trade development (Figure 1).

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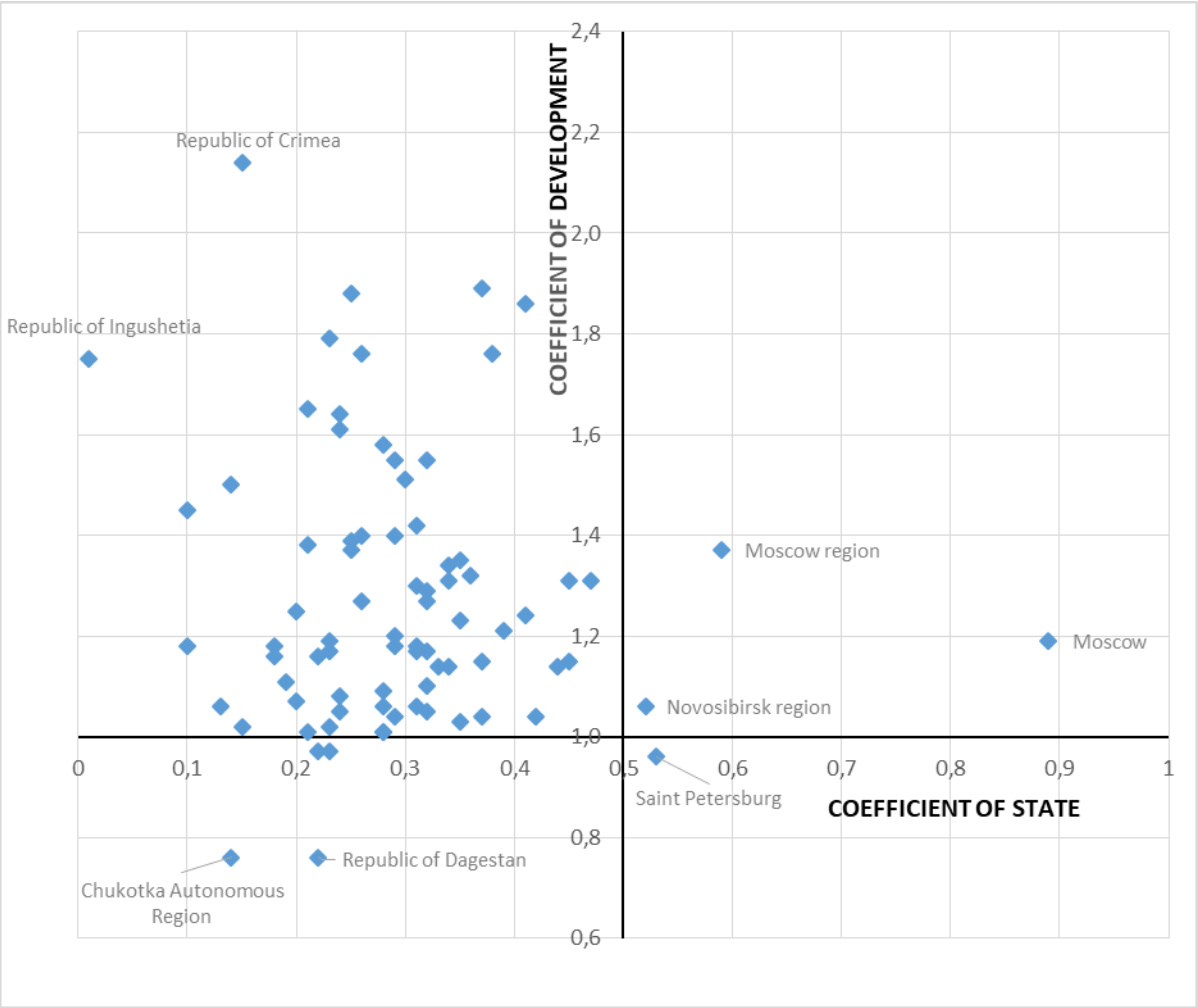

Fig.1. Distribution of Russian regions based on the trade condition and change coefficients, 2016 (Federal State Statistics Service, n. d.; authors' calculations)

As such, the most of the Russia's territory is described by a low level of trade development, which still demonstrates growth. At the same time, two problematic regions (the Republic of Sakha (Yakutia) and the Chukotka Autonomous Region), where trade declines at the low level of development, are large regions occupying a significant area of the state. At the same time, positive results are shown by cities with federal status: Moscow and St. Petersburg, as well as the Moscow region, which is inferior in size to most regions (Figure 2). As such, regional differences in Russian trade are exacerbated in the territorial context.

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Fig.2. Regional differences in Russian trade, 2016 (Federal State Statistics Service, n. d.; authors' calculations)

5. Discussion

The conducted analysis confirmed the existence of regional inequality in Russian trade, which Perevyshin, Sinelnikov-Murylev & Trunin (2017) and Kuznetsova (2015) noted, for example. Given that Russia occupies one eighth of the Earth's area and includes poorly populated territories, the presence of regional differences is expected (Bradshaw & Vartapetov, 2003). The fact that most regions demonstrate a low level of trade development to a varying degree correlates with the conclusions of Miroliubova & Biryukov (2015), according to which most of the Russian regions are unattractive for business and only a few are attractive. Territorial differences are also explained by different density of population. As of the end of 2016, the population of the city of Moscow was 12.9 times that of the population of the Republic of Sakha (Yakutia), or 247.6 times that of the population of the Chukotka Autonomous Region (Federal State Statistics Service, n. d.). In a similar way, the size and density of the population in the Moscow region and Saint Petersburg significantly exceed the population of regions that are problematic in terms of the trade condition and development.

In contrast to Moscow, Saint Petersburg, and the Moscow region, the Novosibirsk region can be considered a more typical region of the Russian Federation. At the same time, as it was said earlier, the Novosibirsk region is described by a high level of trade development and its further growth. In this regard, the Novosibirsk region should be seen as an example of the best practices, which should guide the regional authorities in determining the priority tasks of trade development and the way of their solution. Petrochenko (2015) notes that the main task of the Novosibirsk region in the consumer market is to create an efficient commodity distribution system that meets the modern requirements for the development of the regional economy and the demand of population for consumer goods and services at affordable (moderate) prices within the territorial proximity.

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In accordance with the above task, the main areas of trade development in the Novosibirsk region are: development of competition in the regional food market, increasing the availability of goods, improving the quality of trade services and providing consumers with safe goods of high quality, creating conditions for encouraging trade in small and remote settlements, shaping a developed system of commodity distribution that would create favorable opportunities for local producers and small businesses, and constant monitoring of food quality and food safety (Petrochenko, 2015).

The Republic of Crimea is another interesting region in terms of trade development. After the 2014 political events, significant changes occurred in the social and economic situation in the region, which influenced the trade sector: the commodity distribution system was destabilized, the retail trade turnover in comparable prices declined, the prices of consumer goods and the cost of a minimum food basket increased, the share of profitable trade organizations in their total number decreased (Komissarova, Mayorova & Mayorova, 2018). The change in the status of Crimea in 2014 influenced the corporate social responsibility of trade enterprises, as its level in the Ukraine's trade is generally higher than that in the Russia's trade (Kornilova & Karashchuk, 2017). At the same time, positive trends were observed in the Crimea trade in the following years. The change coefficient of 2.14 is the highest among the Russian regions and indicates the most intensive trade development. In this regard, the measures taken by federal and regional authorities regarding the trade in the Republic of Crimea in a difficult socioeconomic situation are efficient and can be seen by other regions as an example of the best practices.

Conclusions

Analysis of regional differences in the trade condition and development in Russia has led to the following scientific results.

1. A method of evaluating the condition and development of regional trade has been developed. The method combines coefficients of the trade condition and change calculated on the basis of 9 statistical indicators that comprehensively describe different aspects of the trade sector. The suggested method ensures comparability of results across regions and considers for both the current condition and the ongoing changes. The method can be used by the statistics and state authorities to conduct regular monitoring of the trade condition and development in Russian regions.
2. The existence of regional differences in Russian trade has been confirmed. Russian regions are grouped on the basis of indicators of the condition and changes in the trade sector. It has been found that most of the Russian regions are described by a low level of trade development at its growth. At the same time, only a few regions demonstrate a high level of trade development, which continues to grow. This fact justifies the need to strengthen the state regulation in the field of regional trade in Russia.
3. Problematic regions have been identified, where trade has a low level of development and declines. They include the Republic of Sakha (Yakutia), the Republic of Dagestan, the Chukotka Autonomous Region, and the Jewish Autonomous Region. These regions need state support for the trade sector most. Special attention at the federal level should also be paid to the Republic of Ingushetia, where the level of trade development is the lowest in Russia.
4. Regions demonstrating a high level of development and continuing growth of trade have been identified. They include Moscow, the Moscow region and the Novosibirsk region. Given the differences in the socioeconomic development of Russian regions in general, the Novosibirsk region can be regarded as the main example of the best practices in regional trade. The Republic of Crimea is another positive example, the experience of which in restoring the trade sector can be applied to other regions.

The presented results will improve the accuracy and feasibility of managerial decisions in the field of trade adopted by the state authorities at different levels. In turn, given the great socioeconomic importance of trade, its development in the regions will contribute to the socioeconomic stability of the entire state.

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URBAN INEQUALITIES IN ITALY: A COMPARISON BETWEEN ROME, MILAN AND NAPLES

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Abstract. The aim of this paper is to examine the spatial distribution of socioeconomic inequalities in the municipal territories of Italy's three most populous metropolitan cities, Roma, Milan and Napoli, by means of economic and social indicators and with data aggregated at the sub-municipal subdivisions of the cities and the municipalities in their provinces. These metropolitan areas are coming out of the worst crisis Italy has ever experienced, with a new class of poor people found not only in the outskirts and in the less well-off social groups but also among the middle class. Local and national governments cannot ignore this situation; the weakest sections of society have been unable to reap the benefits of the growth in the quaternary sector that has characterized Milan, Rome and Naples after the last decade, albeit to differing degrees.

Keywords: inequalities; spatial indicators; development economics; urban planning; peripheries

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JEL Classifications: O18, R28, R58.

1. Introduction

In the biggest Italian metropolitan cities, socio-economic inequalities and human development indicators show a marked territorial dimension, as they are geographically concentrated and sometimes sensitive to variations in distance from the city centre (Lelo et al., 2017, 2018). In order to better understand the particular nature of the phenomena, this paper compares Italy's three most populous metropolitan areas by analysing both the sub-municipal subdivisions of the cities and the municipalities in their provinces: 155 districts and 120 municipalities for Rome, 88 districts and 133 municipalities for Milan, 30 districts and 91 municipalities for Naples. The

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comparative indicators used are taken from Istat 2011 Census*, and relate to the main variables that characterize the demographic, social and economic status of inhabitants: population density, foreigners, people aged under 30 and over 65, graduates, and the employment rate†. In addition, the average taxpayer income as reported by the Revenue Agency in 2015.

The paper is organized as follows. Section 2 briefly introduces the recent causes of urban inequalities and provides some literature revivew. In section 3 we analyse urban inequalities, by describing and comparing some significant socio-economic indicators for Rome, Milan and Naples, both at sub-municipal level and for hinterland municipalities. Section 4 proposes some policy guidelines for such cities based on the data presented, together with some concluding remarks.

2. Metropolization and inequalities

The organizational and structural reformulation of space in the post-industrial age – with the transition towards a global post-industrial economy, based on IT and knowledge – has transformed the social and functional geographies of the big cities, leading to new forms of fragmented, heterogeneous and discontinuous territory (De Muro et al., 2011; 2012; Lelo, 2017; Kiselitsa et al., 2018, Mikhaylov, 2018). The so-called metropolisation process (Ascher, 1995; Sassen, 1996; Leroy, 2000), that since the end of the 70s has accompanied this transition, can be analyzed in terms of new divisions and spatial reconfigurations of labor, leading to renewed modes of production, distribution and consumption, and modified functions of the urban space (Gaschet et al., 2011). These functional mutations involve the urban form, creating complex urban structures that alternate areas of low density with "lumps" of residences, functions and productive activities (Glaeser, 2010). The spatial and functional fragmentation of the urban space undermines "classical" planning models, suggesting new interpretations of the underling transformation dynamics.

The main areas of investigation corresponding to intrinsic characteristics of each inhabited place – physical dimension, economic dimension and social dimension – have been addressed for long time making the sectoral reasons prevail to the interdisciplinary comparisons. The nature of these distinctions is to be found in the different ways of conceptualizing space and modeling the processes adopted by economists, urban planners, geographers and sociologists (Camagni, 1998). The relationships that link the process of metropolisation to the transformation of productive systems are treated by different strands of economic research. Although inspired by common principles inherited from the urban economy, the economic geography and the theory of endogenous growth, approaches remain heterogeneous and sometimes contradictory. Most of the studies do not explicitly refer to the concept of metropolization, but they are clearly linked to its economic background highlighting three main approaches: the contribution of economic geography and the inclusion of dynamic externalities in the process of urban growth (Glaeser, 1999; Duranton and Puga, 2005; Boshma and Iammarino, 2009); the economy of knowledge and its deployment to the concept of 'knowledge city' (Ovalle et al., 2004; Yigitcanlar et al., 2007); the concept of creativity and the creative city (Landry, 2000; Florida, 2002; Cohendet et al., 2010).

From the socio-spatial point of view, the new geographies of urban dispersion are increasingly considered as processes of opposite sign: decentralization and concentration, sprawl and density, homogeneity and inhomogeneity (Koolhas, 1997; Soja, 2000). The centrality of an area is no longer measured in terms of distance

* Although Census data depict the situation before the economic crisis, they make possible a homogeneous comparison over the whole national territory at municipal and sub-municipal level.

† The Dataset is available in an open format at: http://mapparoma.blogspot.it/p/fonti.html. The data for Rome are net of nominal residences of immigrants and homeless people at associations and charities in some central districts.

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from the city center, but by the level of accessibility (Amin e Thrift, 2002) and the ability to integrate a plurality of uses and functions useful to the community (Pavia, 2002). These approaches, whose convergence with the economic sphere is limited, outline partial visions of the transformation processes involving today's metropolitan areas. It is not easy to effectively address socio-economic inequalities determined by the process of metropolisation. Traditional criteria used to analyse urban structures such as size, limits, spatial density, continuity, concentration and specialization of functions, must be able to integrate with variables able to grasp the underlying economic processes of production, distribution and consumption, and the socio-economic characteristics such as education and employment, amenities, integration and access to services for the socially weaker groups, identity and social ties.

3. Rome, Milan and Naples: a comparison of three metropolitan cities

In this paper we propose, with no claim to being comprehensive, some initial, comparative readings with regard to some indicators, held to be significant in terms of addressing socio-economic urban inequalities, of Italy's three most populous metropolitan areas: Rome, Milan and Naples. They are comparable in terms of resident population but not in terms of surface area, urban form and economic performance, and they also represent the traditional North-South divide in Italy (Table 1). These three areas differ in terms of territorial size: the provinces of Milan and Naples add up 274,000 hectares, half the size of the province of Rome which covers 536,000 hectares, a figure which is even more evident at municipal level, where the sum of Milan and Naples municipalities is only 23% of the territory of Rome. Rome is characterized by being a regional capital of exceptional size, whose administrative boundary includes large areas of countryside, while the urban areas of Milan and Naples go beyond even the administrative boundaries of the respective provinces, extending into the neighbouring ones.

Table 1. Italian metropolitan cities.

Name	Province *residents 2017*	Capital *residents 2017*	Area *km²*	Density *inh./km²*	Municipalities No.	GDP *Billion € 2015*
Rome	4,353,738	2,873,494	5,363	812	121	154
Milan	3,218,201	1,351,562	1,576	2,042	134	161
Naples	3,107,006	970,185	1,179	2,635	92	55
Turin	2,277,857	886,837	6,827	334	316	70
Palermo	1,268,217	673,735	5,009	253	82	22
Bari	1,260,142	324,198	3,863	326	41	24
Catania	1,113,303	313,396	3,574	312	58	19
Florence	1,014,423	382,258	3,514	289	42	35
Bologna	1,009,210	388,367	3,702	273	55	38
Venice	854,275	261,905	2,473	345	44	26
Genoa	850,071	583,601	1,834	464	67	28
Messina	636,653	236,962	3,266	195	108	11
Reggio Calabria	553,861	182,551	3,210	173	97	8
Cagliari	431,430	154,083	1,249	346	17	12
14 cities	21,948,387	9,583,134	46,639	471	1,274	663
% out of Italy	36.2%	15.8%	15.4%		16.0%	40.5%
Italy	60,589,445	60,589,445	302,073	201	7,960	1,637

Source: Authors' analysis on ISTAT data.

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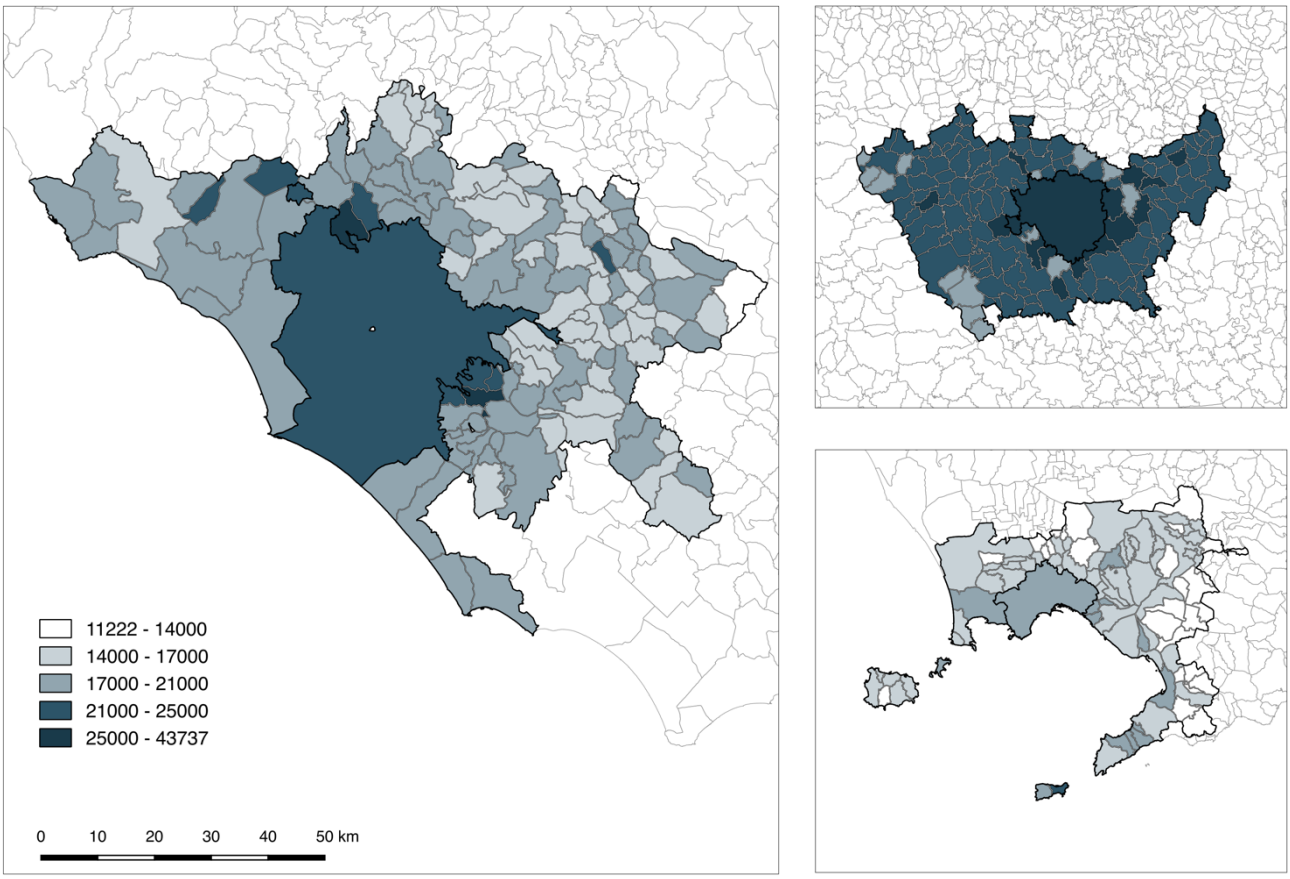
3.1. Average income

The average annual income per taxpayer is unequally distributed over the three metropolitan areas (Figure 1). Almost the entire territory of the province of Milan is in the over-€20,000 bracket, but Milan (average income €30,600) is not the richest municipality: there are five richer hinterland municipalities with average incomes of over €31,000 (Basiglio, Cusago, Segrate, San Donato and Arese). In the province of Rome, the only two municipalities with an average income of just after €25,000 are Formello and Grottaferrata, located in the first hinterland ring, while Rome municipality remains just below this threshold at €24,700 (probably flattened by the effect of the internal variability over the extended municipal territory) and most of the other municipalities are in the €15,000-€22,000 bracket. Figures are very different in the province of Naples where, except for Capri, San Sebastiano al Vesuvio, Procida and Sorrento, the rest of the municipalities have an average income of less than €20,000; Naples has an average income of just under €19,900, and an elevated number of municipalities have an average of below €15,000. In the boxplots (Figure 2) the same data are displayed for all municipalities in the three provinces[‡].

Figure 1. Maps of average income for taxpayer in 2015.



Source: Authors' analysis on data from the Ministry of Economy and Finance - Departement of Finance.

‡ Upper whisker = maximum, upper box side = third quartile, band inside the box = second quartile (median), lower box side = first quartile, lower whisker = minimum.

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Figure 2. Boxplots of average income for taxpayer in 2015.

Source: Authors' analysis on ISTAT data.

3.2. Population density

In all three of the provinces analysed, population density decreases as distance from the centre increases, reflecting the markedly monocentric structure of the main urban systems. However, the three cities examined here have particular characteristics that depend on the different administrative boundaries of the metropolitan territory (Figure 3).

Notably Rome, whose urban continuum is mostly included within the municipal boundaries, has a very high population density in the historical and intensive periphery belt inside the Orbital Motorway (Grande Raccordo Anulare, or GRA), and low density outside the GRA, except for the eastern sector and the coastline of Ostia, which have always been the most urbanized. The highest density of over 190 inhabitants per hectare is found to the east of the city centre (Gordiani, Don Bosco, Appio, Torpignattara and Tuscolano Nord), as well as in some areas to the west (Marconi and Eroi) and north (Saccopastore). The municipalities in the first hinterland ring, despite experiencing a marked demographic growth over the last few decades, in parallel with the growth in the building sector and in property prices, still have far fewer residents compared with Rome; they also remain separate from Rome's urban continuum. Figures greater than 10 inhabitants per hectare are only recorded in the area of the Castelli Romani to the south-east of Rome (especially Ciampino, Albano, Marino, Genzano and Grottaferrata), in some coastal municipalities (Ladispoli and Anzio) and to the north-east of Rome (Fonte Nuova and Guidonia).

Milan is different from Rome because its urban continuum goes beyond the boundaries of its municipality and even of those of its province, extending into the neighbouring province of Monza and Brianza. The density is therefore very high in all capitalist sub-municipal districts, apart from the non-residential ones, with over 170 inhabitants per hectare, similar to the levels in Rome, to the west of the city centre (Selinunte and Washington) and to the east (Loreto, Buenos Aires-Venezia, XXII Marzo and Umbria-Molise). The first hinterland belt is also very densely populated, more so than Rome, with over 50 inhabitants per hectare in the populous municipalities to the north between Milan and Monza (Bresso, Sesto San Giovanni, Cusano Milanino, Cinisello Balsamo and Cologno Monzese) and to the south-west (Corsico and Cesano Boscone), while it only registers low levels in the less urbanized and more agricultural sectors, on the borders with the provinces of Pavia and Lodi.

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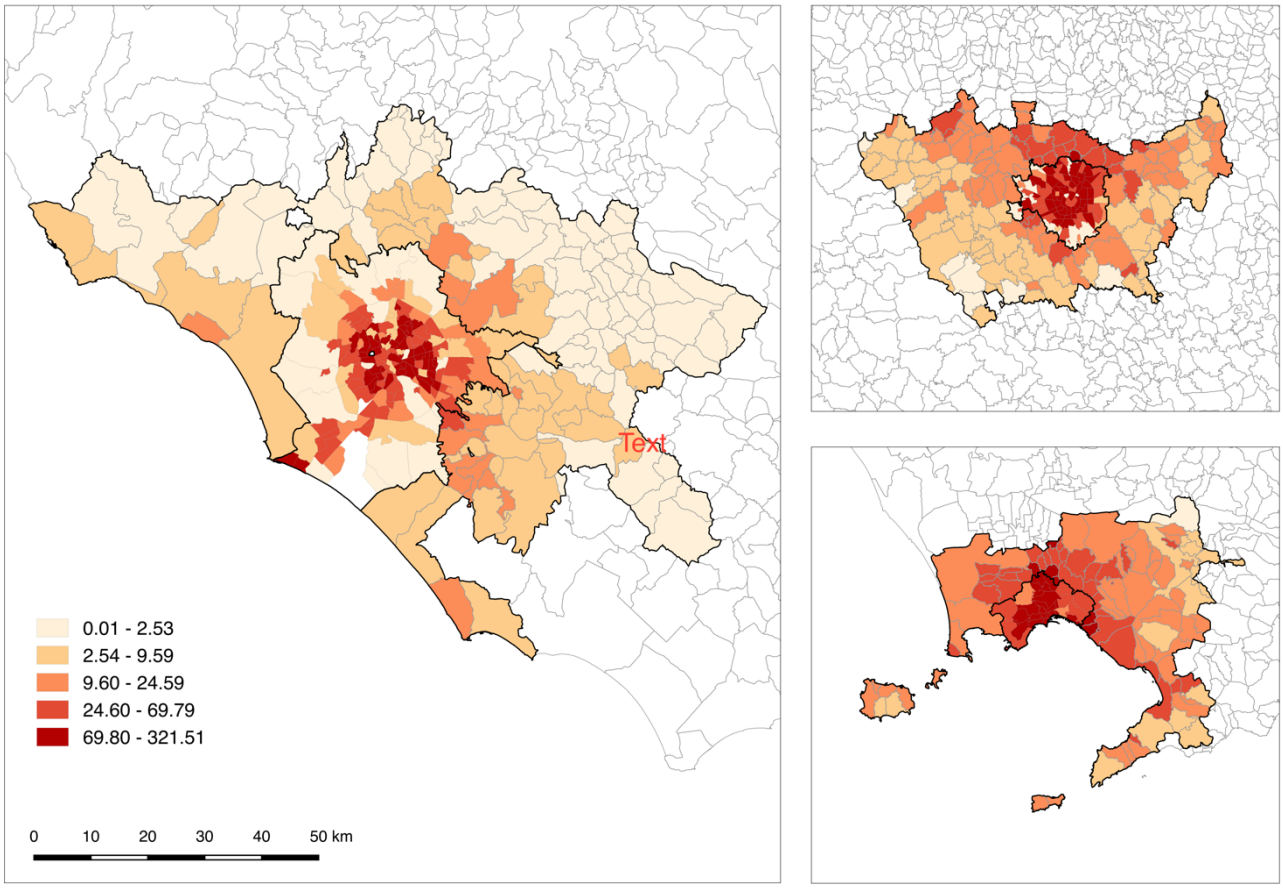
The situation is the same for Naples, which is different from Rome due to its extremely dense urban fabric and is already joined to the north with the province of Caserta and to the south-east with the province of Salerno. The central districts of Naples, together with Vomerohill, are the ones with the highest density, over 200 inhabitants per hectare (San Lorenzo, Montecalvario, Avvocata, Pendino and Vicaria), which is higher than in Rome, while Mercato, San Ferdinando and Stella have more than 150 inhabitants per hectare. Some hinterland municipalities have the highest density in Italy, as well as the most populated towns that are not province capitals, given that Giugliano, Torre del Greco, Pozzuoli and Casoria have between 80,000 and 120,000 inhabitants. The density exceeds 100 inhabitants per hectare or is just below that, and is therefore much higher than in the hinterlands of Rome and Milan, in Casavatore and Melito (to the north), Portici and San Giorgio a Cremano (to the south-east), and around 70 per hectare in Frattaminore, Arzano, Cardito, Mugnano and Casoria (all to the north of Naples); it only falls drastically in the hillier areas, namely to the north-east towards Irpinia, to the south-east on the Sorrentine peninsula and on the island of Ischia.

Figure 3. Maps of population density per hectare in 2011.



Source: Authors' analysis on ISTAT data.

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3.3. Foreigners

The share of foreigners appears to be very variable in the metropolitan cities of Rome and Milan, while it is uniformly low in Naples (Figure 4). With regard to foreigners, the territory of Rome does not present the rifts between the centre and the outskirts that usually characterize the demographic and socio-economic variables, given that they are not particularly concentrated in specific areas of the city. As a matter of fact the incidence of foreigners is over 15% (excluding the non-residential urban areas, and net of nominal residences of immigrants and homeless people) in very different districts, according to their country of origin and their jobs: in the well-off areas to the north and south where they perform domestic services there are many Filipinos and, to a lesser extent, Peruvians and Ukrainians (Grottarossa Ovest, Appia Antica Nord and Sud, and Parioli); in the east, there are many Chinese and Bengali people near businesses and restaurants which they either own or where they are employed (Esquilino, Quadraro, Casetta Mistica and Omo); in the districts near to or outside the GRA, accommodation costs less especially for Romanians, and to a lesser extent for Peruvians and Ukrainians (Tor San Giovanni and Tor Fiscale). In the hinterland the presence of foreigners displays similar trends, with a particularly high share of over 13% in municipalities with more affordable housing and which are closer to the city: the Tiber valley to the north (Civitella San Paolo, Ponzano, Campagnano, Rignano, Sacrofano and Riano), the north-east (Marcellina, Fonte Nuova, Sant'Angelo, San Polo dei Cavalieri and Poli), and on the northern coastline (Ladispoli).

In contrast to Rome, foreigners in Milan appear to be particularly concentrated in some suburban districts and in the first hinterland ring to the north and east of the city. The former include districts outside of the city centre, especially in the eastern sector, with figures of over 20%, comparable to the figures for Rome, to the north-west (Affori, Comasina, Dergano, Farini, Bovisa, Villapizzone and Selinunte), north-east (Loreto and Padova) and east (Parco Monlué - Ponte Lambro, Ortomercato and Scalo Romana). In the most populous hinterland municipalities the incidence of foreigners is over 12% to the north between Milan and Monza (Baranzate, Cologno Monzese, Cinisello Balsamo and Sesto San Giovanni) and to the east (Pioltello and San Giuliano), as well as on the furthest point to the east on the border with the province of Bergamo (Vaprio d'Adda and Cassano d'Adda).

In Naples, however, there are limited numbers of foreigners both in the city itself and in almost all of its province, which is in sharp contrast to Rome and Milan. In the city, the share of foreigners is almost 12% in Zona Industriale only, while it is between 8 and 10% in a few central districts (Stella, San Lorenzo, Mercato, Pendino and Montecalvario), and falls below 1% in the populous northern outskirts (Secondigliano, San Pietro a Patierno and Miano) and to the west (Soccavo). In the hinterland this share is just over 5%, still far below that of the municipalities of the province of Rome, only on the islands (Forio d'Ischia, Capri, Serrara Fontana, Anacapri and Casamicciola Terme) and in a few Vesuvian municipalities to the east of Naples (Terzigno, Palma, San Giuseppe Vesuviano, Poggiomarino and Striano).

In the boxplots (Figure 5), as the next sections, the same data are displayed for all municipalities in the three provinces and for all districts of their capitals.

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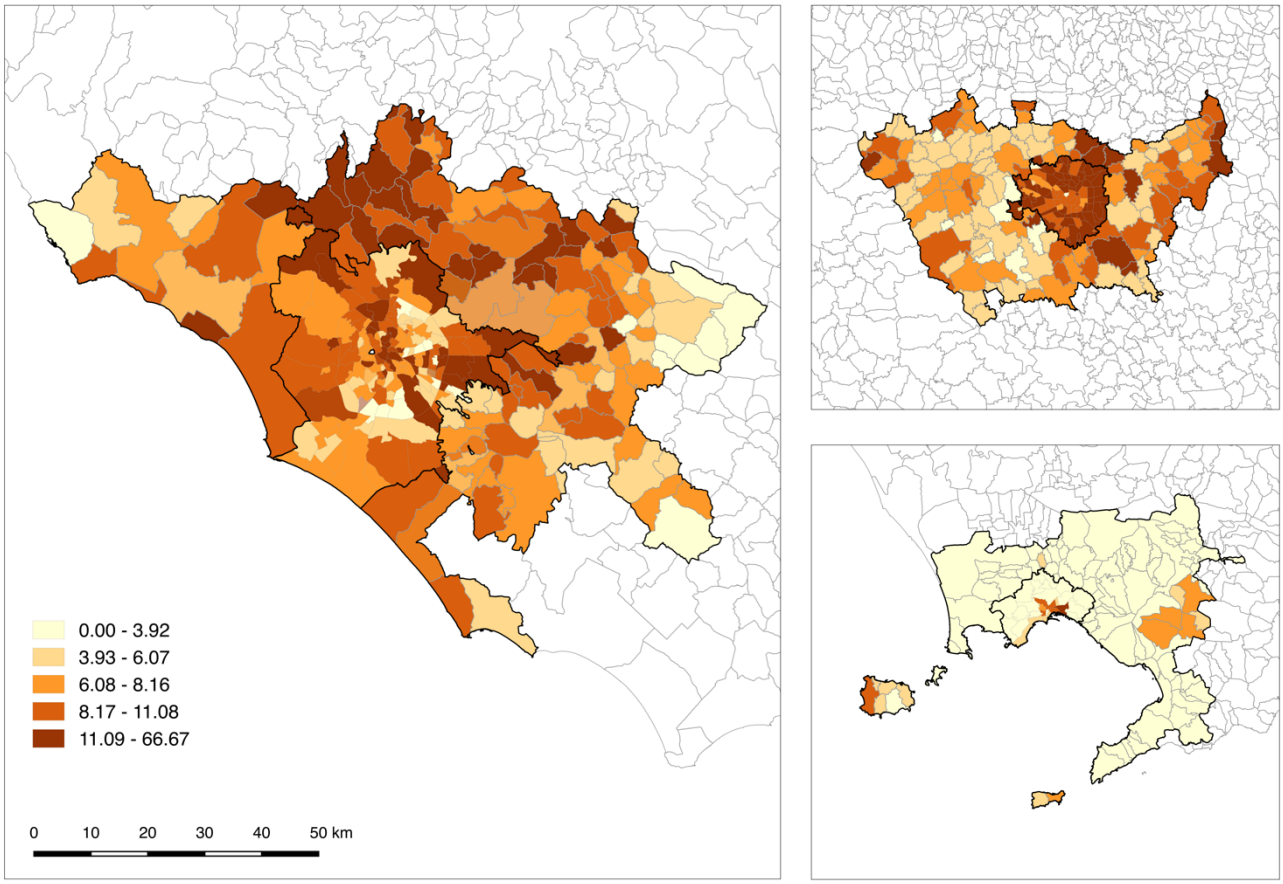
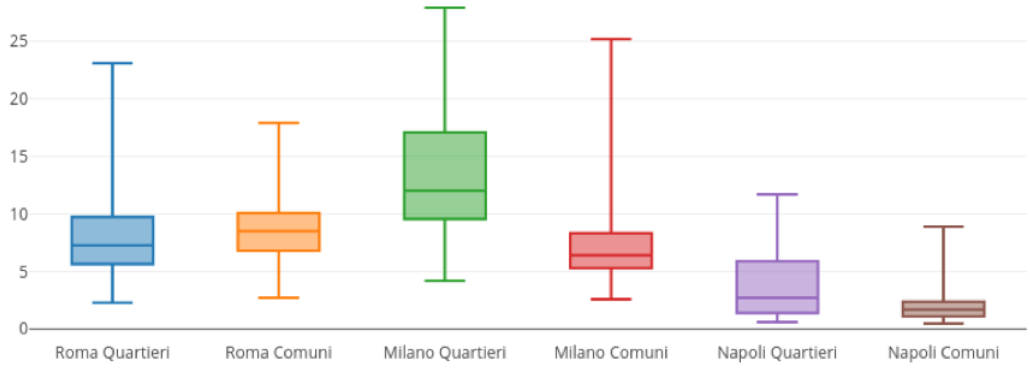
Figure 4. Maps of share of foreign residents in 2011.



Source: Authors' analysis on ISTAT data.

Figure 5. Boxplots of share of foreign residents in 2011.



Source: Authors' analysis on ISTAT data.

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3.4. The young and the elderly

In the big cities the most central housing is becoming increasingly expensive, and is also shifting from the real estate market to the growing demand from tourism, thus giving rise to gentrification and 'airbnbization' processes and the displacement of residents, especially families, the remaining ones being mainly single people and widows/widowers, in any case with a high average age (Figures 6-9).

Roma is no exception, with young people under the age of 30 concentrated in the districts outside the GRA and in the hinterland municipalities undergoing a construction boom, while elderly people over the age of 65 mainly live in the central districts of the capital and in the municipalities furthest from the metropolitan city, where the population is lower. Young people account for over a third of the residents in the new districts on the outskirts of Rome to the east (Sant'Alessandro, San Vittorino, Borghesiana, Lunghezza and Barcaccia) and south (Vallerano Castel di Leva, Porta Medaglia and Santa Palomba), as well as in Santa Maria della Pietà inside the GRA to the north-west, while the elderly account for over 28% of the residents in the older outskirts to the west (Pineto, Aurelio Nord and Sud, Eroi, Colli Portuensi), east (Don Bosco, Torrespaccata and Pietralata), north (Conca d'Oro and Val Melaina) and south (Valco San Paolo and Navigatori). In the hinterland municipalities, young people account for over a third of residents only in the south-eastern area (Lariano, San Cesareo, Labico, Artena, Zagarolo, Valmontone, Lanuvio and Gallicano), as well as in Fonte Nuova and Mentana to the north-east, while the share of elderly people is biggest in the small municipalities in the mountains, the most populated of which is Carpineto (25%).

In Milan, as in Rome, there are very few young people across almost all of the municipal territory, and only exceed 28% in a few peripheral districts to the south-east (Parco Monlué - Ponte Lambro, Triulzo Superiore and Rogoredo), north (Adriano, Comasina, Bicocca, Dergano and Quarto Oggiaro) and west (Muggiano and San Siro), as well as Pagano to the north-west of the city centre, while the elderly account for over 30% in the populous districts to the east (Parco Lambro - Cimiano and Mecenate), west (Gallaratese, Bande Nere and Lorenteggio) and south (Gratosoglio-Ticinello and Barona). In the hinterland municipalities, the share of young people is over 25% everywhere, though this figure is below that for Rome, with the highest figures (among the biggest municipalities) to the south (Basiglio, Pieve Emanuele and Zibido San Giacomo), east (Pioltello) and north (Solaro), while the percentage of elderly people is over 23% in the populous municipalities of the northern belt (Bresso, Cusano Milanino, Sesto San Giovanni and Novate), to the west (Corsico) and south-east (Melegnano), as well as in Magenta on the border with the province of Novara.

Naples also has a greater concentration of younger age brackets in the outermost areas of the province, and in contrast to the figures of elderly people in the city centre, but there are far more young people compared with Rome and Milan. The share of young people in the districts of Naples is consistently over than 27%, and even reach figures close to or above 40% in the populous outskirts to the north (San Pietro a Patierno, Scampia, Piscinola and Miano), east (Ponticelli, Barra and San Giovanni a Teduccio) and west (Pianura), while the percentage of elderly people is only over 20% in the districts to the west (Arenella, Vomero, Chiaia, Fuorigrotta and Posillipo), as well as in San Giuseppe in the city centre. In the hinterland too, young people are almost never less than a third of residents, levels which are therefore higher than in Rome, and actually account for over 42% to the north of Naples (Melito, Casandrino, Crispano, Volla, Afragola, Qualiano, Sant'Antimo and Caivano) and to the south-east (Pimonte, Casola, Santa Maria la Carità and Lettere), while the elderly only reach 20% on the islands (Capri and Procida), on the Sorrentine peninsula (especially Sorrento) and in the municipalities of Portici and San Giorgio a Cremano to the east of Naples.

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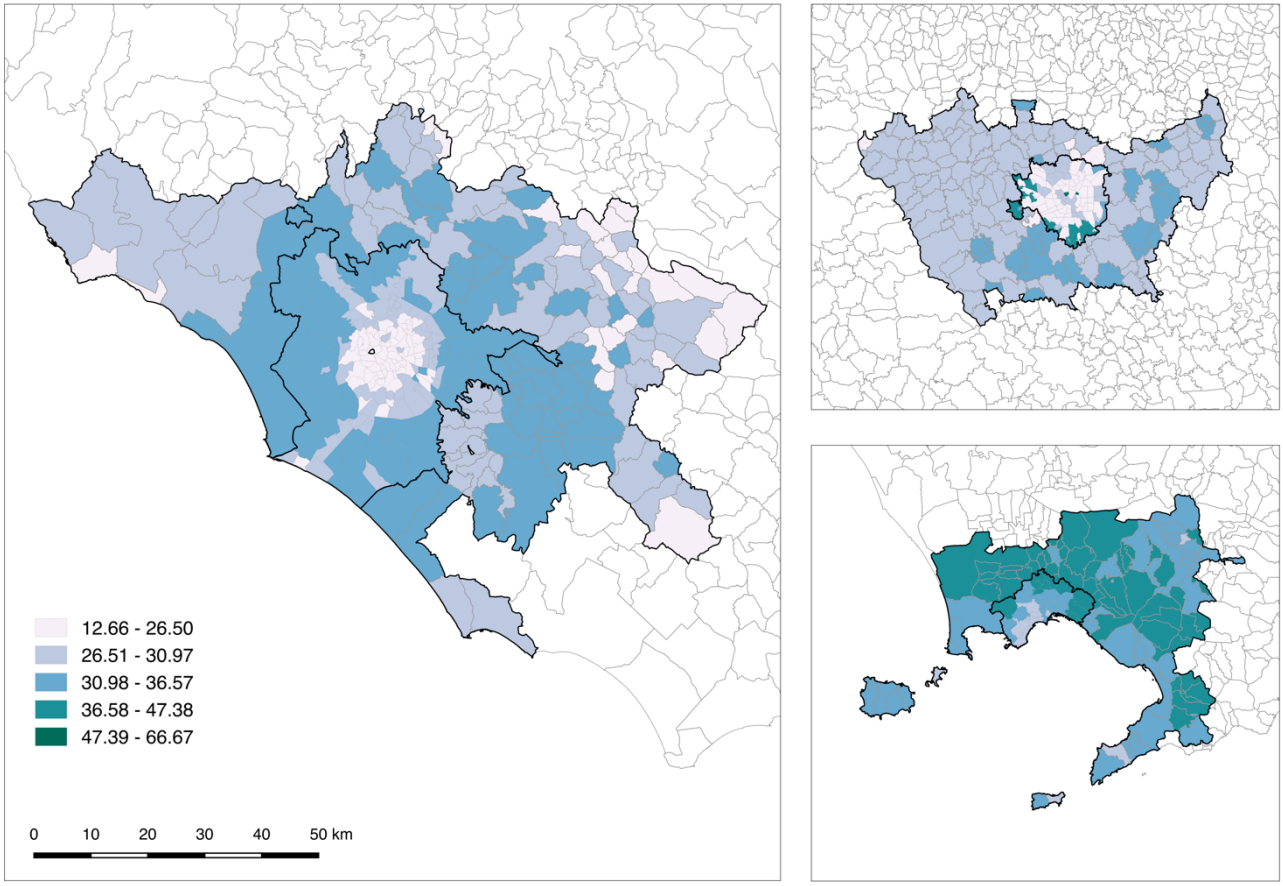
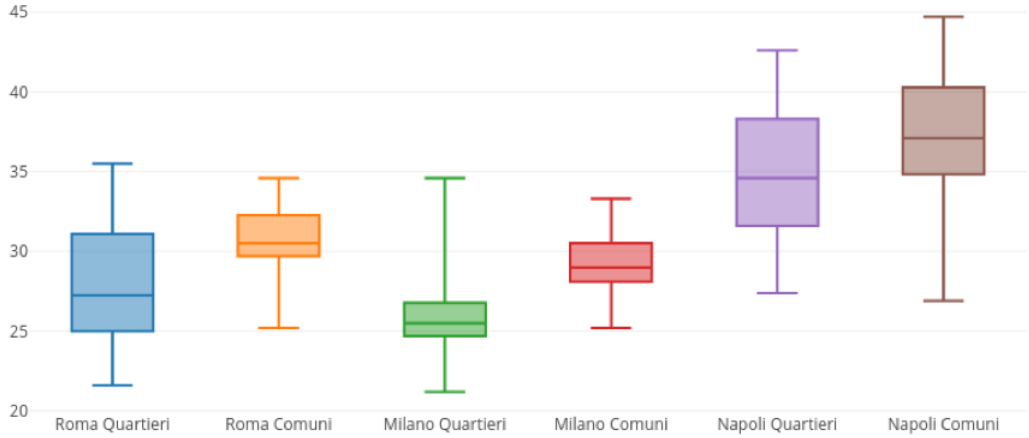
Figure 6. Maps of share of residents under 30 in 2011.



Source: Authors' analysis on ISTAT data.

Figure 7. Boxplots of share of residents under 30 in 2011.



Source: Authors' analysis on ISTAT data.

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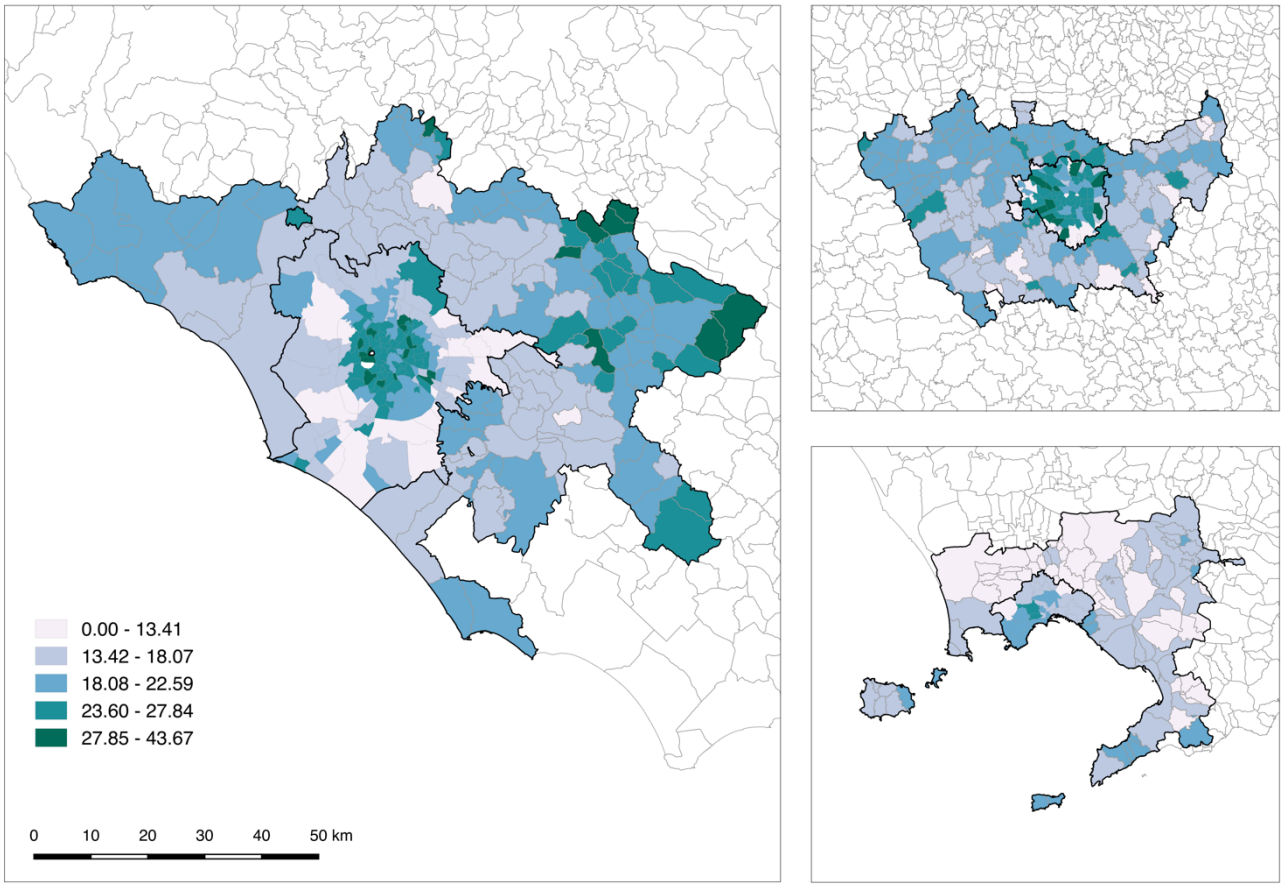
Figure 8. Maps of share of residents over 65 in 2011.



Source: Authors' analysis on ISTAT data.

Figure 9. Boxplots of share of residents over 65 in 2011.

Source: Authors' analysis on ISTAT data.

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3.5. Graduates

Demographic characteristics influence the socio-economic composition of the various urban areas, especially the incidence of academic qualifications. In Rome and Milan there is a greater share of graduates in the most central districts and only in a few other hinterland municipalities, so that the distance from the centre is also a social distance, while in Naples the socio-economic problems in the city centre mean that the highest numbers of academic qualifications are concentrated above all in the well-off semi-central areas (Figures 10 and 11).

Specifically, in Rome municipality, there are eight times more graduates in Parioli (49%) than in Tor Cervara (6%). The share is over 42% in the well-off districts to the north (Parioli, Salario, Acquatraversa, Farnesina, Trieste, Medaglie d'Oro, Nomentano and Tor di Quinto), south (Eur and Navigatori) and in the centre (Celio, Centro Storico and Prati), while it is below 10% especially in the outskirts close to or outside the GRA to the east (Tor Cervara, Borghesiana, San Vittorino, Torre Angela, Torre Maura and Giardinetti - Tor Vergata), as well as in Santa Palomba to the south and in Santa Maria di Galeria to the north-west. In the hinterland the share of graduates never exceeds 25%, with the highest figures in the Castelli Romani area to the south-east (Grottaferrata, Monte Porzio Catone, Frascati and Nemi), in the Tiber valley to the north (Sacrofano and Formello) and around Bracciano Lake to the north-west (Trevignano, Bracciano and Manziana), while it is below 10% in many municipalities to the south-east (Artena, Cave, Lariano, Valmontone, San Cesareo, Zagarolo, Ardea and Lanuvio) and north-east (Palombara Sabina and Fonte Nuova), besides those in the Apennines with many elderly people.

This divide is very sharp in Milan too, as in Rome, given that there are seven times as many graduates in Pagano and Magenta-San Vittore (both standing at 51.2%) than in Quarto Oggiaro (7.6%). The share of graduates is over 42% in the entire centre within the city walls and in the neighbouring districts (Pagano, Magenta-San Vittore, Duomo, Guastalla, Vigentina, Brera, Washington, De Angeli-Monte Rosa, Buenos Aires - Venezia and Ticinese), while it is below 12% in the outskirts to the north-west (Quarto Oggiaro, Comasina and Bovisasca), west (Quinto Romano, Baggio and Figino), south (Barona and Gratosoglio-Ticinello) and east (Parco Monlué - Ponte Lambro). The figures are lower for the hinterland as they are in Rome, since – with the exception of Basiglio to the south (34%) – the share of graduates never exceeds 27%, with the highest figures found in the municipalities to the east (San Donato Milanese, Segrate, Cernusco sul Naviglio, Cassina de' Pecchi and Peschiera Borromeo), as well as in Arese to the north-west, while in many other municipalities the figure remains below 10%, including (and only considering the most populous ones) Senago and Cinisello Balsamo to the north and Rozzano to the south.

The differences are even more marked in Naples compared with Rome and Milan, given that there are nine times as many graduates in Posillipo, Chiaia and Vomero (about 40%, in any case fewer than in the other two cities) than in Scampia, San Giovanni a Teduccio and Miano (4.5%). The share only exceeds 30% in the well-off districts to the west (Arenella, together with those already mentioned) and in San Giuseppe in the city centre, but it falls below 10% in the populous outskirts to the north (Scampia, Miano, San Pietro a Patierno, Secondigliano, Piscinola and Poggioreale), east (San Giovanni a Teduccio, Barra and Ponticelli) and west (Pianura and Soccavo), as well as in Mercato e Zona Industriale to the east of the city centre. There are also very few graduates in the hinterland, the highest figure being 15-17% in Nola, in some municipalities to the east (Portici and San Sebastiano al Vesuvio) and on the Sorrentine peninsula (Sorrento, Sant'Agnello, Piano di Sorrento and Meta), and in any case fewer than in the provinces of Rome and Milan, while far too many municipalities have fewer than 7%, including (only considering the most populous ones) many to the north (Crispano, Qualiano, Caivano, Arzano, Frattaminore, Casandrino, Afragola, Casavatore, Sant'Antimo and Casalnuovo) and to the south-east (Santa Maria la Carità and Sant'Antonio Abate).

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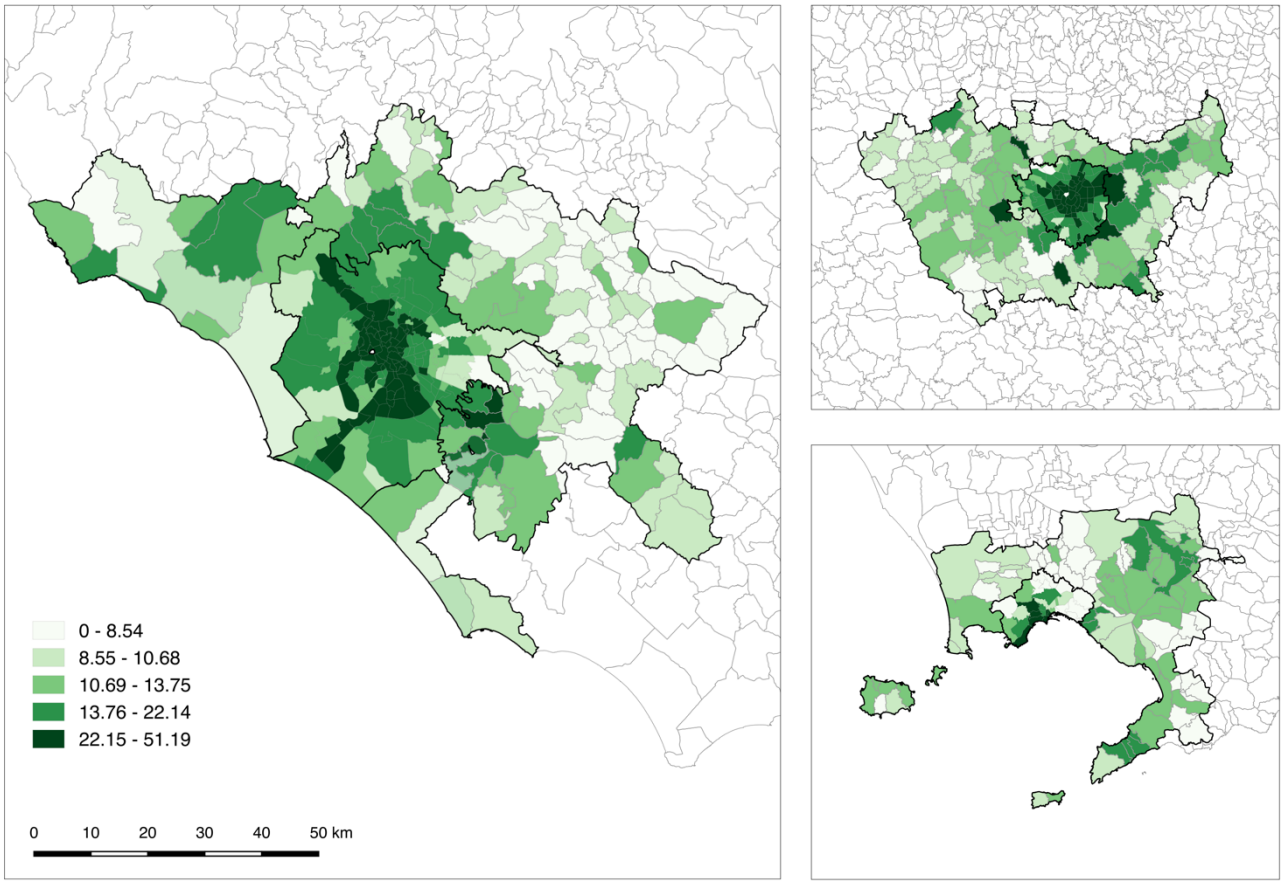
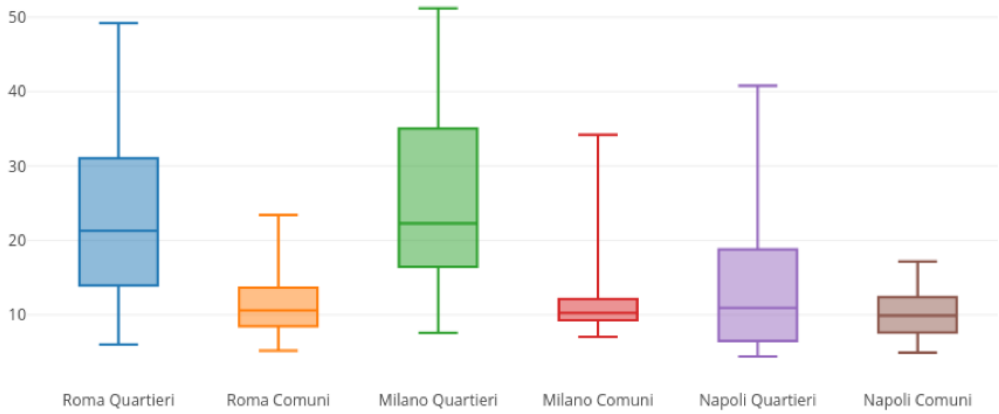
Figure 10. Maps of share of graduates on the population with 20 years or more in 2011.



Source: Authors' analysis on ISTAT data.

Figure 11. Boxplots of graduates on the population with 20 years or more in 2011.



Source: Authors' analysis on ISTAT data.

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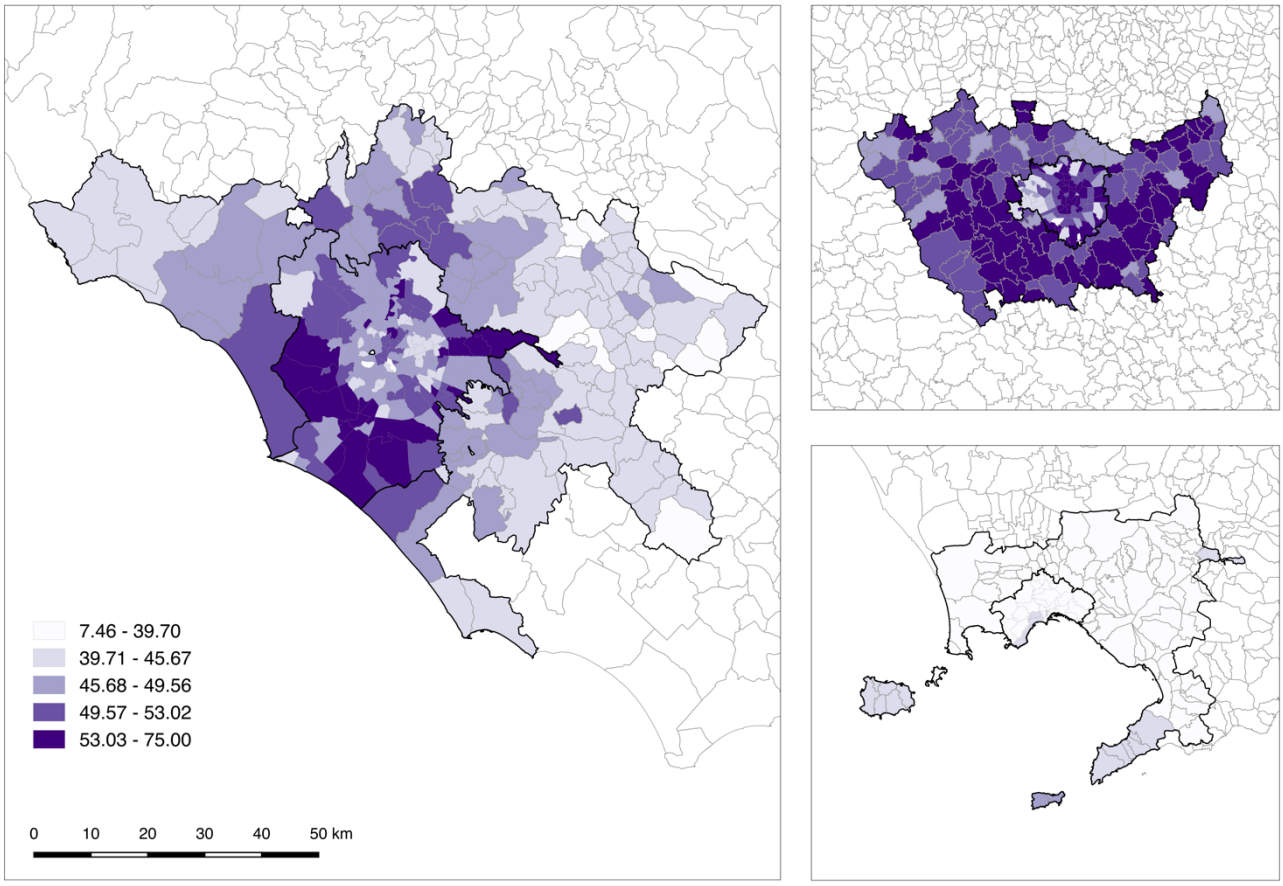
3.6. Employment rate

Job opportunities are the outcome of educational ones. Large differences between centre and outskirts still remain about employment, although the situation is more complex and includes some particular cases. Being employed does not just mean having an income, it also and above all means being part of a community, self-realization and social inclusion: for these reasons the geography of employment and unemployment are symptomatic of territorial divides. Available data are taken from the 2011 Census, and therefore precede the serious recession of the subsequent years, which is why we show the employment rate, as it is less subject to economic cycles than the unemployment rate. These data are in any case the only chance we have to explore these phenomena at district level, and should therefore be considered more from the point of view of the differences between the urban areas than as absolute values, since it is well-known and enduring that Milan has a higher average than Rome, which in turn has a much higher average than Naples (Figures 12 and 13).

Figure 12. Maps of employment rate on the population aged 15 years or more in 2011.



Source: Authors' analysis on ISTAT data.

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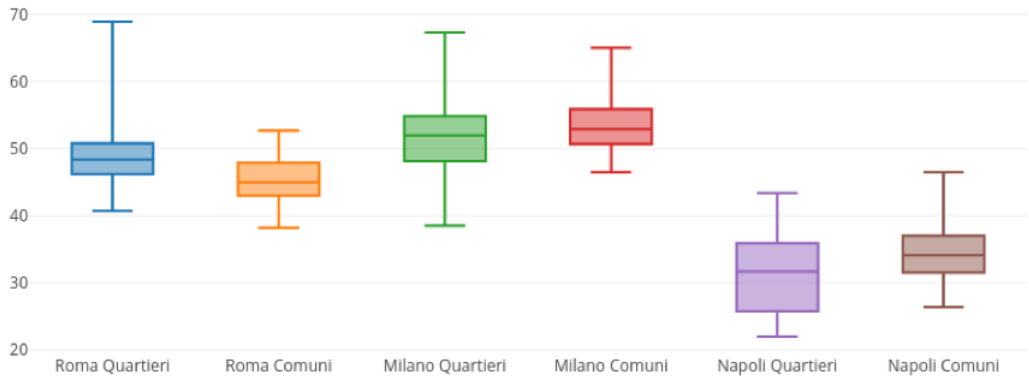
Figure 13. Boxplots of employment rate on the population aged 15 years or more in 2011.



Source: Authors' analysis on ISTAT data.

The new residential areas on either side of the GRA house young families in which both adults usually work, either with stable or precarious jobs, and they are among the districts with the largest numbers of people in the workforce, more so than the traditionally well-off neighbourhoods to the north. The employment rate only exceeds 55% in the outskirts to the south-west (Magliana, Malafede, Mezzocamino and Vallerano Castel di Leva) and to the east (Acqua Vergine, Sant'Alessandro, Lucrezia Romana, Barcaccia and Lunghezza), while it is just over 40% in the old working-class districts to the north (Tufello) and east (Torrespaccata, Casilino, Don Bosco and Gordiani), as well as in Ostia Nord on the coast. The employment rate is lower in the hinterland, only reaching 50-52% in a few municipalities to the north (Fiano, Capena, Campagnano, Riano, Castelnuovo di Porto, Monterotondo and Formello) and south-east (Labico, Pomezia and Montecompatri), as well as in Fiumicino on the coast, while it is just over 40% (only considering the most populous municipalities) on the coast to the south of Rome (Nettuno and Anzio) and to the south-east (Velletri, Artena, Lariano, Cave and Colleferro).

The employment rate is higher on average in Milan than in Rome; it is only over 60% in three districts with low populations to the south-west (Muggiano) and south-east (Triulzo Superiore and Rogoredo), although it is between 55 and 60% in the historical centre (Duomo) and in various neighbouring districts (Farini, Porta Romana, Garibaldi-Repubblica, Navigli, Sarpi, Centrale, Ticinese and Guastalla) or further out from the city centre to the north and east (Adriano, Bicocca, Loreto, Dergano and Lambrate), while it is below 45% in the outskirts to the south (Barona and Gratosoglio-Ticinello), west (Gallaratese, Lorenteggio and Forze Armate), east (Mecenate) and north (Quarto Oggiaro, Bovisasca and Niguarda - Cà Granda). There are also many medium-sized municipalities in the hinterland with an employment rate between 55 and 60%, and therefore higher than the figures for Rome, to the east (Gessate, Settala, Mediglia, Pessano con Bornago, Vignate, Peschiera Borromeo and Pozzuolo Martesana), west (Vanzago, Settimo Milanese and Corbetta), south (Assago, Pieve Emanuele, Basiglio and Buccinasco) and north (Vimodrone), while it is below 50% in the entire populous northern belt between Milan and Monza (Bresso, Cusano, Sesto San Giovanni, Cinisello Balsamo, Cologno, Arese, Novate, Garbagnate and Bollate) and in other municipalities to the west (Magenta and Corsico) and east (Melzo).

The absolute figures for Naples are lower than for Rome and the differences between districts are far more marked, since the employment rate is 43% in Posillipo, twice as much the very low rate of 22% in Scampia. This rate records figures of 40-43%, typical of Rome's working-class areas, only in the well-off districts to the west (Posillipo, San Giuseppe, Chiaia, Vomero and Arenella), and actually falls below 30% in the populous outskirts to the north (Scampia, Miano, San Pietro a Patierno, Piscinola, Secondigliano and Poggioreale), east (San Giovanni

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a Teduccio, Ponticelli and Barra) and west (Soccavo), as well as in the Mercato and Pendino districts in the city centre. The employment rate is only over 40% in a few municipalities in the hinterland too, only on the islands (Capri, Anacapri, Casamicciola Terme, Serrara Fontana, Forio, Lacco Ameno and Ischia) and the Sorrentine peninsula (Sorrento, Massa Lubrense, Sant'Agnello, Piano di Sorrento, Meta and Vico Equense), as well as in Visciano to the north-east, while it is around 30% in the populous municipalities to the north (Sant'Antimo, Caivano, Afragola, Crispano, Frattaminore, Grumo Nevano, Arzano, Qualiano, Casavatore, Casandrino, Frattamaggiore and Casoria), south-east (Ercolano, Torre Annunziata, Boscoreale, Torre del Greco and Boscotrecase) and west (Monte di Procida) of Naples.

Conclusions

The aim of this first comparative study was to have a better understanding of Rome's economic performance and social cohesion compared with the other large Italian metropolitan cities.

So – what is the extent of metropolitan inequality according to the evidence we collected? First of all, the province of Milan as a whole has an average income of over €25,000 with peaks of €35,000 in some hinterland municipalities. This is clearly different from Rome, where the average income is about €20,000 and is only over €25,000 in two municipalities in the north of the city: Formello and Grottaferrata. Average income falls below €20,000 in Naples, with the exception of Capri and Sorrento where it is €21,000. This difference in terms of income between the three cities is also confirmed by the employment figures: in some areas of Milan the employment rate is actually over 60%, and just under 60% in many central districts, while it only falls below 50% in a few municipalities in the northern area. Naples comes nowhere near this figure, not even Posillipo with 43%, let alone Scampia where only one person in five is employed. The employment rate in Rome is only over 55% in some new residential areas on the outskirts, on either side of the GRA, where young families have settled.

The data on graduates are particularly interesting as a way to underline the inequalities in terms of opportunities. The ratio between districts with the most graduates and those with the least is seven to one in Milan (51.2 vs 7.6), eight to one in Rome (49 vs 6) and nine to one in Napoli (40 vs 4.5). These data clearly illustrate the inequalities in Italy's three main metropolitan areas. Moreover, the further south you go in Italy the lower the absolute levels, since the territorial dualism in Italy is not only economic, to be measured by GDP, but also and above all in terms of opportunities; in today's complex society it is difficult to take advantage of them without academic qualifications. Furthermore, a district-based comparison of the data on education and employment shows how education has a clear impact on employment as well, since investing in education also helps to improve the quality and quantity of employed persons: this is nothing new and there is a great deal of literature on the subject, but it does no harm to refresh the memories of those who draw up public policies. This is not a field for local governments to deal with, although some policies such as lower taxes or a no-tax area for school canteens, or scholarships, as some regions have tried out could potentially be tools for combating early school leaving and low levels of tertiary education among the weakest sections of the population.

The territorial issues involved in employment, production and housing call for new and more complex interactions between the various approaches to urban problems. Italy's metropolitan areas will have to be a driving force in any strategic planning, on a par with the best examples provided by European cities – e.g. Barcelona, Lyon, Munich, Stockholm and Amsterdam –able to find resources, time, themes and ways to implement projects, together with a shared vision for their development. At the same time, our paper shows clear types of social exclusion and polarization between increasingly poor peripheral districts and well-off central ones, as if there were a kind of two-tier pace of growth. This phenomenon is more common in Naples and Rome, but it is also found in Milan, economic capital of the wealthy Northern Italy. These metropolitan areas are coming out

of the worst crisis Italy has ever experienced, with a new class of poor people found not only in the outskirts and in the less well-off social groups but also among the middle class. Local and national governments cannot ignore this situation; the weakest sections of society have been unable to reap the benefits of the growth in the quaternary sector that has characterized Milan, Rome and Naples after the last decade, albeit to differing degrees. Scant attention has been paid to the peripheral areas, poverty has not been reduced and non-specialized workers are increasingly subject to forms of social exclusion. The middle class is trying to cope with the increase in the cost of living and in property prices, which are still often prohibitive, despite falling in recent years. Now would be a good time to revive social housing policies that have been on hold for decades. Too many people are excluded owing to a lack of opportunities, of social occasion, of inclusive social relationships and of institutions able to carry out their tasks. This shortfall needs to be addressed using all the tools available to encourage the creation of social capital.

Lastly, our paper reveals the need for specific policies, not only for the various metropolitan areas but also within them. In order to combat the emergence of inequalities in metropolitan areas, it is important to put people at the heart of policies, or rather their needs above anything else. To find the right way to achieve this, and to avoid stereotypes, data-driven policies are needed to enable national and local authorities to identify real needs and combat the various and new forms of marginality and social exclusion.

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THE INVESTMENT COMPONENT IN A NATION'S ECONOMIC SECURITY: THE CASE OF THE RUSSIAN FEDERATION

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Abstract. The purpose of this paper is to provide a characterization of the current state and level of the investment component in Russia's economic security and concretize the key focus areas for ensuring it. The study is grounded in the dialectical method of scientific cognition, the method for cognizing the process of attaining investment security in all its contradictions, integrity, and development, as well as the systemic approach to the analysis of the effect of investment activity on the national economy. The authors explore some of the key theoretical aspects of investment security within the national economy and examine the dualism of investment security as a component in the nation's economic security; establish a system of indicators for ensuring investment security, including its major qualitative and quantitative criteria; compute a set of indicators for the investment component in economic security; identify some of today's key threats to investment security within the Russian economy. Exploring the theoretical aspects and computing the indicators of investment security serve as a basis for further research into the subject and may help detect and minimize threats that may arise in connection with the investment process, as well as develop and concretize a set of major focus areas for ensuring investment security at all levels.

Keywords: economic security; investment process; investment risks; investment security; Russian Federation

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JEL Classifications: E22, O10

1. Introduction

The globalization of international economic relations, which has become a distinctive trait of our civilization's development in the 21st century, has given rise to a number of new categories in both the political and economic spheres, which now require scholarly conceptualization and substantiation. Among the more significant concepts is a nation's economic security. "Economic security may be construed as a state of the national economy where, through the effective and integrated use of available resources (natural, material, financial, labor, administrative, and political/legal), as well as a system of state activities and measures, there can be achieved the optimum level

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of protection for it from external and internal threats through boosting the competitiveness of domestically manufactured products, the nation's defense capability, and people's living standards and quality of life and attaining progress in the economic, social, demographic, and other spheres" (Bart 2011).

A major component part of economic security is investment security, which can help achieve the integrity of the nation's economic system and its economic security.

Accordingly, there is relevance in conducting integrated research into issues related to fostering the investment security of the national economy and ensuring state regulation of it, with a subsequent focus on resolving relevant practical objectives on ensuring it in the Russian Federation.

2. Literature review

Quite a broad spectrum of issues related to the economic substance, structure, functions, and methods of investment security have found reflection in recent literature (e.g. Bikas, Saponaitė 2018; Shvetsova et al. 2018; Kuril 2018; Tvaronavičienė 2018a; 2018b; Načisčionis et al. 2018; Katina et al. 2018; Muhtar et al. 2018).

The above-mentioned authors have made a significant contribution to the development of research on the subject. However, the theory of economic security, as well as issues related to working out and enhancing the investment mechanism for ensuring it, still need concretization. There is also a need for whole new approaches to describing the influence of investment activity on crucial social/economic processes taking place in Russia that are related to boosts in its economic security.

3. Methods and the study's mission

The study is grounded in the dialectical method of scientific cognition, the method for cognizing the process of attaining investment security in all its contradictions, integrity, and development, as well as the systemic approach to the analysis of the effect of investment activity on the national economy.

The study's methodological basis is sets of general scholarly and philosophical approaches (systemic, synergetic, structural/functional, etc.) and methods (scholarly abstraction, comparative, graphic representation, etc.). The authors also employ certain statistics methodologies.

The study's purpose is to provide a characterization of the current state and level of the investment component in Russia's economic security and concretize the key focus areas for ensuring it.

4. Results and discussion

Investment security within the national economy is a type of economic security that ensures the reproductive nature of the economy, thus acting as a "system of investment relations within the economic system aimed at the enhancement and further development of investment processes, most importantly at ensuring the stability, sustainability, and independence of investment activity within the national economy" (Litvinov & Buzin 2008).
Investment security is of a dual nature: on the one hand, it is a component part of the system of ensuring economic security, while, on the other hand, it maintains a relative amount of independence due to the special nature of investment activity.

Investment security, as a component part of economic security, takes on the role of a regulator that coordinates the movement of investments. In this context, the process of ensuring investment security is joined by financial

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security. Interaction among the entities is regulated by the various forms of control. On the part of the government, it is taxation, financial, and administrative control. Nongovernmental entities exercise control through special institutions (e.g., audit firms and courts of arbitration) and federations (associations, leagues, guilds, unions, and movements). The specific forms of control form a chain of two-way communication that enables making adjustments to previously set objectives to ensure the maximum effectiveness of the system's operation.

The system of ensuring investment security is comprised of a set of interrelated and coordinated elements which directly influence it. The key elements include:
1. The political element, which is reflected in the direct dependence of the volumes of investment coming in into the country on the level of its geopolitical influence, the activity of political movements within it, and other countries' foreign policies toward it.
2. The economic element, which is expressed through the dependence of innovation activity in the country on its geoeconomic influence in the global arena, the state of its economy, and its system of regulation and stimulation/restriction in the area of investment activity using economic methods.
3. The social element, which is expressed through the demographic situation in the country, its gender-and-age structure, its population's education levels, and its levels of social support. The focus here is on having sufficient labor resources with relevant education and qualification levels.
4. The innovation element, which is reflected in the interrelationship between investment attractiveness for potential investors and the availability of cutting-edge technology in the country (as well as its ability to access it), its level of scientific activity, and its level of development of innovations. Having in place a sound innovation element may help maximize the effect from production activities, as well as minimize the costs, based on the effective implementation of technology.
5. The environmental element, which is of the least significance to most investors and the state as a whole due to the nation's imperfect legislation in the area of environmental conservation and protection, the high costs of implementing eco-friendly technology, and the focus on more important issues.
The system of indicators for ensuring investment security includes a set of qualitative and quantitative criteria. The quantitative indicators must be aligned with appropriate criteria and metrics. Table 1 lists a set of appropriate threshold values for these indicators.

Table 1. Indicators of the Nation's Investment Security

Indicator	Measurement units	Threshold values	Restrictions
Total GDP relative to the G7 average	%	75	Not less than
Investment in the economy, %	% of GDP	25	Not more than
Inflow of foreign investment into the economy, %	%	5	Not more than
Outflow of investment from the economy, %	%	5	Not more than
Investment in fixed capital stock, %	%	10	Not less than
Share of foreign investment in total investment, %	%	25	Not more than

Source: Compiled by the authors based on data from S.Yu. Glazev (1997)

The authors employed the following indicators of investment security and methods for computing them (Shchegolev & Shakhov 2009; Nikitenko & Bulavko 2009, p. 77):
1. Total GDP relative to the G7 average. This indicator helps determine how much Russia is lagging behind the G-7 nations in GDP growth (1.1):

$$\frac{GDP_n \times 100\% \times 7}{\sum_{G7} GDP_n}, \qquad (1.1)$$

where GDP_n is Russia's GDP in the n-th year; 7 is the number of countries in the group; $\sum_{G7} GDP_n$ is the sum of the GDPs of the countries in the group in the n-th year.

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2. Investment in the economy. This indicator helps assess the investment yield in the period from the time the funds were invested in the economy to the present time (1.2)

$$\frac{\mathrm{TI}_n}{\mathrm{GDP}_n} \times 100\%, \qquad (1.2)$$

where TI_n is the total investment in the economy in the n-th year.

3. Inflow of foreign investment into the economy. This indicator helps determine the degree to which the nation depends on foreign investment coming in into the economy (1.3):

$$\frac{\mathrm{TI}_{\mathrm{IN}_n}}{\mathrm{GDP}_n} \times 100\%, \qquad (1.3)$$

where $\mathrm{TI}_{\mathrm{IN}_n}$ is the volume of foreign investment in the economy in the n-th year.

4. Outflow of investment from the economy. This indicator helps determine the structural changes within the economy caused by investment flowing out of the economy (1.4):

$$\frac{\mathrm{TI}_{\mathrm{OUT}_n}}{\mathrm{GDP}_n} \times 100\%, \qquad (1.4)$$

where $\mathrm{TI}_{\mathrm{OUT}_n}$ is the volume of investment that flowed out of the economy in the n-th year.

5. Investment in fixed capital stock. This indicator characterizes a period in which there took place the complete restoration of fixed capital stock based on the attraction of investment for restoring it (1.5):

$$\frac{\mathrm{TI}_n}{\mathrm{TFCS}_n} \times 100\%, \qquad (1.5)$$

where TFCS_n is the total fixed capital stock in the n-th year.

6. The share of foreign investment in total investment. This indicator characterizes economic activity by foreign investors within the nation's economy (1.6):

$$\frac{\mathrm{TI}_{\mathrm{IN}_n}}{\mathrm{TI}_n} \times 100\%. \qquad (1.6)$$

The indicators of investment security must be computed in comparable quantities (e.g., billion rubles) and based on a certain time period (e.g., year). In the event data are not available on one of the criteria, no calculations can be performed for the period, which, consequently, renders it impossible to draw any valid inferences.

In the event an indicator under analysis differs from the threshold value significantly (for the worse), it may be possible to speak of potential threats to investment security. Investment threats, or threats to investment security (investment activity), are factors within the economic system that have negative impact on investment activity, can minimize the positive effect from investment activity, or result in a negative effect. Risks to investment security at the level of a country are, mainly, of a general nature. When a nation is highly dependent on global processes, considerable impact may come from general foreign economic risks, as, for instance, is the case with the current sanctions pressure on Russia.

Any kind of activity that has a commercial basis to it requires funding, which can be internal and external. At the level of the state, internal funding implies the use of the state's own funds (e.g., the state budget and public funds), while external funding deals with attracting funds from a third party (e.g., investors, commercial private funds, and loans). Attracted funds, except for charity-based and unremunerated contributions, are, normally, the better option for the state, as any investor will pursue commercial gains in the form of a percentage of revenue from a project, stock dividends, etc. This may, also, foster the economy's dependence on and the need for continual boosts in investment.

Fig.1 illustrates the dynamics of investing in fixed assets in Russia across the key sources of funding.

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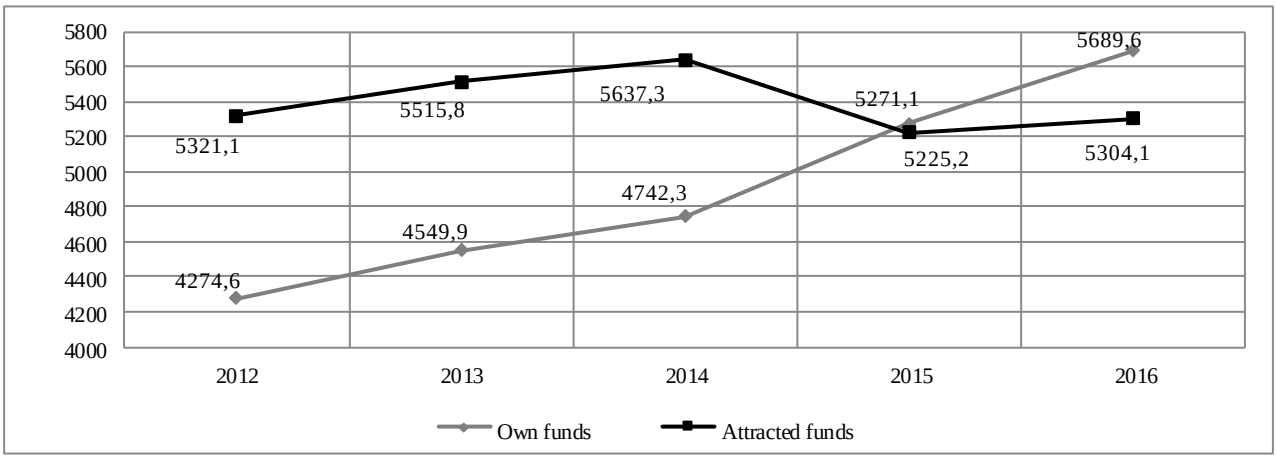

Fig.1. Investment in fixed assets in Russia across the key sources of funding (2012–2016), billion rubles

Source: Compiled by the authors based on data from the Russian Federal State Statistics Service (n.d.)

The authors' analysis indicates that up to 2015 the main source of funding investment in fixed assets in Russia was attracted funds. Only in 2016 things began to shift toward the use of own funds. The lack of own investment may be conducive to a risk of the economic situation worsening and a threat to investment security (and afterwards economic security, as a whole).

A crucial condition for stability in the country is all-round development. In a climate of sanction restrictions and amid the active pursuit of a policy of import substitution, investment is needed today with respect to all types of economic activity in Russia. However, the nation has for years experienced an imbalance across the sectors of the economy. The key focus in terms of investment attractiveness has long been on the following sectors: extraction of mineral resources, agriculture, including hunting, forestry, and fisheries, and, somewhat less, on manufacturing activities (Table 2). However, at the current stage in the development of the global economy, these types of activity are increasingly becoming less sought-after, and in Russia that is coupled today with a poor innovation and technological component.

Table 2. Investment in Fixed Assets in Russia across the Key Types of Economic Activity (2012–2016), billion rubles

Type of activity	Year				
	2012	2013	2014	2015	2016
Agriculture, hunting, forestry, fisheries, and aquaculture	488.6	530.9	525.5	520.2	627.6
Extraction of mineral resources	1,858.4	2,004.0	2,144.8	2,385.2	2,830.4
Manufacturing activities	1,688.7	1,945.3	2,084.6	2,172.6	2,123.7
Production and distribution of electric power, gas, and water	1,166.0	1,187.6	1,186.2	980.0	940.2
Construction	348.6	438.1	469.3	401.2	445.0
Wholesale and retail trade; repair of motor vehicles, motorcycles, household goods, and personal appliances	456.0	517.9	554.6	542.8	632.7
Transport and communications	3,330.7	3,288.6	2,981.0	2,499.7	2,726.7
Real estate operations, leasing, and provision of services	1,968.0	2,195.7	2,701.4	3,161.4	3,018.3

Source: Compiled by the authors based on data from the Russian Federal State Statistics Service (n.d.)

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The low levels of diversification of investment are posing a serious danger to the nation's economic security as a whole, giving rise to disproportions in its economic development.

The authors evaluated the current state of investment activity in Russia by analyzing a set of relevant indicators (Table 3).

Table 3. Key Indicators Influencing Investment Volumes in Russia (2012–2016), %

Indicator	Year				
	2012	2013	2014	2015	2016
Total investment, billion rubles	12,586.l09	13,450.23	13,902.64	13,897.18	14,639.83
FDI imports into Russia, billion rubles	905.63	1,655.31	1,020.31	589.49	N/A
FDI exports from Russia, billion rubles	852.68	2,191.23	2,247.09	1,593.49	N/A
Cost of fixed capital stock, billion rubles	121,268.9	133,521.53	147,429.65	160,725.26	N/A
GDP, billion rubles	66,926.86	71,016.72	79,199.65	83,232.61	86,043.64

Source: Compiled by the authors based on data from P.G. Nikitenko and V.G. Bulavko (2009) and the Russian Federal State Statistics Service (n.d.)

Among the above indicators, the greatest concern is the low level of foreign direct investment in the economy's real sector, while there are increases in portfolio investment. On top of that, today "foreign capital is being concentrated in the nation's export-oriented sectors, which is further exacerbating deformations in the Russian economy" (Litvinov & Buzin 2008). Some of the threats in the area of investment security include low levels of increase in investment as opposed to GDP growth. "In reality, there may be observed a mutual effect between revenue and investment. Due to the multiplier effect, autonomous investment, as an initial "injection", leads to a boost to GDP, which, logically, is followed by an increase in the propensity to invest in society (induced investing). This may help boost economic growth rates based on the accelerator effect. A combination of the multiplier and accelerator effects provides the multiplier/accelerator effect (the Hansen-Samuelson model)" (Zhdanova 2015). It may be worth giving separate consideration to the GDPs of the G-7 nations and Russia. This indicator is central to the study of the nation's overall economic security, as it encompasses virtually all processes and changes taking place within its economy. Taking a more global approach to investigating the indicator may help determine the nation's current geoeconomic and geopolitical status in the global arena. Table 4 helps explore the dynamics of the GDPs of the G-7 nations and the Russian Federation in the period 2012–2016 through an analysis of relevant data and trends and comparisons with the threshold value.

Table 4. Dynamics of the GDPs of the G7 Nations and Russia (2012–2016), trillion US dollars

Country	2012	Average value	2013	Average value	2014	Average value	2015	Average value	2016	Average value
Great Britain	2.37	4.64	2.45	4.81	2.55	4.96	2.66	5.08	2.76	5.00
Germany	3.55		3.61		3.72		3.84		3.47	
Italy	2.11		2.11		2.13		2.17		1.85	
Canada	1.48		1.53		1.59		1.63		1.46	
USA	16.16		16.77		17.42		17.97		18.56	
France	2.49		2.54		2.58		2.65		2.46	
Japan	4.34		4.69		4.75		4.66		4.41	
Russia	3.40	73.28	3.49	72.56	3.57	71.98	3.47	68.31	1.13	22.6

Source: Computed and compiled by the authors based on data from the International Monetary Fund (n.d.)

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The first factor that is central to the study of the above indicator is the difference between trends in the growth of Russia's GDP based on data from the Russian Federal State Statistics Service (Rosstat) and from the International Monetary Fund (IMF). According to data from the IMF, Russia's GDP kept growing up until 2014, and after that it started to decline. Based on data from Rosstat, the nation's GDP was growing year by year, without any declines. Here, the indicator has been affected by the factor of inflating the indicators to ensure a match to federal development programs and charted courses for national development. This technique has long been widely employed in many countries around the world. Today's global space is characterized by an economic race among nations, with many of them lobbying for their own interests in the geopolitical and geoeconomic arenas. In the case of the IMF, a nation that is actively engaged in the pursuit of its own interests is, above all, the United States. Thus, it cannot be stated objectively that the comparative analysis by the IMF is more credible than that by Rosstat.

The authors computed the average GDP for the G-7 nations and compared the figure with the value for Russia in percentage terms. This indicator demonstrated a trend toward decrease in the period 2012–2016. Between 2012 and 2016, there was a decline of 50.68%. The greatest decline was recorded in 2015 – 45.71%. The threshold value for this indicator is not less than 75%. With that said, in contrast with the period 2012–2014, when the threat to economic security was only in its incipience, in 2016 it turned into a major problem, with the nation falling behind on a number of general global trends under the pressure of sanction restrictions and amid cooling relations with certain nations.

In order to be able to directly compute the dependence of the state of the nation's economic security on its investment component, it is necessary to compute the key coefficients for this group of indicators: investment in the economy, inflow of foreign investment into and outflow of investment from the economy, investment in fixed capital stock, and share of foreign investment in total investment. The coefficients are computed based on the data mentioned earlier in this work (Table 4). The actual values are to be compared with the threshold ones. If an indicator deviates from the threshold value, depending on the direction of deviation, it may be possible to speak of there being a threat to the nation's economic security within this area with the group of investment indicators. Any deviation on the part of the indicators within the group of investment coefficients may have significant impact on the nation's economic security, as is evidenced in Table 5 below.

Table 5. Actual and Threshold Values for Indicators of the Investment Component in Russia's Economic Security (2012–2016), %

Coefficient	Threshold value	Actual value				
		2012	2013	2014	2015	2016
Investment in the economy, %	≤ 25	18.81	18.94	17.55	16.70	17.01
Inflow of foreign investment into the economy, %	≤ 5	1.35	2.33	1.29	0.71	N/A
Outflow of investment from the economy, %	≤ 5	1.27	3.09	2.84	1.91	N/A
Investment in fixed capital stock, %	≥ 10	10.38	10.07	9.43	8.65	N/A
Share of foreign investment in total investment, %	≤ 25	7.20	12.31	7.34	4.24	N/A

Source: Computed and compiled by the authors based on data from P.G. Nikitenko and V.G. Bulavko (2009), the Russian Federal State Statistics Service (n.d.), and S.Yu. Glazev (1997)

"The indicators of investment security approaching their maximum admissible values are testimony to an augmenting threat to social stability in society, and exceeding the threshold values – to society entering a zone of instability and social conflicts, in point of fact to, overall, a real threat to economic security" (Nikitina 2011, p. 30).

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In analyzing and comparing the actual values for the investment component of the nation's economic security, the most efficient method is ranking the indicators. This is due to that, visually, one may be tempted to consider as the most stable a year in which all indicators are the greatest, which is wrong. In ranking the indicators, depending on the direction in which the actual values deviate from the threshold one, each year is assigned a rank, with 1 standing for the best result (a safe direction for development) and 4 denoting the emergence of a threat. The most stable year is the one featuring the smallest sum of the ranks. The choice of a 1-to-4 ranking scheme has to do with the fact that data on the indicators are available only for 4 years: 2012, 2013, 2014, and 2015. There is a lack of up-to-date, credible data for the year 2016, due to which it was possible to compute just one coefficient: investment in the economy. Table 6 provides a ranking of indicators of the investment component in Russia's economic security for the period 2012–2015.

Table 6. Ranking of Indicators of the Investment Component in Russia's Economic Security (2012–2015), %

Coefficient	Actual value			
	2012	2013	2014	2015
Investment in the economy, %	3	4	2	1
Inflow of foreign investment into the economy, %	3	4	2	1
Outflow of investment from the economy, %	1	4	3	2
Investment in fixed capital stock, %	1	2	3	4
Share of foreign investment in total investment, %	2	4	3	1
Average rank	2	3.6	2.6	1.8

Source: Compiled by the authors based on data from P.G. Nikitenko and V.G. Bulavko (2009) and the Russian Federal State Statistics Service (n.d.)

The most stable year is 2015, with an average rank of 1.8. However, the year witnessed a shortage of investment in fixed capital stock and a threat of capital flowing out of the economy.
The authors' investigation helped identify the following threats to investment security within the Russian economy:
1. The rate of accumulation being insufficient to enable the Russian economy to shift to a new technological paradigm. According to scholar A.S. Bulatov, galvanizing the modernization of Russia requires a new wave of industrialization and a boost in the rate of gross accumulation to the level of the 1980s – 27–31% (Bulatov 2011).
2. Low rates of increase in investment compared with GDP growth.
3. Low, and continually falling, figures on foreign investment in fixed assets, while there are increases in portfolio investment.
4. Increased wear and tear on plant and equipment, with the share of totally worn-out plant and equipment having reached a disastrous point, which is resulting in an increased risk of accidents and declines in labor productivity.

Conclusions

The findings from the authors' study indicate that, under the influence of objective circumstances, it is the investment component that is coming today to the forefront within the system of national economic security. Investment security may be construed as the state's ability to control investment activity by means of relevant economic levers (without exerting too much control over the participants to ensure the autonomy of economic processes) in order to achieve a maximum effect from investment.

Investment security implies interaction with all components in economic security to ensure maximum effectiveness in implementing economic policy within the investment sphere.

The system of investment security is continually influenced by two major groups of factors: destructive ones, which reduce the overall level of security, and positive ones, which facilitate boosts in investment security and effective economic development.

To summarize the findings from the authors' analysis, the investment component in Russia's economic security is currently in a state of being protected. However, certain events of the last few years (the imposition of economic sanctions, a worsening of geoeconomic and geopolitical impact on the part of certain nations, the need to take part in military operations, etc.) have given rise to a number of threats that need to be minimized and eliminated as soon as possible to help stabilize the nation's economic security and improve its investment image globally. The imperatives for investment security ought to occupy a key place in the area of developing a long-term investment policy. Exploring the theoretical aspects and computing the indicators of investment security (in real time) serve as a basis for further research into the subject and may help detect and minimize threats that may arise in connection with the investment process, as well as develop and concretize a set of major focus areas for ensuring investment security at all levels.

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RELATIONSHIP OF GENDER TO THE POSITION OF SLOVAK UNIVERSITY STUDENTS ON THE SOCIO-ECONOMIC DETERMINANTS OF THE BUSINESS ENVIRONMENT AND THE DEVELOPMENT OF ENTREPRENEURSHIP

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Abstract. The current competitive environment and globalization processes create pressures on education processes at universities. Increasing business opportunities, business creation and business development is also one of the forms of unemployment. To do this, education for entrepreneurship at various levels of education is essential, as well as active support for infrastructure resources in the economy. High school students represent a significant group of young people with a sufficient knowledge base, analytical, creative and practical skills that are essential to building entrepreneurial self-confidence. Many research studies declare gender differences in the approach to entrepreneurship that have an impact on decision-making processes in the application of graduates of higher education. To eliminate these differences, it is important to explore in more detail the factors that cause them. This was also an incentive for our research. We realized online survey among students of Slovak universities in 2017. Our objective was to find which socioeconomic determinants of entrepreneurship are dependent on gender of students at Slovak universities. We wanted to know also how propensity for entrepreneurship is influenced by gender. From our results we can conclude that gender of students is significant determinant of attitude toward both entrepreneurship environment ($p < 0,05$) and especially entrepreneurship propensity ($p < 0,001$). Men are more self-confident from the viewpoint of actual and possible entrepreneurship than women. The results of our research can be beneficial to relevant policy makers as well as to experts involved in the development of regional development plans, business support and education experts, etc.

Keywords: Gender dependence; socioeconomic determinants; entrepreneurship environment; entrepreneurship; entrepreneurial competences; educational programs; entrepreneurial opportunities; barriers to business development.

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JEL Classifications: I21, I23, L26.

Additional disciplines sociology; psychology; educology; information and communication.

1. Introduction

In the current period, the interest in the development of entrepreneurship among young people is increasing. It is related to the pressures on the economic growth of the country, the increasing competitiveness of companies as well as technological and innovative developments (Stankevičiené et al. 2017; Duľová Spišáková et al. 2017). Business development in the country is also linked to the structural aspects of the economy, with a segment of small and medium-sized businesses taking the lead (Androniceanu, 2015; Ključnikov et al. 2016; Machová et al. 2017; Dobeš et al. 2017; Kozubíková et al. 2017). Their emergence and action is important especially where conditions for the operation of large institutions are not suitable. This concerns less developed areas, areas with high unemployment, and so on (Misoska et al., 2016). It is these aspects that are very important in supporting the entrepreneurial activities of young people (Staniewski & Awruk, 2015). An important role is played by business education, which is strongly criticized (Belas et al. 2017). One reason is the poor reflection of these educational programs on changes in the economic and business environment of the country, insufficient links with firms, and insufficient penetration of innovation in education processes (Bedzsula et al. 2016). New education programs must focus on entrepreneurial competences, multi-dimensional problems, creativity, creative and innovative activities, and so on (Dragolea et al. 2017; Estaswara, 2016). This also requires a specific approach to learning-based learning processes, as students perceive particular aspects and conditions of business, and whether their tendency towards entrepreneurship is modifiable by promoting quality learning processes (Upadhyay, 2017). These aspects supported us in a deeper study of the issue where we focused on the gender differences in attitudes of university students in Slovakia towards the socio-economic determinants of the business environment and the development of entrepreneurship. Main objective of our paper is to find which socioeconomic determinants of entrepreneurship are dependent on gender of students at Slovak universities. We wanted to know also how propensity for entrepreneurship is influenced by gender.

2. Literature Review

Available research studies provide interesting insights into the quality of entrepreneurial education and its determinants. Askun and Yıldırım (2011) examined the quality of entrepreneurial education at public higher education institutions in Turkey. Authors surveyed the websites of 360 Academic Units. Business authors understand this as a means of eliminating unemployment and other negative issues related to the global economic crisis. Improved human resources and a knowledge base are essential to improve business and support entrepreneurship. The authors call for the need to improve entrepreneurial courses in higher education. Enterprise education is one of the major infrastructure resources of the business economy, as it helps individuals to acquire business skills and knowledge. Many researches show that starting a business is related not only to education but also to knowledge and individual abilities. Entrepreneurial education takes the form of formal education, so universities should use the learning process as a real opportunity for students to set up businesses and use business cooperation. The conclusion of the study is of an institutional nature. The authors point out that while there are government, industrial and non-governmental organizations' efforts to develop the business environment in Turkey (in the legislative, knowledge and human infrastructure area), business development is insufficient in comparison to other advanced Eastern European countries. There are no coordinated national education strategies and policies implemented in industry strategies, which weakens the development of entrepreneurship. Research findings unequivocally confirm that courses in entrepreneurship at public higher education institutions in Turkey are insufficient to provide the necessary knowledge and skills for creating new business entities. Similar findings have also been found by experts Riel et al. (2015). In their research study, they focus on pan-European certified education and training programs. The authors point out that preparing young people for entrepreneurship is a

strategic goal in a knowledge-based economy to ensure sustained growth and essential for the successful start-up of small and medium-sized businesses that can sustain themselves in the business environment under the pressure of innovation. The authors emphasize the importance of education in the context of creating an innovation potential that is essential for business. They analyze the bjectives in training programs: developing entrepreneurial endeavours, educating students about the skills they need for entrepreneurship, developing their entrepreneurial ability to identify and exploit opportunities. Torres et al. (2017) examined gender differences in student decision making. Questionnaire research was carried out on a sample of 1493 students. Based on findings from other studies, women also decided to become entrepreneurs much less than men. Women are more attributed to their success by external circumstances than by their own abilities or efforts. Based on the findings of their findings, greater efforts to start a business were found among those students whose parents or relatives or friends are doing business. This business effort is much higher for students living in families where both parents run their own businesses. The authors also point to interesting findings that students who have expressed interest in doing business are also able to undertake higher risks (exhibiting greater tolerance for risk). Quality business education, business support by family members as well as the ability to undertake business risks are important attributes of business development in the country. Cavaller (2011) points out in his study the need to implement new systems to measure the performance and efficiency of university education. By giving the university the character of a business university, it requires a different approach to assessing the performance and efficiency of its learning processes. Cavaller highlights problems with the application of new methodologies in assessing heterogeneous education systems. According to the author, the new model of the university must identify and evaluate the actors of education, concentrate on analyzing the provided knowledge base for the students, with an emphasis on analytical, practical and creative skills. Pihie and Bagheri (2011) examined their differences in the entrepreneurial self-assessment of teachers and students of secondary vocational schools. A survey sample was made up of 315 teachers and 3000 students from technical and vocational secondary schools. They have used the Business Self-Assessment Tool (ESE) in both students and pedagogues. The authors point out that business education is currently scattered throughout the country. The results of their analyzes show that there is a significant difference in the results of business self-evaluation between teachers and students. Business confidence dominated most among the teachers, business self-sufficiency dominated among students. Differences in entrepreneurial efficacy between teachers and students point to the need for targeted and effective interventions in business education at technical and vocational schools to ensure the realization of the idea of "entrepreneurship as an alternative career". These research findings can be important for educators in creating specific education and training programs. The focus is on building effective education strategies and using effective methods by which teachers gain high motivation and confidence in their ability to effectively teach entrepreneurship, apply entrepreneurial teaching methods, increase their entrepreneurial efficiency, and etc. Belloti et al. (2012) focused on identifying the necessary knowledge and skills for prospective entrepreneurs. They took the form of interviewing and survey. The authors point out that entrepreneurial education in the EU lags behind the US and Canada. Business is currently underrepresented in education policies. Of the 21 million students in the EU, only about 5 million are involved in business. The problem is the fact that business education is offered only by business schools. Innovative and effective business ideas come from technical, scientific and creative studies. Authors at the conclusion of the study highlight shortcomings in the concepts of entrepreneurial education at universities, and insufficient solutions to these problems in national education policy as well as at the strategic level of the education system of the country. They also call for the need to increase skills for entrepreneurial pedagogy, which are different from those for other academic subjects. Improving entrepreneurship education should be a challenge for today's knowledge-based society.

3. Data and methodolog

All data were gathered by online survey that concerned attitude toward entrepreneurship among Slovak university students (216 men (38,0 %) and 352 women (62,0 %) in 2017. Together we gathered data of 40 indicators. They

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can be divided into ten groups. Indicators of first nine groups are rather input – entrepreneurship environment. They characterize attitude of students towards socioeconomic determinants of entrepreneurship in Slovakia. The tenth group was intended for entrepreneurship propensity (more output character). Each group contains four indicators. Complete list of all used indicators is as follows:

E1: Social environment
X11: There is an entrepreneur in my family and I highly respect him/her.
X12: Society in general appreciates entrepreneurs.
X13: Politicians as well as public consider entrepreneurs to be beneficial for society.
X14: Media provide true information regarding status and activities of entrepreneurs.

E2: Entrepreneurial support from state
X21: The state supports entrepreneurship by using its tools.
X22: The state creates high-quality conditions for starting an entrepreneurship.
X23: The state financially supports entrepreneurship.
X24: Legal conditions for doing entrepreneurship are of high quality.

E3: Macroeconomic environment
X31: I consider the macroeconomic environment of my country to be positive for doing entrepreneurship.
X32: The state of macroeconomic environment of my country supports starting an entrepreneurship.
X33: Present macroeconomic environment does not prevent me from starting an entrepreneurship.
X34: Present level of basic macroeconomic factors (GDP, employment, inflation) supports entrepreneurship and creates interesting entrepreneurship opportunities.

E4: Quality of entrepreneurship environment
X41: entrepreneurship environment of my country is of good quality and convenient for starting an entrepreneurship.
X42: The entrepreneurship environment of my country is relatively risk-resistant and enables to start an entrepreneurship.
X43: Conditions for doing entrepreneurship have improved in my country in the last five years.
X44: The amount of administrative work of entrepreneurs in my country has decreased in the last five years.

E5: Access to the financial resources
X51: There is no intensive financial risk in the entrepreneurship environment, i.e. having limited access to external financial sources, bad payment habits, etc.
X52: Entrepreneurship entities have easy access to bank credits.
X53: I consider the credit conditions of commercial banks in my country to be appropriate.
X54: The interest rates of commercial banks support entrepreneurship activities.
E6: Quality of university education
X61: I consider university education of my country to be of good quality.
X62: I consider the educational structure at my faculty (university) to be of high quality.
X63: The knowledge acquired at my faculty (university) will help me when doing entrepreneurship.
X64: The knowledge acquired by students in my country will help them to start an entrepreneurship.

E7: Personality traits
X71: An entrepreneur does not have to have any special innate abilities.
X72: The most important characteristics of an entrepreneur are specialization, persistence, responsibility, and risk-resistance.
X73: It is easier to do entrepreneurship if close relatives are in entrepreneurship.

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X74: Every person has certain prerequisites for doing entrepreneurship.
E8: Entrepreneurships advantages
X81: The advantages of entrepreneurship outnumber the disadvantages.
X82: An entrepreneur is wealthier and having a higher social status.
X83: Doing entrepreneurship enables to have career growth and interesting job opportunities.
X84: Doing entrepreneurship enables to make use of own abilities.
E9: Entrepreneurship disadvantages
X91: The disadvantages of entrepreneurship outnumber the advantages.
X92: The disadvantage of doing entrepreneurship is not having a regular income.
X93: The negative aspect of doing entrepreneurship is the fact that an entrepreneur does not have time to be with his/her family.
X94: The disadvantage of doing entrepreneurship is not having good reputation within society.

Y: Entrepreneurial propensity
Y1: I am very interested in entrepreneurship.
Y2: I am convinced that I will start an entrepreneurship after I graduate from university.
Y3: In case nothing unexpected happens, I will start an entrepreneurship within three years latest.
Y4: At present, I have entrepreneurship activities.
Measure of student agreement with statements about entrepreneurship conditions and about entrepreneurial propensity was graded by typical ordinal five-level Likert scale: 1 -Strongly disagree, 2 – Disagree, 3 - Neither agree, nor disagree; 4 – Agree, 5 - Strongly agree.
For achievement of our objective we used suitable statistical methods: descriptive statistics, parametric and nonparametric (Wilcoxon test) analysis of variance (ANOVA) and discriminant analysis (for possible multivariate classification of gender based on socioeconomic determinants and on propensity for entrepreneurship. All statistical reports and graphs were made by statistical system IBM SPSS version 19. We wanted to know association of gender to location parameters (arithmetic mean and median) of available entrepreneurial indicators. That is why we tested possible shift in mean and median in all available indicators by gender of students at Slovak universities.

4. Results

Basic statistical characteristics (arithmetic mean, median and sample standard deviation) of students' attitudes towards entrepreneurship grouped by gender are in table 1 (significant differences in analysed indicators according to gender are in bold).

Table 1. Statistical characteristics of attitude of students from Slovak universities toward entrepreneurship grouped by gender

Gender	Men (n = 216)			Women (n = 352)			Gender	Men (n = 216)			Women (n = 352)		
Variable	M	Mdn	s	M	Mdn	s	Variable	M	Mdn	S	M	Mdn	s
X11	3.81	4	1.142	3.85	4	1.158	X61	3.10	3	1.036	3.19	4	1.089
X12*	**3.09**	**3**	**0.972**	**3.29**	**4**	**0.958**	X62	3.49	4	1.061	3.51	4	0.984
X13	2.54	2	0.997	2.62	3	0.898	X63	3.46	4	1.025	3.53	4	1.001
X14	2.57	2	0.838	2.51	2	0.861	X64	3.29	4	0.956	3.30	4	0.991
X21	2.46	2	1.024	2.50	2	0.978	X71	2.95	2	1.170	2.80	2	1.139
X22	2.35	2	0.913	2.39	2	0.957	X72	3.72	4	0.903	3.85	4	0.843
X23	2.66	2	0.951	2.60	2	0.964	X73	4.02	4	0.795	4.12	4	0.795

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X24	2.47	2	0.945	2.60	2	0.901	X74	2.77	2	1.145	2.76	2	1.074
X31	2.52	2	0.988	2.49	2	0.961	**X81***	**3.42**	**4**	**1.022**	**3.20**	**3**	**0.988**
X32	2.70	2	0.949	2.60	2	0.925	**X82***	**3.18**	**3**	**1.001**	**2.97**	**3**	**1.011**
X33	3.20	3	0.956	3.05	3	0.952	X83	3.80	4	0.804	3.82	4	0.762
X34*	**2.93**	**3**	**0.966**	**2.75**	**3**	**0.915**	X84	4.07	4	0.777	4.00	4	0.702
X41	2.46	2	0.983	2.45	2	0.945	**X91***	**2.68**	**2**	**1.045**	**2.86**	**3**	**0.970**
X42	3.07	3	0.986	3.15	3	0.955	**X92*****	**3.25**	**4**	**1.053**	**3.56**	**4**	**0.904**
X43	2.88	3	1.066	2.91	3	0.923	X93	3.17	3	1.104	3.18	3	1.111
X44	2.48	2	1.011	2.54	3	0.957	**X94****	**2.66**	**3**	**0.931**	**2.46**	**2**	**0.833**
X51	2.57	2	0.971	2.68	2	0.956	**Y1*****	**3.68**	**4**	**1.067**	**3.39**	**4**	**1.043**
X52	3.38	4	0.870	3.34	4	0.860	**Y2*****	**3.25**	**3**	**1.154**	**2.86**	**3**	**1.037**
X53	3.26	3	0.863	3.31	4	0.837	**Y3*****	**3.01**	**3**	**1.110**	**2.70**	**3**	**0.975**
X54**	**3.30**	**3**	**0.882**	**3.10**	**3**	**0.870**	**Y4*****	**2.44**	**2**	**1.215**	**2.06**	**2**	**1.020**

Notes: M - arithmetic mean; Mdn – median; s – sample standard deviation, * $p < 0.05 \wedge p \geq 0.01$; ** $p < 0.01 \wedge p \geq 0.001$; *** $p < 0.001$.

Source: own processing

The four dependent variables stated as Y1 to Y4 seem to have quite high sample standard deviations for the both genders. For the male population, it is little bit higher than for the female population. From the whole data set, the highest values of sample standard deviation are reached just right by the dependent variables. The number 4 as median is recorded only in a few cases up to the X61 indicator, but then it is the most frequent answer of the respondents.

From the table we can see that measure of agreement with entrepreneurship environment statements is significantly larger in group of men in comparison with women in case of following indicators:
X34 (Present level of basic macroeconomic factors (GDP, employment, inflation) supports entrepreneurship and creates interesting entrepreneurship opportunities),
X54 (The interest rates of commercial banks support entrepreneurship activities),
X81 (The advantages of entrepreneurship outnumber the disadvantages),
X82 (An entrepreneur is wealthier and having a higher social status),
X94 (The disadvantage of doing entrepreneurship is not having good reputation within society).
On the other, side women were more likely to agree in case of:
X12 (Society in general appreciates entrepreneurs),
X91 (The disadvantages of entrepreneurship outnumber the advantages),
X92 (The disadvantage of doing entrepreneurship is not having a regular income).
These indicators seem to be statistically significantly larger for male population than for female population. The disparities in evaluation of these indicators are at a level of few tenths generally. For the X12 indicator it is at a level of 0.2 for the female population, for X34 indicator it is 0.18 for the male population, the X54 indicator – 0.2 for the male population, the X81 indicator – 0.22 for the male population, the X82 indicator – 0.21 for the male population, the X91 indicator – 0.18 for the female population, the X92 indicator – 0.31 for the female population, and finally the X94 indicator – 0.2 for the male population.

The significant differences of entrepreneurship environmental statements between men and women are depicted in error bar plot (95% confidence interval of arithmetic mean, graph 1). We must remark that indicator X91 (The disadvantages of entrepreneurship outnumber the advantages) was excluded from further analyses because of its

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redundant information in comparison with X81 (The advantages of entrepreneurship outnumber the disadvantages). Both indicators have got the same meaning: X81 is positive about entrepreneurship advantages while X91 is rather negative.

It is interesting that there are no differences in indicators by gender in following entrepreneurship environmental groups: E2 (Entrepreneurial support from state), E4 (Quality of entrepreneurship environment), E6 (Quality of university education) and E7 (Personality traits).

On the opposite all four output indicators of entrepreneurial propensity are highly dependent on gender. From input entrepreneurship environmental, indicators seem to be the most often significant (three from four) are indicators of group E8 (Entrepreneurship disadvantages).

The following Figure 1 demonstrates error ranges of the individual indicators.

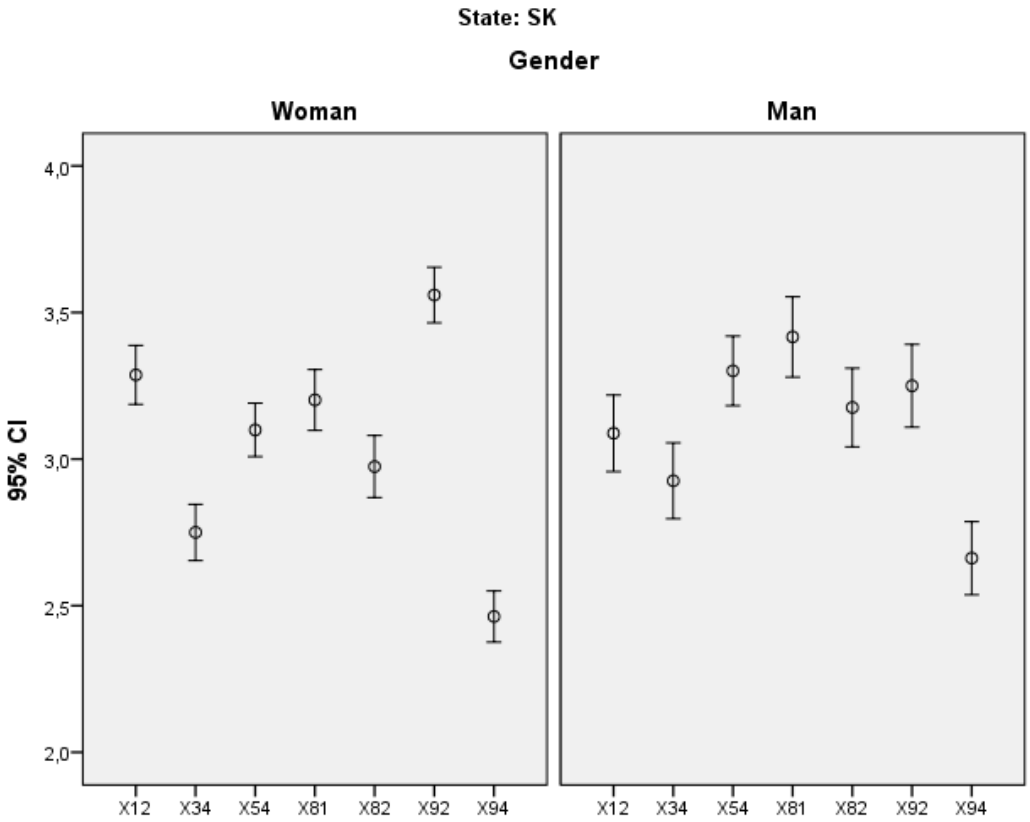

Fig.1. Error bar plot of significant differences in agreement with entrepreneurship environmental statements between students - men and students - women

Source: own processing

Differences in all four output indicators of entrepreneurial propensity were significant:
Y1 (I am very interested in entrepreneurship),
Y2 (I am convinced that I will start an entrepreneurship after I graduate from university),
Y3 (In case nothing unexpected happens, I will start an entrepreneurship within three years latest),
Y4 (At present, I have entrepreneurship activities).

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And in all of them were location parameters larger in group of men in comparison with women (p < 0,001; see also figure 2). So men are more self-confident from the viewpoint of actual and possible entrepreneurship. The gender differences are at an approximate level of a few tenths. In a case of the Y1 dependent variable, the disparity is calculated at a level of 0.29, the Y2 variable difference is at level of 0.39, the Y3 variable – 0.31 and finally, the Y4 variable – 0.38. All the dependent variables are differentiated towards the male population.
Figure 2 visualises rangeof error rate of the significant differences according to entrepreneurship propensity statements between men and women.
.

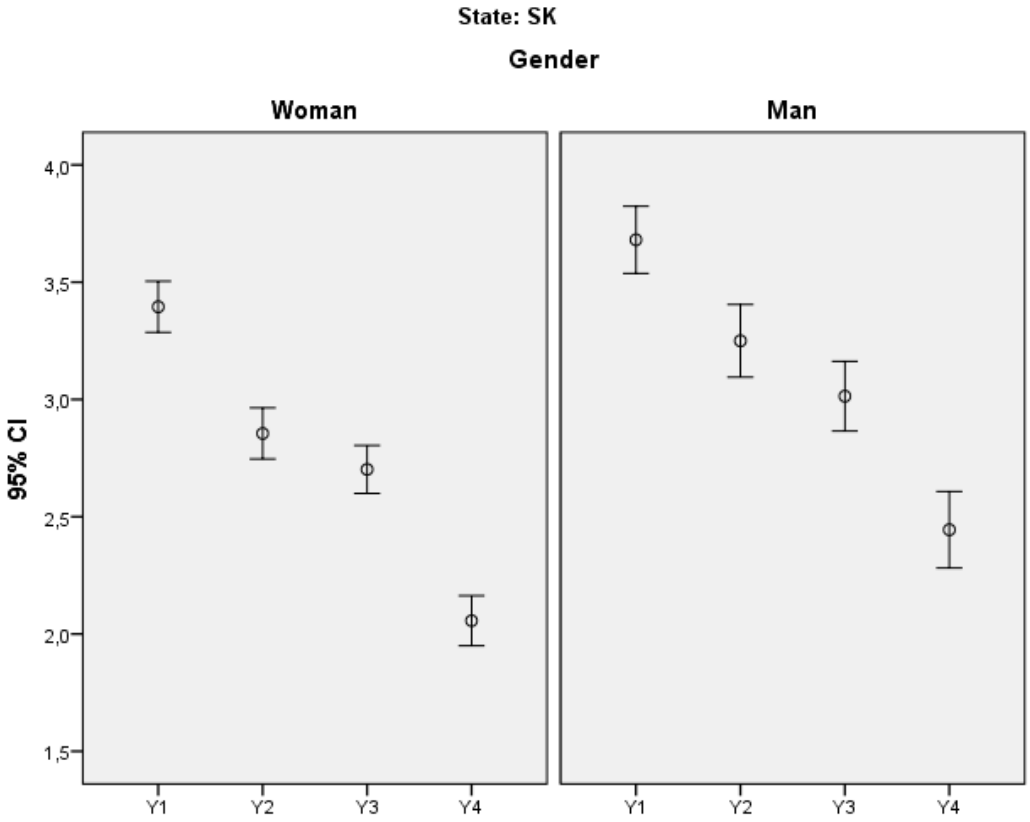

Fig.2. Error bar plot of significant differences in agreement with entrepreneurship propensity statements between men and women

Source: own processing

Next objective was to find out multivariate dependence of gender on a few entrepreneurship indicators. For achievement of the objective we used stepwise discriminant analysis. From original count of 12 univariate significant differences in all entrepreneurship predictors by gender stepwise discriminant analysis has found five. In table 2, there are results of stepwise discriminant analysis. In the first step algorithm included indicator Y2 (I am convinced that I will start an entrepreneurship after I graduate from university). At second was added indicator X92 (The disadvantage of doing entrepreneurship is not having a regular income). The third significant indicator was X12 (Society in general appreciates entrepreneurs). Last two included indicators are X54 (The interest rates of commercial banks support entrepreneurship activities) and Y4 (At present, I have entrepreneurship activities). All involved indicators are highly significant (p < 0,001).

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Table 2 reveals statistical significance of the variables involved in the analysis.

Table 2. Significant entrepreneurship predictors of gender of Slovak university students found by stepwise discriminant analysis

		Wilks' Lambda							
						Exact F			
Step	Entered	Statistic	df1	df2	df3	Statistic	df1	df2	Sig.
1	Y2	0.970	1	1	566	17.790	1	566	0.000
2	X92	0.948	2	1	566	15.472	2	565	0.000
3	X12	0.931	3	1	566	13.919	3	564	0.000
4	X54	0.921	4	1	566	12.086	4	563	0.000
5	Y4	0.912	5	1	566	10.880	5	562	0.000

Source: own processing

The exact F-test reveals that all the variables mentioned in Table 2 come from the same probability distribution. This is the fact important to carry out the whole analysis.

Conclusions

Economic uncertainty of the labour market and the threat of unemployment require a constant increase in education and skills. One of the Europe 2020 initiatives is to improve entrepreneurial skills and innovation. The importance of the education system in supporting business attitudes and skills has increased in the recent decade. The education system must flexibly respond to changing national and global business environments as well as the economic and social conditions. This requires a consistent preparation of the workforce entering the labour market, which increases the demands for the learning processes. For their quality setting, it is important to know the students' preferences for entrepreneurship, their motives, attitudes and opinions. This was also the goal for our research. On basis of available data gathered by online survey among students of Slovak universities we have got some important results. Gender of students is a significant determinant of attitude toward of both entrepreneurship environment and entrepreneurship propensity. The gender disparities in a field of the explored indicators are quite visible. The male population agree with the statements, which has more general aim – for instance, macroeconomic situation is willing to support entrepreneurship in form of creation of new potential entrepreneurship opportunities along with the interest rates that provides a good background for such support. Also, the male population thinks that all the advantages overweight all the disadvantages and entrepreneurship. The sole personal indicator points to a state of entrepreneur – to its bigger wealth and higher social status. This is confirmed also by the indicators X71 and X74 for the both genders with the values of 2.95 and 2.77 for the male population and 2.80 and 2.76 for the female population respectively. On the other hand, the female population is in agreement with the fact society appreciates entrepreneurs and with the disadvantages – concerning not regular income of entrepreneur and also a fact that all the disadvantages outnumber all the advantages of entrepreneurship. This is curious because for the male population it is absolutely oppositely. To summarise the whole outcome of the analysis, there should be noted that the investigated findings are quite different. This could be an input for the further analysis and a platform for additional research.

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MIGRATION AND THE ECONOMIC CRISIS IN THE EUROPEAN UNION MEMBER STATES: CLUSTER ANALYSIS

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Abstract. European Union (EU) is facing large migration flows, whose distribution and volatility in the observed period between 2006 and 2015 across the EU member states, among other factors, were affected by the financial and economic crisis. This paper examines how the homogeneity of the EU member states was changing with respect to economic performance and migration statistics indicators. Consequently, the non-hierarchical cluster analysis by using k-means method was conducted based on the average values of the selected variables in four time periods: the pre-crisis, crisis, and post-crisis periods. The fourth period is year 2015, the beginning of massive immigration in the EU area due to world migration crisis. Our results indicate relative stability of the number and structure of clusters of EU-28 member states in the selected time periods on the bases of observed variables. There are few exceptions, however, related to countries that were heavily influenced by the financial and economic crisis, and Germany which stood out with decreasing unemployment rates and increasing net migration values in the post-crisis period.

Keywords: economic crisis; European Union member states; migration; non-hierarchical cluster analysis

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JEL Classifications: C38, E00, F22

1. Introduction

European Union (EU) has been hosting growing number of foreign citizens every year. According to Eurostat data, in the period between 2007 and 2015 their number rose by 22.4% (Eurostat 2017). If observing the available data on the stock of foreign citizens in the pre-crisis period, for example in 2007, around 28.6 million foreign citizens lived in the EU-28 member states, which is approximately 6% of total population in EU-28 in this period. In Germany (around 7 million or 25%), Spain (4.5 million or 16%) and France (3.7 million or 13%) lived a slightly more than half of all foreign citizens. If the United Kingdom (3.7 million or 13%) and Italy (2.9 million or 10%) are added, it can be concluded that five economically largest EU-economies hosted three fourths of all foreign citizens in EU-28 in 2007. Similar conclusion holds for 2015. Around 35 million foreign citizens lived in EU-28 in 2015, which is around 7% of the total population (Eurostat 2017). According to Eurostat's database,

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Germany hosted the largest number of foreign citizens in EU-28 in 2015 with 7.5 million (22%), the United Kingdom with 5.4 million (15%) and Italy with 5 million (14%) followed. Finally, Spain and France each contributed with around 13% and 12%, respectively. As can be noticed, the share of foreign citizens in the EU population has increased and their distribution has slightly changed.

Greater volatility is observed, however, when migration flows in the European Union are analysed. The observed period between 2006 and 2015, for which data were available, is very interesting from an economic point of view, since it includes the data for the EU in the pre-crisis period, the data in the period when the EU was struggling with the global financial and economic crisis and the period of the recovery of most EU economies. Furthermore, the world migration crisis in 2015 caused a massive immigration in the EU member states from the Middle East area and Africa. Due to different economic performances of the EU member states which, among other factors, highly influences the size and direction of migration flows, migration flows were very volatile. Some EU countries, which were known as net immigration countries, because of their exceptional economic performances (among other social and political factors) in the pre-crisis period, became net emigration countries, due to increasing emigration and decreasing immigration levels.

On a more general level, the reasons for migrating can be grouped into economic, social and political ones. In this paper we are especially interested in how the homogeneity of the EU member states was changing in the period between 2006 and 2015 with respect to economic performance and migration statistics indicators. The gross domestic product (GDP) per capita was chosen as economic performance proxy, whereas the unemployment rate is used as the labour market performance indicator. The migration statistics indicators are represented by net migration as an indicator of migration flows, and stock of foreign citizens variable as an indicator of migration stock. Consequently, in this paper non-hierarchical cluster analysis by using k-means method with respect to the aforementioned variables in four time periods is conducted. The first period is the pre-crisis period, which includes years 2006 and 2007. The second is the crisis period between 2008 and 2012. The third period refers to the recovery phase and includes years 2013 and 2014. The final period is year 2015, the beginning of massive immigration in the EU area due to world migration crisis. For every time period the cluster analysis is conducted, based on the average values of the selected variables.

The paper is organized as follows. After brief introduction, section 2 gives the literature review. Section 3 explains data and methods. Section 4 gives overview of the European Union economic and migration performances in the period between 2006 and 2015, including descriptive statistics and correlation analysis. Section 5 is devoted to non-hierarchical cluster analysis and interpretation of the results. Section 6 concludes.

2. Literature review

The two main objectives of theoretical and empirical research of migration focus on the migrants' decision to leave their country of origin, including the choice of the destination country, and on the economic impacts of migration flows for the destination country (Lincényi 2017; Njaramba et al. 2018; Lietuvnikė et al. 2018). The answers to these questions play a crucial role in developing immigration policies for the European countries (Kerr, Kerr 2011).

The human capital model in the mainstream economics implies that international differences in the returns to factor supply, controlling for migration costs, skill levels, income inequality and immigration policies motivate a worker to move (Bodvarsson, Van den Berg 2013). Hicks in 1932 in his Theory of Wages (Hicks 1932) argues that „differences in net economic advantages, chiefly differences in wages, are the main causes of migration“. Borjas' mathematical formalization of Roy model on self-selection in immigration is the theoretical model used in analysing the determinants of immigration and the composition of immigrant flows (Borjas 1999). Mayda (2010)

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in her empirical investigation of the determinants of international bilateral migration inflows into fourteen OECD countries by country of origin, between 1980 and 1995, using panel data set, actually tests predictions of a standard international migration model. Among economic determinants of migration flows, Mayda (2010) finds that income opportunities in the destination country significantly increase the size of emigration rates. The share of the young population in the total number of population of the origin country, as a demographic factor, has a positive and significant impact on emigration rates (Mayda 2010). Country's immigration policy plays a very important role in the number and skill distribution of immigrants (Hatton, Williamson 2002). For example, although both the United States and Canada attract large numbers of immigrants, their different immigration policies generate immigrant population that greatly differs in their skill mix (Aydemir, Borjas 2007). Network effects, especially important in providing job information and financial and psychological support to immigrants (Johnson 1980), imply high correlation of bilateral migration flows over time (Clark et al. 2007), which Mayda (2010) also found in her research. Hille and Straubhaar (2001) using pooled time series, cross sectional model of bilateral migration flows between the Southern and Northern EU countries take bilateral rate of migration between emigration and immigration countries in the certain time period as dependent variable, and wage differentials (neoclassical approach), unemployment rates and the distance between countries (human capital approach) and stock of migrants living in the destination country (network migration approach) as independent variables, which are specified in logarithms (Hille and Straubhaar 2001). All estimated coefficients, except the coefficients for distance, have the expected signs and are statistically significant. However, all four coefficients appeared to be jointly significant. Therefore, when analysing determinants of migration flows, the economic, social and institutional variables are taken into account.

The main findings in the extensive literature on the economic impacts of migration, especially its impact on immigrants' and natives' wages and employment, comes down to the overall conclusion that ‘the likelihood and magnitude of adverse labour market effects for natives from immigration are substantially weaker than often perceived’ (Kerr, Kerr 2011). Naturally, some migrant and native groups are more affected than others, depending on the age, education and duration of migrant's stay.

In recent years, according to the survey of Nathan (2014), attention in the migration literature shifted towards exploring the wider effects of migration on the production and consumption sides of the host country, especially on the entrepreneurship, innovation, investment, prices and public sector, where focus is on the role of high-skilled migrants.

Increasing immigration levels in the EU, especially since 2013, importantly contribute to Europe's population growth. Cuaresma et al. (2015) in their quantity and quality perspective of migration, claim that Europe’s economic future, among other factors, will by a large amount be influenced by two issues: population ageing and large migration flows. According to United Nations (2017), the size of the total population in Europe would have declined during the period 2000-2015 in the absence of migration. According to European Commission’s Eurobarometer report for spring 2015, immigration was the most important issue EU faced in 2015 (European Commission 2015). Consequently, migration issue is seen as one of top priorities at the public and political levels (International Organization for Migration 2017). In addition, it is becoming a first-order policy question in research also (Kerr, Kerr 2011). There is a lot of literature on migration flows and the impact of economic crisis on EU-economies (i.e. Beets, Willekens 2009, Chojnicki, Edo, Rogot 2016), but to our knowledge, there is no paper making the cluster analysis on the EU member states in the pre-crisis, crisis and post-crisis periods.

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3. Data and methods

According to the literature review, for the economic and the labour market performance indicators GDP per capita and unemployment rate are chosen. The migration statistics indicators are represented by net migration as an indicator of migration flows, and stock of foreign citizens variable as an indicator of migration stock. Data are collected from Eurostat database (Eurostat 2018a, b, c, d, e, and f) for the EU-28 member states in the period from 2006 to 2015. Data for the variable Stock of foreign citizens are available for the period 2007-2016. In addition, there is no Stock of foreign citizens data for Croatia in the period from 2007 to 2012, for Greece in 2008, for Poland in 2009 and for Romania in the period from 2007 to 2011. Also, there are missing data for Net migration variable. There is no Net migration data for Belgium in 2008 and in 2009, for Bulgaria in 2006 and in the period from 2008 to 2011, for Cyprus in 2008, for Poland in 2008 and for Romania in 2006 and in 2007.

According to Eurostat (2018a, b, c, d, e, f), real GDP per capita is calculated as the ratio of real GDP to the average population of a specific year. The unemployment rate is the number of people unemployed as a percentage of the labour force, where unemployed person is defined according to the guidelines of the International Labour Organization. Unemployed person is someone aged 15 to 74 (in Italy, Spain, the United Kingdom, Iceland and Norway aged 16 to 74 years), without work during the reference week, available to start work within the next two weeks or has already found a job to start within the next three months, and actively having sought employment at some time during the last four weeks. Net migration of a country is the difference between immigration to and emigration from a given area during the year.

The period for which data were available is analysed, which includes the years from 2006 to 2015. Annual growth rate of GDP in real terms in EU-28 economy was used to determine which time period enables the analysis of the economic performance, and as a result the analysis of migration flows, before, during and after the global and financial crisis. In the first defined time period from 2006 and 2007, the average growth rate of GDP for EU-28 economy was 3% in 2007 compared to the year before. Furthermore, the period of the considerable impact of the global financial and economic crisis on the EU-28 economic output, labour market performance and migration flows includes the years from 2008 to 2012, with the negative growth rate of GDP of the EU-28 economy in 2009 of 4.3%, followed by the recovery in two consecutive years (2010 and 2011), with the growth rates of GDP of 2.1% and 1.7%, respectively, but then again the EU-28 economy fell by 0.4% in 2012. Finally, the third and fourth periods are characterized by the continuous growth of the EU-28 economy, and include the years from 2013 to 2015.

In the first step basic descriptive analysis, along with correlation analysis, is conducted. Afterwards, non-hierarchical cluster analysis by using k-means method will be applied to identify homogeneous groups for the EU member states according to values of the observed variables in selected time periods (Mooi, Sarstedt 2011).

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4. Overview of the European Union economic and migration performances in the period between 2006 and 2015 - descriptive statistics and correlation analysis

In the first step, basic descriptive statistics analysis for the four observed variables is conducted and the main results are given in Table 1.

Table 1. Descriptive statistics results of the four observed variables for different observed periods

Period	Statistics	Variable			
		Real GDP per capita	Net migration	Stock of foreign citizens	Unemployment rate
2006-2007 average	n	28	27	26	28
	Mean	24,739	64,252	1,100,308	7
	Std. dev.	16,197	147,259	1,750,853	2
	Coef. var.	65	229	159	31
	Median	23,175	17,827	364,577	7
	Skewness	1.52	3.64	2.22	0.75
	Minimum	4,700	-28,310	13,401	4
	Maximum	81,800	714,875	7,207,716	12
2008-2012 average	n	28	28	27	28
	Mean	24,279	27,302	1,167,578	9
	Std. dev.	15,538	81,797	1,824,563	3
	Coef. var.	64	300	156	37
	Median	21,610	7,526	363,409	8
	Skewness	1.51	2.60	1.95	0.95
	Minimum	5,220	-74,707	17,982	5
	Maximum	78,900	348,816	6,804,369	19
2013-2014 average	n	28	28	28	28
	Mean	24,411	28,947	1,197,033	11
	Std. dev.	15,872	116,906	1,921,035	5
	Coef. var.	65	404	160	50
	Median	19,025	2,438	348,010	9
	Skewness	1.57	2.68	1.86	1.72
	Minimum	5,450	-173,254	21,901	5
	Maximum	79,300	497,029	6,829,468	27
2015	n	28	28	28	28
	Mean	25,439	67,746	1,254,401	10
	Std. dev.	16,304	229,181	2,000,596	5
	Coef. var.	64	338	159	50
	Median	20,100	3,523	346,814	9
	Skewness	1.53	4.54	1.95	1.83
	Minimum	5,800	-61,923	22,470	5
	Maximum	81,300	1,196,686	7,539,774	25

Source: Authors

According to results presented in Table 1, in the observed period between 2006 and 2015, all observed variables are characterized by large differences in values across EU member states, with the coefficient of variation of above 30% in all time periods. The average GDP per capita in the EU-28 member states in the period between 2006 and 2015 was around 25 thousand € with slight fluctuations from one period to the next, but with high differences across countries (as expected), with the coefficient of variation of around 64%.

The lowest value of GDP per capita in 2015 of 5,800 € was recorded in Bulgaria, and the largest of 81,300 € in Luxembourg. Countries that positively stand out in the size of GDP per capita relative to other countries, next to

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Luxembourg, are Denmark, Ireland and Sweden. On the other hand, Bulgaria, Romania, Poland, Latvia and Croatia had the lowest GDP per capita in EU-28 in 2015.

The lowest differences between EU countries are visible when unemployment rate in the period 2006-2007 is analysed. This is not surprising since this was the time when all EU member states experienced positive economic growth. Especially high GDP growth rates in the pre-crisis period had Central-Eastern European Union countries. In particular, the Baltic countries grew on average by 9.9% in 2006 compared to the year before. Due to international exposure, they were also heavily hit by the global financial and economic crisis, resulting in GDP contraction by around 15% in 2009, but they rapidly recovered. The main reason for the economic prosperity of Central-Eastern European Union countries was a strong reliance on foreign capital, with two trajectories of capital development distinguished (Avlijas 2017). The Baltic countries encourage the high value service sectors, such as banking and real estate (Bohle, Greskovits 2012), while the Czech Republic, Hungary, Poland and Slovakia rest mostly on the industry sector, producing higher value manufacturing products (Stockhammer et al. 2016).
The average unemployment rate in the EU-28 in the period 2006-2007 was 7%. The highest income EU-economies (measured by GDP per capita), Denmark (3.9%), Ireland (4.6%), Luxembourg (4.4%), the Netherlands (4.6%) and Austria (5.1%) recorded the lowest average unemployment rates in this period. On the other hand, new EU member states: Slovakia (12.45%), Poland (11.8%) and Croatia (10.8%) recorded the highest average unemployment rates in the period 2006-2007.

When the migration flows in the observed period are analysed, the total number of immigrants into the EU area increased by around 13% in 2007 compared to the previous year, but the trend reversed in the period between 2007 and 2009. Since 2010, the number of immigrants has started to rise, whereby the rise in the period between 2010 and 2013 was very modest, by 5%. In the period from 2013 and 2015 the number of immigrants in the EU member states rose by 37%, from 3.4 million to 4.6 million. When emigration is concerned, 2.8 million people emigrated from the EU-28 in 2015. The number of emigrants shows an upward trend since 2009, with slight fluctuations. Therefore, net migration since 2013 more than tripled and was equal to 1.9 million people in 2015.

The highest variability across countries is noticed when the variable Net migration, next to the variable Stock of foreign citizens, is concerned. In the period between 2006 and 2007 Spain was the leading EU immigration country. It was the time when Spain enjoyed continuous economic growth, reaching 4.2% in 2006 and 3.8% in 2007. In 2006 841 thousand, and in 2007 968 thousand immigrants entered Spain, causing, among other factors, higher rate of demographic growth. Spain was the leading immigration country up until 2008. Very high immigration levels of around 900 thousand and relatively low emigration levels caused the highest positive net migration values of about 700 thousand in 2006 and 2007. Germany followed Spain with high levels of immigration of around 670 thousand. At the same time, many people emigrated from Germany, which resulted in low but positive levels of net migration and put Germany on the last place among the top five economically largest EU countries according to the values of net migration in this period (other countries in decreasing order of magnitude were Italy, United Kingdom and France in the period 2006-2007).

As it was already mentioned, in 2007, the largest number of foreign citizens lived in the strongest EU economies, Germany, Spain, France, United Kingdom and Italy. On the other hand, Malta (13.4 thousand), Bulgaria (25.5 thousand) and Slovakia (32.1 thousand) recorded the lowest number of foreign citizens in 2007.

In 2009, due to global economic and financial crisis, the average GDP in EU-28 decreased by 4.3% compared to the year before. All countries except Poland faced negative growth rates in 2009. This was the time when the Polish economy was enjoying high investment rates, which resulted in rapid capital accumulation. One of the sources of investment funding was “inflow of structural funds from the EU”. On the other hand, low productivity labour force was replaced by more productive workers (Gradzewicz et al. 2014).

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Due to severe global economic crisis, from the period 2006-2007 to the period 2013-2015 period the average EU-28 unemployment rate rose by 43%. An interesting fact is that the variability across countries with respect to unemployment rate increased by 60% from the 2006-2007 to the 2013-2015 period. On one side, there were Germany (4.6%), the Czech Republic (5.1%) and the United Kingdom (5.3%) that recorded the lowest unemployment rates in 2015, whereas Greece (24.9%) and Spain (22.1%) were struggling with the highest unemployment rate in 2015 (although the situation was even worse in 2013 on the Greek and Spanish labour market).

Among the Central EU countries (the Czech Republic, Hungary, Poland and Slovakia), Poland has been recording the highest negative net migration values in the EU since 2007, reaching the highest value in 2011, of 109 thousand people. Immigration levels were relatively high and increasing, especially since 2009, when Poland adjusted its immigration policy to become more open to immigrants, especially those "needed by the Polish economy", (Dąbrowski et al. 2014). At the same time, emigration levels recorded even higher values, especially after Polish accession into the EU in 2004. It is therefore not surprising that Poland is called an immigration and emigration country.

The EU enlargement in 2004 affected migration flows in Baltic countries, resulting in massive emigration (Hazans 2016). According to the data in the observed period from 2006 to 2015, Latvia was experiencing large emigration flows. A major increase in emigration levels is especially evident after the beginning of economic crisis in 2008, when the number of emigrants suddenly increased by 75% compared to the year before (from 15,463 in 2007 to 27,045 in 2008). This trend continued up until 2011. This is not surprising, since the Baltic countries were experiencing the largest GDP drop, by 15% in 2009 compared to the year before. Consequently, unemployment rates rose sharply in all three Baltic countries, from 5.5% in 2008 to 13.5% in 2009 and 16.7% in 2010 in Estonia, from 7.7% in 2008 to 17.5% in 2009 and 19.5% in 2010 in Latvia, and from 5.8% in 2008 to 13.8% in 2009 and 17.8% in 2010 in Lithuania. The following years were characterized by positive growth rates and falling unemployment rates, with year 2015 ending with the unemployment rate of 6.2% in Estonia, 9.9% in Latvia and 9.1% in Lithuania.

It is interesting to note how outliers at the variable Net migration changed in the observed period. In the pre-crisis period, up to 2007, Spain was on the top of European Union's countries of immigration. With the global financial and economic crisis, migration flows changed. Spain was recording high GDP contractions and increasing unemployment rates, which resulted in decreasing levels of immigration and increasing levels of emigration. Consequently, Spain became net emigration country. In the period 2008-2012 Italy stood out as the country with the highest net migration of 349 thousand. Since 2012 Germany took the first place, deviating with almost 5 standard deviations from the mean net migration in 2015. The detailed results are given in Table 2.

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Table 2. Standardized values of variables (z-scores), the top three and the last three European Union member states

Period	Variable	Top three		Last three	
		Member state	z-score	Member state	z-score
2006-2007 average	Real GDP per capita	Luxembourg	3.52	Bulgaria	-1.24
		Denmark	1.32	Romania	-1.17
		Ireland	0.97	Poland	-1.02
	Net migration	Spain	4.42	Poland	-0.63
		Italy	1.93	Lithuania	-0.59
		United Kingdom	0.82	Latvia	-0.49
	Stock of foreign citizens	Germany	3.49	Malta	-0.62
		Spain	1.91	Bulgaria	-0.61
		France	1.48	Slovakia	-0.61
	Unemployment rate	Slovakia	2.42	Denmark	-1.43
		Poland	2.15	Cyprus	-1.25
		Croatia	1.70	Luxembourg	-1.19
2008-2012 average	Real GDP per capita	Luxembourg	3.52	Bulgaria	-1.23
		Denmark	1.28	Romania	-1.15
		Sweden	0.97	Latvia	-0.97
	Net migration	Italy	3.93	Romania	-1.25
		United Kingdom	2.12	Poland	-1.16
		Germany	1.50	Lithuania	-0.79
	Stock of foreign citizens	Germany	3.09	Malta	-0.63
		Spain	2.26	Lithuania	-0.62
		United Kingdom	1.79	Romania	-0.62
	Unemployment rate	Spain	2.82	Austria	-1.31
		Latvia	1.70	Netherlands	-1.30
		Greece	1.51	Luxembourg	-1.26
2013-2014 average	GDP per capita	Luxembourg	3.46	Bulgaria	-1.19
		Denmark	1.28	Romania	-1.11
		Sweden	0.99	Latvia	-0.90
	Net migration	Germany	4.00	Spain	-1.73
		United Kingdom	1.99	Greece	-0.70
		Italy	1.13	Poland	-0.68
	Stock of foreign citizens	Germany	2.93	Lithuania	-0.61
		United Kingdom	1.99	Malta	-0.61
		Spain	1.91	Croatia	-0.61
	Unemployment rate	Greece	2.99	Germany	-1.05
		Spain	2.67	Austria	-0.98
		Croatia	1.20	Luxembourg	-0.90
2015	Real GDP per capita	Luxembourg	3.43	Bulgaria	-1.20
		Ireland	1.59	Romania	-1.11
		Denmark	1.22	Croatia	-0.91
	Net migration	Germany	4.93	Romania	-0.57
		United Kingdom	1.15	Greece	-0.49
		Italy	0.29	Poland	-0.47
	Stock of foreign citizens	Germany	3.14	Lithuania	-0.62
		United Kingdom	2.08	Malta	-0.61
		Italy	1.88	Croatia	-0.61
	Unemployment rate	Greece	3.19	Germany	-1.05
		Spain	2.60	Czech Republic	-0.94
		Croatia	1.35	United Kingdom	-0.90

Source: Authors

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Table 3 contains correlation matrices for the observed variables in the four observed periods. Due to some missing data, number of included EU member states is not the same in all observed periods. Casewise deletion approach was applied. In other words, if there is a missing data at any of the observed variable, such EU member state was omitted from the analysis.

Table 3. Correlation matrices, n=26 for 2006-2007 period average, n=27 for 2008-2012 period average, n=28 for 2013-2014 period average and for 2015

Period	Statistics	Variable			
		GDP per capita	Net migration	Stock of foreign citizens	Unemployment rate
2006-2007 average	GDP per capita	1.0000			
	Net migration	0.0708	1.0000		
	Stock of foreign citiz.	0.1415	0.5521***	1.0000	
	Unemployment rate	-0.4389**	0.0590	0.2063	1.0000
2008-2012 average	GDP per capita	1.0000			
	Net migration	0.2525	1.0000		
	Stock of foreign citiz.	0.1724	0.6558***	1.0000	
	Unemployment rate	-0.4261**	-0.2050	0.1229	1.0000
2013-2014 average	GDP per capita	1.0000			
	Net migration	0.2504	1.0000		
	Stock of foreign citiz.	0.1975	0.6521***	1.0000	
	Unemployment rate	-0.3280*	-0.4692**	0.0567	1.0000
2015	GDP per capita	1.0000			
	Net migration	0.1982	1.0000		
	Stock of foreign citiz.	0.1855	0.7522***	1.0000	
	Unemployment rate	-0.2359	-0.2839	0.0305	1.0000

Note: * Statistically significant correlation at 10%. ** Statistically significant correlation at 5%. *** Statistically significant correlation at 1%.
Source: Authors, Statistica 13.3

Correlation between the variable net migration and the variable stock of foreign citizens is highly statistically significant in all the observed periods, and there is positive and moderate to strong relationship between these variables. Furthermore, statistically significant correlation exists also between real GDP per capita and unemployment rate in the periods 2006-2007 and 2008-2012, with the relationship being negative and moderate. A similar correlation also exists between net migration and unemployment rate.

5. Non-hierarchical cluster analysis

For the application of cluster methods, it is recommended to have at least 2^k units, where k stands for the number of variables used in clustering (Formann 1984). In this paper four variables are selected. Consequently, the minimum number of units for cluster analysis is 16, which is fulfilled since objects of our analysis are EU-28 member states.

Before the cluster analysis is conducted, variable data are linearly transformed into a specific range in order to obtain clusters of good quality (Mohamad, Usman 2013). K-means approach as the most computationally efficient and the most widespread (Dolnicar 2002) non-hierarchical (partitional) cluster analysis method is chosen. In the k-means approach the iterative process of relocating units between clusters according to their vicinity to cluster means is conducted. The maximum average distance method was used to form initial approximations (Lee, Han 2012). As a distance measure squared Euclidean distances are used, with more weight given to EU member states that are away from cluster mean (Bora, Gupta 2014).

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However, in non-hierarchical cluster analysis the number of clusters should be determined in advance. Therefore, in this article the optimum number of clusters will be found by using the v-fold cross-validation approach (Thomassey, Fiordaliso 2006). In this approach, values of variables are first divided into v subsamples. Afterwards, subsamples are gradually dropped out from the analysis, estimates for omitted subsamples are calculated and resulting errors are summed across all subsamples. Solution with the smallest overall error is used to select the optimum number of clusters (De'ath, Fabricius 2000). The optimum number of clusters is illustrated by the cost sequence graph, on which the error function values for different number of clusters is shown (Tibshirani et al. 2001). We decide that the optimum number of clusters, marked with x, is determined by the criterion that the decrease of error function for solution of x+1 clusters is not lower than 5%.

In Figure A1, given in Appendix, graphs of the cost sequence for different observed periods are presented. Graphs of the cost sequence are used to determine the optimal number of clusters in each observed period. Therefore, the optimal number of clusters is 3 in the periods 2006-2007 and 2008-2012, and 5 in the periods 2013-2014 and in 2015.

Table 4. Selected results from ANOVA tables for different observed periods, k means clustering

Period	Number of clusters	Variable	Statistics	
			F-value	p-value
2006-2007 average	3	GDP per capita	13.468	0.0001
		Net migration	9.997	0.0008
		Stock of foreign citizens	60.885	<0.0001
		Unemployment rate	6.185	0.0071
2008-2012 average	3	GDP per capita	4.470	0.0224
		Net migration	21.898	<0.0001
		Stock of foreign citizens	22.695	<0.0001
		Unemployment rate	27.275	<0.0001
2013-2014 average	5	GDP per capita	15.476	<0.0001
		Net migration	51.737	<0.0001
		Stock of foreign citizens	54.048	<0.0001
		Unemployment rate	15.412	<0.0001
2015	5	GDP per capita	15.460	<0.0001
		Net migration	149.067	<0.0001
		Stock of foreign citizens	70.452	<0.0001
		Unemployment rate	13.186	<0.0001

Source: Authors, Statistica 13.3

Selected results from ANOVA tables for all four observed periods are provided in Table 4. Null hypothesis, that cluster means are equal, at the significance level of 5% can be rejected at all variables in all observed periods. Therefore, the clustering process was successful in clustering the EU member states according to the observed variable values in the observed periods.

For better comparison of clusters and understanding of the relationship between them, variable means in each cluster are normalized and their graphs are represented in Figure A2, given in Appendix, for all observed time periods.

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5.1. Non-hierarchical cluster analysis in the period 2006-2007

Table 5 delivers the cluster results for the pre-crisis period, with respect to the selected variable values. Croatia and Romania are left out of the cluster analysis for this period due to missing data. Therefore, 26 countries are clustered, and are grouped into three clusters. The structure of the clustering process in all time period can be found in Appendix in Table A1.

Table 5. Cluster means, k-means clustering, k=3 clusters, h=4 variables, n=26 European Union member states, 2006-2007 average

Cluster	No. of EU member states	% of EU member states	Variables			
			GDP per capita	Net migration	Stock of foreign citizens	Unemployment rate
1	7	26.92	43,671	30,497	422,325	4.77
2	5	19.23	29,290	274,820	4,388,303	7.57
3	14	53.85	15,982	10,056	265,016	7.68

Source: Authors, Statistica 13.3

According to the results, Cluster 1 consists of seven EU member states, which makes 27% of all EU member states. It consists of Austria, Cyprus, Denmark, Ireland, Luxembourg, the Netherlands and Sweden. These countries, in comparison to the other two clusters, had the highest average real GDP per capita of 43.7 thousand € and the lowest average unemployment rate of 4.8% in the period 2006-2007. These are the countries that are very attractive to foreign citizens, recording positive average net migration values (of 30.5 thousand) and the average stock of foreign citizens of 422.3 thousand. Denmark, known for its dynamic labour market, is the EU country with the lowest average unemployment rate in this period (3.9%). Luxembourg naturally distinguishes itself from the rest of the group with the highest level of income, with an average GDP per capita of 81.8 thousand €. Ireland recorded the highest positive value of net migration in this period (84.7 thousand). It was the time when the Irish economy rose by 5.2% in 2007 compared to the year before. The highest stock of foreign citizens was recorded in Austria, with approximately 800 thousand of foreign citizens. The Netherlands with approximately 600 thousand and Ireland with approximately 500 thousand followed.

It is surprising that Finland and Belgium, as countries with very high levels of GDP per capita are not in the first cluster. Belgium recorded one of the highest levels of net migration in period 2006-2007 of 52.5 thousand, after Spain, Italy, the United Kingdom, France, Ireland and Sweden and fifth largest average stock of foreign citizens of 952 thousand. Taking a look at the data for the unemployment rates in Belgium and Finland in the period from 2006 to 2007, they are well above the average unemployment rate of the countries making the first cluster, which is 4.8%. The average unemployment rate in the observed period in Finland was 7.3% and in Belgium it was even higher, 7.9%. The average unemployment rate in Sweden, for example, as a member of the first cluster was also above the average unemployment rate of the members of its cluster, 6.6%, but Sweden has much higher values of net migration and of the stock of foreign citizens than Finland. Sweden recorded sixth highest average value of net migration in this period, 52.5 thousand and Finland much lower, 12 thousand. Sweden hosted four times more of foreign citizens in the period 2006-2007 than Finland, of 472 thousand.

The second cluster in the period 2006-2007 is made up of five economically strongest economies, according to the nominal GDP, and consequently, the most attractive EU countries to migrants: Germany, France, the United Kingdom, Italy and Spain. Their average GDP per capita was 29.3 thousand € and the average unemployment rate was 7.6%, above the average EU-28 unemployment rate in this period. These are countries with the highest positive net migration, whose average value was 275 thousand people and an average of 4.4 million foreign citizens lived in these countries in the period 2006-07. Spain recorded the highest average net migration, of 715 thousand. Italy, the United Kingdom, France and Germany followed.

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The third cluster consists of 14 EU member states, which makes 54% of all EU member state: Belgium, Bulgaria, the Czech Republic, Estonia, Finland, Greece, Hungary, Lithuania, Latvia, Malta, Poland, Portugal, Slovakia and Slovenia. The majority of the members are countries that later joined the EU in the process of its enlargement. The main characteristic of these countries is that, in comparison to the other two clusters, their average GDP per capita was the lowest in the EU, 15,982€. The same conclusion holds for Net migration and Stock of foreign citizens' averages. The average net migration was low, but positive. Only Bulgaria, Lithuania and Poland recorded negative net migration in this period. The average unemployment rate was however the highest in the EU, 7.7%, actually very similar to the members of the second cluster.

5.2. Non-hierarchical cluster analysis in the period 2008-2012

Table 6 contains the results of conducted clustering by taking into account 2008-2012 period. This period includes the year 2009, when the EU economy due to global economic and financial crisis fell by 4.3% compared to the year before. The negative growth rate was also recorded in 2012, when the EU economy on average fell by 0.4%, compared to the previous year.

Table 6. Cluster means, k-means clustering, k=3 clusters, h=4 variables, n=27 European Union member states, 2008-2012 average

Cluster	No. of EU member states	% of EU member states	Variables			
			GDP per capita	Net migration	Stock of foreign citizens	Unemployment rate
1	12	44.44	32,002	12,717	383,835	6.45
2	4	14.81	29,980	186,188	4,683,638	7.85
3	11	40.74	15,016	-11,989	744,003	12.65

Source: Authors, Statistica 13.3

The EU member states are unevenly distributed across three clusters. However, compared to 2006-2007 period, there are some major changes in the structure of clusters. Spain left the second cluster and joined the third. Ireland left the first cluster and joined the third. Belgium, the Czech Republic, Finland, Malta and Slovenia left the third cluster and joined the first cluster. The explanations for such changes in the structure of clusters will be given below.

The first cluster consists of 11 member states: Austria, Cyprus, Denmark, Luxembourg, the Netherlands and Sweden (old) and Belgium, the Czech Republic, Finland, Slovenia, Romania (new). Members of the first cluster had the highest average GDP per capita, 32 thousand €. Now the difference is not so large compared to the second cluster. This is due to entrance of new members, such as Slovenia and the Czech Republic, which have below EU average GDP per capita values. These are the countries with the lowest average unemployment rate, of 6.5% in this period in this group. New members of this cluster had below EU average unemployment rates in the period of global and financial crisis. These countries were usually recording positive net migration values, but there are some exceptions. For example, the migration flows were very volatile in the Czech Republic. In 2007 compared to the year before, the number of immigrants rose by 59% to 105 thousand people, and the number of emigrants fell by 39% to 20.5 thousand people, which resulted in increasing net migration values from 35 thousand in 2006 to 84 thousand in 2007. But the following years were characterized by a massive emigration, where the number of emigrants rose by 151 % in 2008 compared to the year before. In the period between 2009 and 2011 immigration level fell from 108 thousand to 27 thousand. Consequently, net migration values fell from 13.8 thousand to -28.8 thousand. Since 2011, emigration levels have been decreasing and immigration levels increasing and the net migration was positive in 2015. Romania, following Bulgaria, has the lowest GDP per capita in the EU and recorded large negative net migration values in the period between 2008 and 2011. In 2008 Romania recorded the

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third highest emigration level, 302.8 thousand (after Germany and the United Kingdom) and ended 2008 with the net migration value of -164 thousand. It had very low, below EU-28 average unemployment rate of 6.6% in this period.

The second cluster is again reserved for the four economically strongest EU economies, Germany, France, Italy and the United Kingdom. Compared to the previous period, Spain left the cluster and joined the third. Unlike Italy, France and the United Kingdom, Germany stood out with decreasing unemployment rate in this period, from 7.4% in 2008 to 5.4% in 2012. The average net migration and the average stock of foreign citizens for the members of the second cluster were the largest in EU. But in 2008 the net migration for Germany was negative, -56 thousand. This was not in accordance with the assumption of the population projection made in this period, which was based on the assumption that Germany will have an annual net migration of 100 thousand starting in 2008 (Süssmuth 2009). In the light of low fertility rates, better life expectancy and consequently high proportion of older population in German society (65 or older) by 2030 the German population was expected to decrease by 6.4% (by 5 million people), where 30% of population will be 65 or older (Süssmuth 2009). In 2008 GDP rose by 1.1% compared to the year before and contracted by 4.9% in 2009. Since 2009 immigration to Germany has started to rise. The highest rise was recorded in 2015. At the same time, emigration was slowing down, which resulted in continuous rise in the net migration values.

The third cluster in the period 2008-2012 consists of 11 EU-member states: Bulgaria, Estonia, Greece, Hungary, Ireland, Lithuania, Latvia, Poland, Portugal, Slovakia and Spain. Unlike the pre-crisis period, Belgium, the Czech Republic, Finland, Malta and Slovenia joined the first cluster, while Spain and Ireland joined this cluster. The third cluster is made of countries with the lowest average GDP per capita of 15 thousand €, the highest average unemployment rate of 12.7% and negative average net migration values of -12 thousand. The average stock of foreign citizens is relatively high, of 744 thousand, mainly due to inclusion of Greece and Spain.

The reason why Spain joined this cluster lies in its negative growth rates from 2009 to 2013, rising unemployment rates, from 11.3% in 2008 to 26% in 2013, which made Spain net emigration country. Spanish foreign workers were usually unskilled and inexperienced and worked in sectors where the local labour supply was scarce, and these are labour-intensive sectors. Domínguez-Mujica et al. (2012) estimate that immigrants contributed to a 40 per cent increase in GDP between 2001 and 2006. On the other hand, due to low-cost foreign labour, labour productivity remained low, since firms didn't have an incentive to replace low-cost foreign labour force by capital, (Domínguez-Mujica et al. 2012). Economic crisis had a major impact on the employment of foreign citizens, reducing it dramatically by 11% in 2009 compared to the year before, increasing the share of unemployed foreign citizens in the total number of active foreign citizens from 12.2% in 2007 to 37% in 2013 (Eurostat 2017). To restrict the arrival of new immigrants, the Spanish government reduced the work permits quotas and modified the Foreign Residents Law with the goal of toughening residence permit requirements (Domínguez-Mujica et al. 2012). The number of immigrants was continuously decreasing between 2008 and 2013, from 600 thousand in 2008 to 280.7 thousand in 2013, with a slight increase in 2011. At the same time, emigration was increasing, causing continuous fall of net migration values, reaching -251,531 in 2013 (net migration was 731 thousand in 2007) (Eurostat 2017).

Unlike the pre-crisis period, the Celtic Tiger era, when Ireland was recording high positive values of net migration, of 95 thousand people in 2006, when the Irish economy rose on average above 5% in the period between 2006 and 2007, and when Ireland was in the group of EU countries with the lowest unemployment rate of 4.6% (with Luxembourg), situation changed since 2007. In 2009 compared to 2007, the number of immigrants decreased by 60%, from 122.4 thousand in 2007 to 50.1 thousand in 2009. At the same time, the number of emigrants was continuously increasing up until 2012, which resulted in negative and increasing net migration values. Net migration in 2012 in Ireland was negative and equal to -35 thousand people. The global financial and

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economic crisis caused a sharp increase in unemployment rate to 14.7% in 2011 and 2012. In 2008 GDP declined by 3.9% compared to the year before and even more in 2009, by 4.6% compared to the year before.

5.3. Non-hierarchical cluster analysis in the period 2013-2014 and in 2015

The clustering process in the period 2013-2014 and in 2015 classified 28 EU-Member States in five clusters and gave the same structure of clusters. The characteristics of each cluster can be found in Table 7 and Table 8.

Table 7. Cluster means, k-means clustering, k=5 clusters, h=4 variables, n=28 European Union member states, 2013-2014 average

Cluster	No. of EU member states	% of EU member states	Variables			
			GDP per capita	Net migration	Stock of foreign citizens	Unemployment rate
1	3	10.71	29,067	159,460	4,602,659	9.85
2	14	50.00	12,689	-10,051	150,265	10.94
3	1	3.57	33,750	497,029	6,829,468	5.10
4	2	7.14	19,500	-113,362	2,872,797	26.15
5	8	28.57	43,238	25,317	628,770	7.83

Source: Authors, Statistica 13.3

Table 8. Cluster means, k-means clustering, k=5 clusters, h=4 variables, n=28 European Union member states, 2015.

Cluster	No. of EU member states	% of EU member states	Variables			
			GDP per capita	Net migration	Stock of foreign citizens	Unemployment rate
1	1	3.57	34,300	1,196,686	7,539,774	4.60
2	3	10.71	29,500	177,097	4,932,230	9.20
3	14	50.00	13,307	-10,077	153,677	9.30
4	2	7.14	20,100	-23,333	2,638,162	23.50
5	8	28.57	45,375	44,581	669,868	7.50

Source: Authors, Statistica 13.3

This was the period in which the majority of EU-countries recorded positive GDP growth rates. Irish economy stood out with the highest growth rate in the whole observed period. On the other hand, there is a list of EU countries that recorded negative growth rates in the observed period: the Czech Republic (in 2013), Greece in 2013 and in 2015, Spain in 2013, Croatia in 2013 and 2014, Cyprus in 2013 and 2014, Italy in 2013, the Netherlands in 2013, Portugal in 2013, Slovenia in 2013 and Finland in 2013 and 2014.

The average unemployment rate for the EU economy in this period grew by 11% compared to the previous observed period (2008-2012). The economic crisis caused higher differences with respect to unemployment rate among EU countries, with the higher coefficient of variation compared to the previous period. The highest recorded average unemployment rate was 26%, and was recorded in Spain.

Since 2015 was the record year for Germany with respect to net migration of 1.2 million people, and very high net migration in 2013 and 2014, and additionally decreasing unemployment rate, Germany was classified as a sole member of the first cluster, with the average net migration in the period 2013-2015 of 730 thousand people and the average unemployment rate of 5 %, the lowest in the EU.

France, Italy and the United Kingdom are again grouped together. Their average unemployment rate was relatively high, 9.6% in the period 2013-2015. The average stock of foreign citizens was among the highest, of 4.7 million people. They recorded relatively high average GDP per capita of 29 thousand € and relatively high

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average positive net migration of 170 thousand people. The United Kingdom's labour market can also commend with the third lowest unemployment rate in 2015, which was 5.3%. The Czech Republic recorded the second lowest unemployment rate in 2015 of 5.1%. Italy and France on the other hand recorded above average EU-28 unemployment rate in 2015, with the unemployment rate of 11.9% in Italy, and 10.4% in France.

One (the fifth) cluster consists again of the countries that have the highest GDP per capita, of 45.4 thousand €, and on average the lowest unemployment rate, of 4.6%, below the EU-28 average: Austria, Belgium, Denmark, Finland, Ireland, Luxembourg, the Netherlands and Sweden. These countries attract foreign migrants and have positive net migration values of 44.6 thousand on average, and relatively high stock of foreign citizens, 670 thousand on average. The structure of this cluster is very similar to the pre-crisis period. There are some changes however. Cyprus left the cluster, since the global economic crisis seriously affected the Cyprus labour market, and the unemployment rate more than tripled in the period between 2006 and 2015. The unemployment rate was 4.6% in 2006, and rose to 15% in 2015 (although in 2013 and 2014 it was even higher, 16%). Furthermore, the Cyprus economy was recording negative growth rates in the period between 2012 and 2014, especially in 2013, when it fell by 5.9%. Consequently, since 2012 Cyprus economy became a net emigration country, with rising emigration and decreasing immigration levels.

The EU member states from Cluster 3: Bulgaria, Croatia, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia and Slovenia, on average had the lowest GDP per capita, the lowest stock of foreign citizens averages, relatively high unemployment rate, and negative net migration values. The Czech Republic, Malta, Hungary, Estonia, Slovenia and Slovakia recorded positive net migration in 2015, whereas only in Slovakia, Malta and Hungary net migration was positive in the whole observed period between 2006 and 2015.

Spain and Greece were grouped in the same cluster, having on average, the highest negative net migration and the highest unemployment rate. These are EU countries with the relatively high level of income, and relatively high stock of foreign citizens.

Conclusions

In the observed period between 2006 and 2015, which also includes the period of global financial and economic crisis, European Union faced growing number and increasing share of foreign citizens, whose distribution with respect to hosting countries has changed as well. Especially volatile were migration flows. To make the analysis of economic and migration performances of European Union member states in the observed period more tractable, the cluster analysis was conducted based on the average values of the selected variables in four time periods. The gross domestic product (GDP) per capita was chosen as economic performance proxy, whereas the unemployment rate was used as the labour market performance indicator. The migration statistics indicators were represented by net migration as an indicator of migration flows, and stock of foreign citizens variable as an indicator of migration stock. The first period is the pre-crisis period, which includes years 2006 and 2007. The second is the period between 2008 and 2012, in which the EU economy struggled with the global economic and financial crisis. The third period refers to the recovery phase and includes years 2013 and 2014, and the final period is year 2015, the beginning of massive immigration in the EU area due to world migration crisis.

The cluster analysis identifies three clusters of countries in the pre-crisis and crisis periods. Cluster composed of the highest income EU countries with relatively low unemployment rate, positive relatively large net migration levels and relatively high stock of foreign citizens was relatively stable in the observed period. Austria, Denmark, Luxembourg, the Netherlands and Sweden were their constant members, whereas Belgium and Finland joined in the crisis and post-crisis period, mainly due to relatively higher unemployment rate in the pre-crisis period.

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Cyprus left it in the post-crisis period due to bad economic and labour market performances and consequently increasing negative net migration in the crisis period. Ireland was the only EU country that left the pre-crisis cluster in the crisis period and joined it again in the post-crisis period. The reason lies in negative GDP growth rates, sharp increase in unemployment rates and decreasing levels of immigration in the crisis period. Due to relatively good performances on the labour market in the crisis period, Slovenia and the Czech Republic joined this cluster in the crisis period, but left it in the post-crisis period.

Germany, France, Italy, Spain and United Kingdom shared the same cluster in the pre-crisis period. This cluser is composed of the economically strongest and the most attractive EU countries to migrants. These are countries with the highest stock of foreign citizens and relatively high average unemployment rate in the pre-crisis period. However, there were some major changes in the crisis and post-crisis periods. Spain left this cluster due to negative growth rates in the pre-crisis period and rising unemployment rates. Spain recorded large and increasing emigration levels, and decreasing immigration levels and consequently became net emigration country. On the other hand, Germany stood out with decreasing unemployment rates and very high net migration in post-crisis period, especially in 2015, being grouped in its own cluster in the post-crisis period.

The third cluser is mostly composed of countries that later joined the EU in the process of its enlargement. These are the lowest income EU countries, with the highest average unemployment rate, relatively low net migration levels in the pre-crisis period and negative and increasing net migration levels in crisis and post-crisis period. The average stock of foreign citizens was again the lowest among EU member states. The structure of this cluster was relatively stable, with Bulgaria, Croatia, Estonia, Hungary, Latvia, Lithuania, Poland, Portugal and Slovakia being its constant members, and Cyprus joining in the post-crisis period. Furthermore, Czech Republic, Slovenia and Malta joined this cluster in the pre-crisis and post-crisis period.

Spain and Greece were grouped in the same cluster in the post-crisis period, having on average, the highest negative net migration and the highest unemployment rate. These are EU countries with the relatively high level of income, and relatively high stock of foreign citizens.

The cluster analysis is based on the average values of the selected variables, which can be seen as a limitation of the research. Furthermore, it would be interested to conduct the sensitivity analysis of the k-means method with respect to the chosen variable values, since by taking averages in the period between 2013 and 2015 economically unreasonable results were obtained, grouping 20 EU-member states in the same cluster.

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Appendix

Table A1. Members of clusters for different observed periods, European Union member states by using two-letter country code

Period	European Union member states				
	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
2006-2007 average	AT, CY, DK, IE, LU, NL, SE	FR, DE, IT, ES, UK	BE, BG, CZ, EE, FI, EL, HU, LV, LT, MT, PL, PT, SK, SI	-----	-----
2008-2012 average	AT, BE, CY, CZ, DK, FI, LU, MT, NL, RO, SI, SE	FR, DE, IT, UK	BG, EE, EL, HU, IE, LV, LT, PL, PT, SK, ES	-----	-----
2013-2014 average	FR, IT, UK	BG, CY, CZ, EE, HR, HU, LV, LT, MT, PL, PT, RO, SK, SI	DE	EL, ES	AT, BE, DK, FI, IE, LU, NL, SE
2015	DE	FR, IT, UK	BG, HR, CY, CZ, EE, HU, LV, LT, MT, PL, PT, RO, SK, SI	EL, ES	AT, BE, DK, FI, IE, LU, NL, SE

Source: Authors, Statistica 13.3

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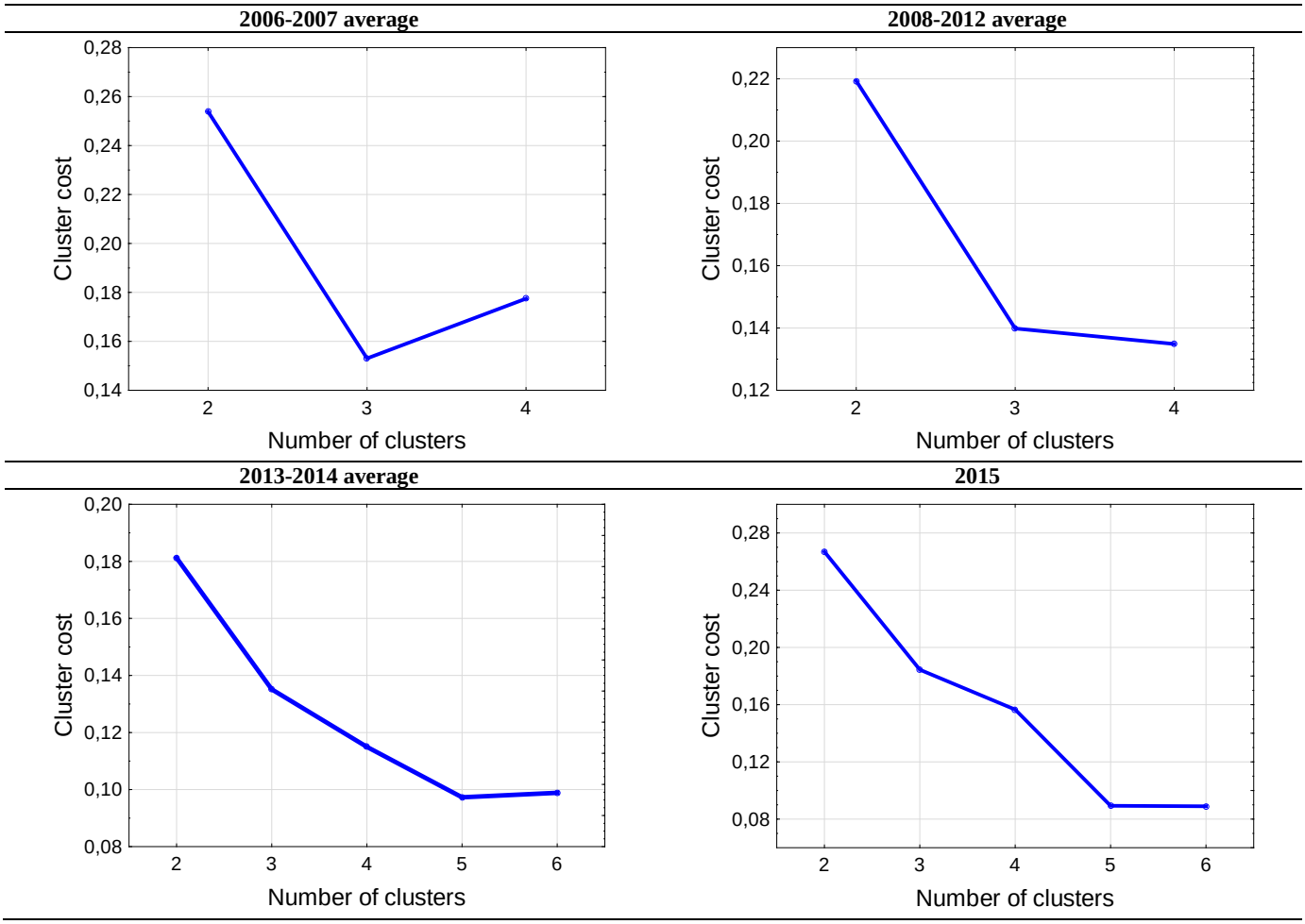

Fig. A1. Graphs of the cost sequence for different observed periods.

Source: Author's illustration, Statistica 13.3

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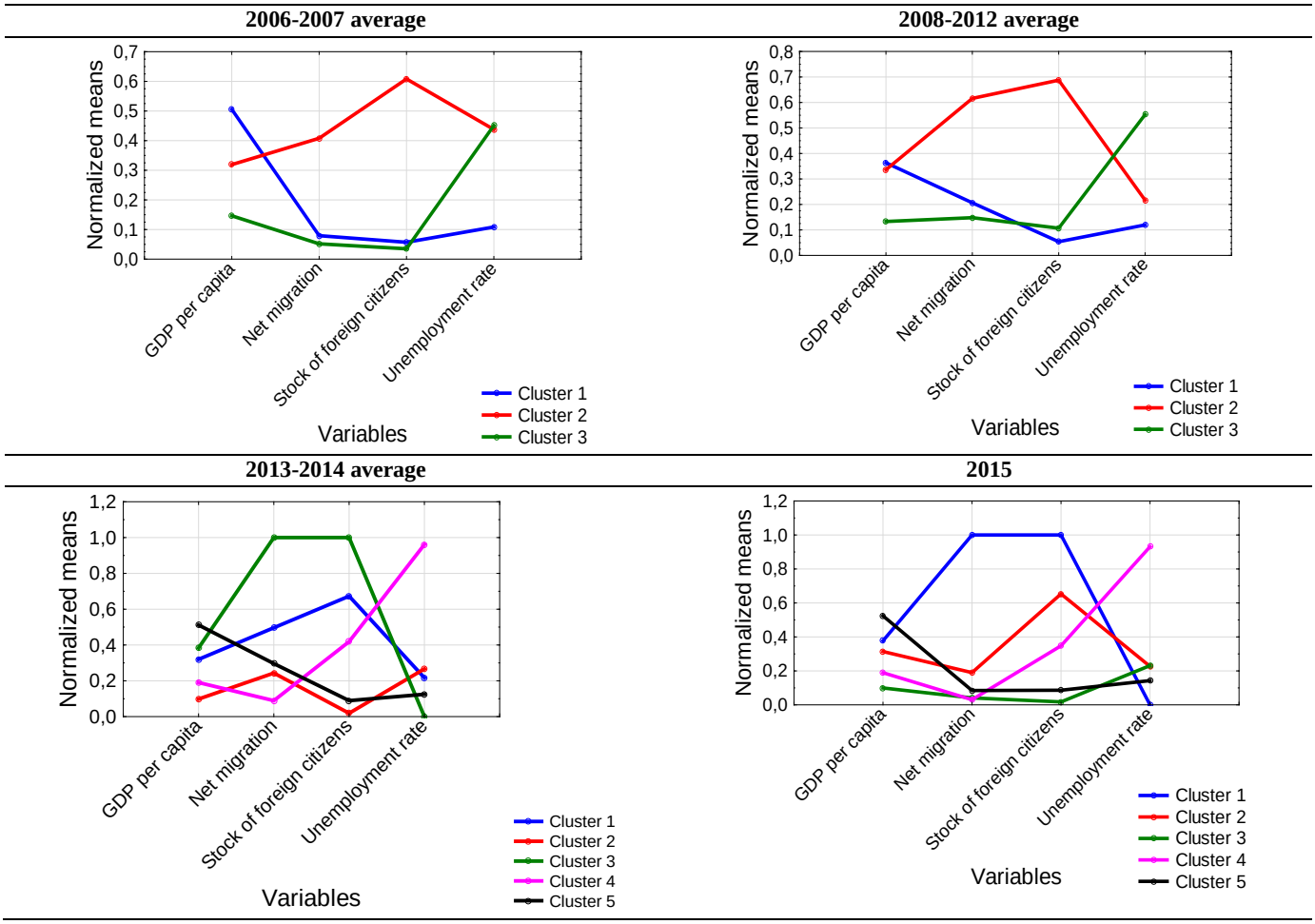

Fig. A2. Graphs of normalized means for different observed periods.

Source: Author's illustration, Statistica 13.3

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DEVELOPMENTAL REVIEW PROGRAM IMPACT ON ENHANCING THE EFFECTIVENESS OF "TEACHING AND LEARNING" IN ACCOUNTING PROGRAM: A CASE STUDY IN A SAUDI UNIVERSITY*

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Abstract. Liberalization and globalization has opened up new and compelling challenges in the higher education section. Quality is invariably one of the factors that help educational institutions to remain relevant and thrive in the current highly competitive scenario, Quality in higher education is, as such, a hot topic and there is no paucity of literature in this regards. However, a fair review of the literature showed that there is scant literature about the impact of developmental review for enhancing of effectiveness of accounting program. The present work has attempted to bridge this gap in literature. The study has focused on Standard four – "Education and Learning" in the accounting program of a university in Saudi Arabia. The results of the study showed that there is profound positive impact of the developmental review towards the implementation of the requirements of standard four in the program. A few suggestions based on the study are also presented.

Keywords: Higher education; Accreditation; Developmental review Program; NCAAA; Standard four; Teaching and Learning

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1. Introduction

The higher education scenario in general and business education in particular has undergone significant transformations in recent past. Globalization and disruptive technological changes in the external environment have forced educational institutions to involve in innovation and all round quality improvement. Accreditation is now increasingly being identified as one of the best ways to be noticed in the crowd (Zammuto, 2008). As early as in 1964, MacKenzie stated that accrediting educational institutions serve two purposes:

- Assisting of the general public to identify quality institutions and/or programs that meet the required minimum standards
- Enhancing the overall quality of education by providing a minimum standard for excellence.

In general, accreditation process is considered tohelp in improving the all-round quality of education and embarks on a continuous improvement program.

Saudi Arabia is now in a transition phase –from resource based economy to that of a knowledge based economy. To cater to this radical change, Saudi Arabian graduates are required to acquire the appropriate knowledge, skills and attitudes; such that they are prepared to deal with any unforeseen problems. Towards this, they should develop qualities to arrive at quick and creative solutions to complex problems. With this mindset, various education providers are putting in their best and sustained efforts to make them stand apart from the crowd. Almost all the universities and higher education institutions in Saudi Arabia are now striving to improve their all-roundquality and embark on a continuous improvement program through accreditation process.

The Saudi Government is focusing on quality of higher education in two dimensions. It is simultaneously aiming at enhancing the efficiency and effectiveness of each institution, and at the same time creation of a national education system that is strong and coherent (Onsman, 2011). To achieve this, the Government is creating a wide network of complementary Higher Education institutions. The Ministry of Education has also embarked on a systematic plan of accreditingall academic institutions within a given time frame. It is with objective in mind that the National Commission for Assessment and Academic Accreditation (NCAAA) was established in the year 2004. NCAAA is the responsible authority for academic accreditation and quality assurance of higher educational institutions in the kingdom.NCAAA is authorized to tie the funding of higher education institutions to compliance of the quality standards. Overall, the acceptance of national guidelines of "quality, finance, scientific research, scholarships, and strategic planning" by individual institutions is considered as having paramount importance (Onsman, 2011).

Guided by the NCAA Quality Code,which presents the required benchmark statements; the Quality Assurance Agency (QAA) provides guidance about the requirementsof higher education expectations.The QAA conducts reviews of the institutions and brings out reports that highlight good practices, and makes recommendations for improvement of the academic standards and quality. It also comments on the level at which an institution attains its institutional responsibilities. Another body that is involved in enhancing the quality in the higher education sector is the National Qualification Framework (NQF). The NQF stipulates five distinct learning domains. There should be not more than eight Course learning outcomes, which in turn is to be in alignment with one or more of thelearning domains. It also stipulates a"program learning outcome matrix map", which identifies the program learning outcomes that are to be incorporated into individual courses.

A few commentators have looked at the position of accreditation of Saudi educational institutions. In thisregard, the comment of Onsman (2011) is worth considering:

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> Despite the best intentions of the NCAAA, quality assurance mechanisms are far from universally in place, let alone adhered to—especially in the newer universities. Both pedagogically and philosophically, the use of English as the medium of instruction requires a great deal more consideration and careful development (p. 530).

With this comment at the backdrop, it is attempted to have a cursory look at the accreditation process in the accounting department of a University of Saudi Arabia. Based on this the objectives of the study are set.

2. Objectives of Research:

The main objective of the study is to know the impact of developmental review program for Academic Accreditation by NCAAA on enhancing the effectiveness of Standard four – "Education and Learning" in accounting program.

Standard four states that there should be clear specification about student learning outcomes which is consistent with NQF stipulations. This has to be assessed against the required "external reference points". It also states that the teaching staff must have appropriate qualification and experience. The teaching staffs are required to use appropriate teaching strategies that would bring out the required learning outcomes. They are expected to involve in activities that are capable of improving their teaching effectiveness. Assessment of students, survey of graduates and employers are to be used for evaluation of quality of teaching and effectiveness of the programs. Improvement plans are to be devised based on these assessments and surveys.A brief description of Standard four is provided in the Annexure.

The following sub-objectives are also set for the study:

1) To know how developmental review program impacts Academic Accreditation (NCAAA) towards enhancing the effectiveness of students' learning outcomes, students' assessment, educational assistances to the students, quality of teaching, support the efforts to improve the quality of teaching and qualifications of faculty members and their experiences.
2) To know the challenges that stand in the way of executing the criteria of standard four effectively. This will contribute to identify the main obstacles and priorities of improvement required for Accounting Program.
3) To propose appropriate mechanisms to develop the quality of Accounting Program in the light of requirements of NCAAA.

3. Literature Review

Many studies have been undertaken around the globe to ascertain the effectiveness of accreditation process. A review of literature shoes that the studies in this regards have thrown our mixed and conflicting results. Some areas in which research has been conducted include retention rates (Espiritu, 2007), student outcome (Lejeune and Vas, 2009), research output (Ehie and Karathanos, 1994; Udell et al., 1995; Hedrick et al., 2010), program improvement (Elliottand Goh, 2013), organizational effectiveness (Elliottand Goh, 2013; Lejeune and Vas, 2009), etc.

Espiritu (2007) conducted a study on the retention and graduation rates of accredited institutions. The study found higher rates of retention and graduationin accredited institutions. Student outcome was the topic of research of Lejeune and Vas (2009). They found that the accreditation process succeeded in contributing toward effectiveness measures. However, it need not necessarily contribute towards student outcomes.Research output in accredited institutions was a topic of empirical analysis by many (Ehie and Karathanos, 1994; Hedrick et al., 2010; Udell et al., 1995). All the studies revealed higher research productivity and/or perceived importance of

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intellectual contributions. Increased focus on both quality and research was also observed by Elliottand Goh (2013).

Another area were substantial research was done was instructional effectiveness/program improvement. Elliottand Goh (2013) found that accreditation is capable of serving as a catalyst for change andcan brings in program improvement. However, Pritchard et al. (2010) measured instructional effectiveness at an AACSB accredited US colleges of business. They found no change in instructional effectiveness over a period of six-years. In a recent study Novakovich (2017) found that accreditation helps substantially in the design, implementation, and evaluation of learning activities. This could ultimately result in all round higher quality and effective learning experiences.

Organizational effectiveness is another area were substantial research has emerged (Lejeune and Vas, 2009; Sulphey and Alkahtani, 2017). Lejeune and Vas (2009) measured organizational effectiveness as a result of accreditation and found that it contributed toward certain effectiveness measures likeresource acquisition. A comprehensive study by Elliottand Goh (2013) found that accreditation facilitated organizational learning, promoted strategic alignment, a re-assessment of institutional mission by all concerned, and an emphasis on performance management, leadership and resource dependence. For a better understanding the research results are presented in a table (Table 1).

Table 1. Factors that changed as a result of accreditation and the authors

No	Factors	Authors
1	Retention rates	Espiritu (2007); Womack andKrueger(2015)
2	Graduation rates	Espiritu, 2007
3	Student/learning outcome	Lejeune and Vas (2009), (Welsh and Dey, 2002; Shupe, 2007).
4	Research	Elliottand Goh (2013); Ehie and Karathanos (1994); Udell, Parkerand Pettijohn (1995); Hedrick, Henson, Krieg and Wassell (2010):Elliottand Goh (2013); Roberts, Johnson and Groesbeck (2006)
5	Instructional effectiveness/Program improvement	Elliottand Goh (2013); Novakovich (2017);Pritchard, Saccucci and Potter (2010)
6	Organizational effectiveness	Elliottand Goh (2013); Lejeune and Vas (2009);Newman (2000);
7	Quality	Istileulova and Peljhan (2015)

It is also worthwhile to have a look at the studies that emerged in the Middle East and Saudi Arabia regarding accreditation of higher education institutions. It can be observed that, with the turn of the century, there has been renewed interest in the Middle East in general and Saudi Arabia in particular about the complex and multiple effects and influences of globalization on the Higher Education sector (Altbach 2010; Donn and Al Manthri 2010; Sulphey, 2017; Sulphey, AlKahtani and Syed, 2018). Saudi Arabia is now putting in renewed efforts to strategically raise the standards and quality of Higher Education at par with international benchmarks (Sulphey and Al-Kahtani, 2018). This is attempted to be attained by maintaining its distinctive cultural heritage (Onsman, 2011). A number of studies have emerged in this area too. A few of them include that of Romanowski (2017)

Studies about Accreditation of Accounting Programs

There exist only few program specific studies pertaining to accounting. A few studies in this area include that of Brown and Balke (1983), Campbell and Williamson (1983), Balke and Brown (1985), Kren et al. (1993),Bitter et al. (1999), Bitter (2014), etc. Most of these studies are in the form of surveys conducted on accounting educational administrators to identify their perceptions about the utility and value of accreditation of their

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programs. Bitter (2014) also determined whether this perceptions of accounting education administrators differed across various institutions that gained accreditation.

However, there are a few significant studies too. For instance, Sinning and Dykxhoorn (2001) identified the various benefits that accounting programs could obtain from the accreditation process. Some benefits, according to them include program improvement, enhanced attractiveness to various stakeholders, and enhanced reputation of the program. Kim et al (1996) analyzed the relation between the salaries of graduates of accredited accounting departments or colleges and those that were not accredited. The descriptive study concluded that the average starting salary of graduates of accounting program from accredited institutions are higher. This indicates that employers and recruiters recognize the quality of accredited accounting programs.

The study by Koh and Koh (1998) implemented a model to enhance quality atNanyang Technological University. Implementation of this model on the students of accounting program enabled the students to get the required knowledge and to acquire skills with high spirits.Hindi & Miller (2010) studied the ability of existing accounting programs to get the graduates acquire skills and knowledge necessary to labor markets. They particularly focused on professional accounting skills, ability to solve the problems, communication skills, critical thinking skills, skills of dealing with IT and its use in addition to the skills of professional development of ethics and continuing education. They found that there is strong support towards providing professional accounting skills and knowledge, but very low support for professional development of ethics and continuing education. Another area that the study focused was on the importance of review and evaluation of quality of performance for accounting programs continuously, which have benefits for the program and its outcomes. They also found positive indication about the program to keep pace with the changes and developments happening in the labor market.

The study of Arlinghaus(2002) stressed on the importance of recommendation made by the accrediting institution in terms of some skills and practical experiences of teachers in the accounting departments in American universities. It was found that such recommendations are capable of contributing in increasing the effectiveness of accounting programs, as well as its environment. Certain other significant findings are that the time allocated by faculty members for scientific research, authoring and publication exceeded the overall time allocated to gain scientific skills. Based on the study he recommended that it would be ideal for a group of faculty members to focus on scientific research, authoring, publication and intellectual contributions; while another group focus on acquiring practical accounting experiences, interaction and engaging in the labor market. Mounce et al. (2004) studied the importance of experiences and scientific skills of faculty members of accounting departments in US universities attempting to get academic accreditation from AACSB.

The study of Watty (2005), conducted in Australian universities, assessed the viewpoints of faculty members of accounting programs. The study examined the importance of the role of faculty members in designing of the program, its contents and its implementation; and its contribution towards developing a professional career. It also evaluated the extent of considerations provided for the requirements of the profession, the institution, quality standards, government, beneficiaries of the program, experiences and abilities of faculty members and their role in designing the program and its course. The study produced many significant results. The most important being the fact that the views and opinions of various samples were different with respect to the concepts of quality for accounting education. The importance of achieving general objectives from accounting programs was also stressed. Studis have also identified the importance and the role of faculty members in bridging the gap between the skills and knowledge gained from education and requirements of the labour market (Sulphey and Alkahtani, 2017). Another study by Weisenfeld and Robinson – Backmon (2007) examined the views of faculty members of accounting programs of several American universities. The views of faculty members belong to various socio-demographics were ascertained. Aspects like characteristics of teaching cadre, quality of work environment under based on ethnicity or gender, extent of preparation to work, etc. were examined. The study found diversity in

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terms of ethnicity and gender in the teaching cadre. The study highlighted the importance of providing a sound academic environment for faculty members and the importance of clear and specific plans and strategies for the programs.

Gaharan et al. (2007) examined the benefits, problems and challenges of accounting accreditation from AACSB. It also discussed the challenges and difficulties faced by institutions that are not accredited. This comprehensive study identified a host of positive impacts of accounting departments that are accredited. They found that accreditation process resulted in better involvement by the respective advisory boards, having a scientific performance evaluation process in place for the faculty, curriculum improvement, overall quality improvement of students and faculty, and last but not the least – better placement for the graduates. A few other benefits include:

- "Developing of regulations for faculty members pertaining to promotion, annual evaluation and further recruitment,
- Developing of a curriculum that reflects positively on students so as to make them suitable for the current labor market,
- Developing and updating the mission of the program and activation of the role of advisory councils by including various stakeholders."

The study also succeeded in bringing out the various challenges faced by the faculty members on the works assigned to them for academic accreditation. Other limitations identified include limited funding, difficulty in getting the required support for office works, no compensation for extra work, etc. The study also succeeded in presenting several recommendations that could assist the accounting programs in getting accreditation.

The various studies conducted in the accounting programs are presented in a chronological order in the following table (Table 2).

Table 2. Findings conducted in accounting programs

Factor studied	Author(s)	Findings
Salaries differences of graduates from accredited institutions	Kim et al (1996)	• The average starting salary of graduates of accounting program from accredited institutions are higher than that of non-accredited institutions
Ability of programs to help graduates acquire skills and knowledge based on labor markets	Hindi & Miller (2010)	• Strong support was found towards providing professional accounting skills and knowledge, but very low support was found for professional development of ethics and continuing education.
Benefits from accreditation	Sinning & Dykxhoorn (2001) Gaharan et al. (2007)	• Program improvement, enhanced attractiveness to various stake holders, and enhanced reputation of the program • Better involvement by the respective advisory boards, scientific performance evaluation process for the faculty, curriculum improvement, overall quality improvement of students and faculty, and better placement for the graduates.
Role of faculty in designing a professional program	Watty (2005)	• Faculty members are capable of bridging the gap between the skills and knowledge gained from accounting education and requirements of the labour market.

A review of literature thus shows that most of these studies were conducted either in the USA, Europe or Australia. A fair review by the researcher failed to find out any worthwhile study conducted in Saudi Arabia or even in the Middle East. The present study attempts to bridge this gap in literature.

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4. Research methodology

The present research relied upon Inductive, Deductive as well as Descriptive and Analytical Approach.

Inductive approach extrapolates the previous studies and writings related to the topic of research and extract logical conclusions which can help to meet the research objectives. Deductive approach is intended to attempt to design a model through which the quality of educational system of accounting program can be evaluated from the perspective of NCAAA. Descriptive and Analytical Approachis used to diagnose and analyze the sub-standards of Standard four related to education and learning with the aim to design "improvement plan" for these standards. It is expected that this will contribute towards enhancement of the effectiveness of Standard four.

Research Tool

Questionnaire method was used to ascertain the views of those concerned with the quality of accounting program like faculty members of accounting, students, and graduates of the university under study.

Research Methods

The method used for the study included both desk study and test study methods. Desk Study Method was used to collect the necessary data to formulate the theoretical aspects of the study through knowing the references relevant to the topic of the research. The Test Study Method was used to test the extent of acceptance or rejection of research hypotheses.

Research Community and Sample

The research community comprised of faculty members in the department nominated for program academic accreditation, regular students and the graduates formed the community for research. The sample size for the study consisted of three hundred and three respondents, distributed between the three groups sated above. Data was collected with the help of a questionnaire distributed to the four following categories:

- **First Category**: This consisted of 222 students undergoing accounting program in the university.
- **Second Category**: This consisted of graduates from the department of accounting. 53 respondents responded to the study.
- **Third Category**: This included all faculty members (28) of Accounting Program in the University.

Table 3 presents the detailed description of the sample of the study.

Table 3. Frequency of the Three Sample Groups

Groups	Frequency	Percent	Valid Percent	Cumulative Percent
Student	222	73.27	73.27	73.27
Graduate	53	17.49	17.49	90.76
Teaching Staff	28	9.24	9.24	100
Total	303	100	100	

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5. Analysis of Data

The second part of the questionnaire contained details about the impact of developmental review program for academic accreditation (NCAAA) on enhancing the effectiveness of standard four "Education and Learning" and its determinants in accounting program. This data was analyzed using SPSS 21.0 software and Gretl 1.8.0 (Gnu Regression, Econometrics and Time-series Library).

The questionnaire had several elements of criterions under Standard Four and their practices. This specifies the extent of quality and availability of these determinants that in turn point the overall rating of the developmental review program impact for academic accreditation (NCAAA), and enhances the effectiveness of these practices in the Accounting Program. For have a comprehensive view, the data was gathered from three groups of stockholders (students, graduates, and teaching staffs).

Test of Normality

The researcher has utilized two type of statistical normal distribution test, Shapiro-Wilk and Kolmogorov-Smrnov toexamine the distribution of the responses.It was found that all responses distributed normally with statistical significance.A significantly lower chi-square value in an unconstrained model indicates that discriminate validity wasachieved. Convergent validity is assessed from the measurement model by determining whether each indicator is estimated pattern coefficient on its posited underlying construct factor is significant. The value of Cornbach's Alpha for all elements of scale was 97.1 per cent this value indicates excellent reliability percentage.

Testing the impact of developmental review program for accreditation on teaching and learning standard

Bitter (2014), Bitter, et al (1999), and Gaharan, et al (2007) have highlighted the need for development review towards accreditation of accounting programs. Based on these studies, the objective of the study was set to test the impact of developmental review program for accreditation on teaching and learning standard. To test this, the researcher used one-way t-test and correlation for the three groups. The results are presented in the following sections:

Impact of Developmental Review Program for the Students' Group

Shupe (2007) has presented the various benefits of focusing on the student learning outcomes. This is one of the most important criterion as regards to accreditation of any program. The impact of the Developmental Review Program based on student perception is presented in Table 4. It can be observed the overall mean is 3.47, which greater than 3 (elementary mean). The value of $\boldsymbol{t}$ was 10.082, greater than $\boldsymbol{t_a}$ = 1.962, with high level of statistical significance. In addition, the level of the impact of developmental review program for accreditation on teaching and learning standard of this group was 61.73%, which shows that there is positive impact of the developmental review program on the accounting program. Further, positive impact can also be observed on the implementation of all the four sub standards and their practices in the accounting program. The value of t for these sub-standards can be found to be11.411, 7.636, 7.160, and 10.212. These denote that all the elements of the criterion present a strong positive impact.

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Table 4. *t* Test for the Impact of Developmental Review Program on in the Accounting Program for the Students Group

Elements	N	df	Mean	Std. Deviation	*t*	Sig. (2-tailed)	%
Students Learning Outcomes	222	221	3.53	0.687	11.411	0.000	63.16
Students Evaluation	222	221	3.39	0.769	7.636	0.000	59.85
Educational Support for Students	222	221	3.40	0.841	7.160	0.000	60.10
Teaching Quality	222	221	3.55	0.807	10.212	0.000	63.82
Impact of Developmental Review Program	222	221	3.47	0.694	10.082	0.000	61.73

Testing the Impact of Developmental Review Program for the Graduates' Group Review Program:

The results of the test pertaining to the perception of the Graduates are presented in Table 5. From the table it can be seem that the mean value is 3.52, which is greater than the elementary mean of 3. The ***t***value was 4.792, which is higher than t_a (2.000), which is statistically significant. The level of developmental review program impact (DRPI) for accreditation on teaching and learning standard of this group was found to be63.12%, indicating that it lies within the positive zone of developmental review program. This is in line with an earlier study by Brown and Balke (1983) that has examined the accounting curriculum comparison based on the programs for those intending to seek accreditation.

Based on the elements of standard four, a positive impact can be observed on the implementation of the four sub standards and their practices. The *t* for the sub-standards was were 5.581, 3.794, 3.736, and 4.756, denoting positive impact of the Developmental Review Program.

Table 5. *t* Test for the Impact of Developmental Review Program on in the Accounting Program for the Graduates Group

Element	N	df	Mean	Std. Deviation	t	Sig. (2-tailed)	%
Students Learning Outcomes	53	52	3.58	0.756	5.581	0	64.49
Students Evaluation	53	52	3.42	0.809	3.794	0	60.53
Educational Support for Students	53	52	3.5	0.977	3.736	0	62.53
Teaching Quality	53	52	3.6	0.915	4.756	0	64.94
Impact of Developmental Review Program	53	52	3.52	0.798	4.792	0	63.12

Testing the Impact of Developmental Review Program for the Teaching Staff Group

The need for complete faculty involvement in accounting accreditation was highlighted by Sinning and Dykxhoorn (2001). Campbell and Williamson (1983) in their study about accreditation of accounting programs have also considered the administrators' perceptions of quality standards, accorded prime importance to this aspect. In line with this the present study has also taken the perception of the faculty regarding developmental review of the program. Table 5 presents the perception of the teaching community about the developmental review program. It can observe from the table that in line with the earlier cases, the actual mean (3.60) is higher the elementary mean. Similarly the *t* value (6.097) is also greater than t_a (2.052), and is statistically significant. This positive impact also was observed for all the elements. The value of *t* for the different criterion was found to be 9.738, 5.442, 5.474, 5.086 and 2.779.

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Table 5. *t* Test for the Impact of Developmental Review Program on in the Accounting Program for the Teaching Staff Group

Element	N	df	Mean	Std. Deviation	t	Sig.(2-tailed)	%
Students Learning Outcomes	28	27	3.87	0.471	9.738	0.000	71.68
Students Evaluation	28	27	3.54	0.521	5.442	0.000	63.39
Educational Support for Students	28	27	3.61	0.587	5.474	0.000	65.18
Teaching Quality	28	27	3.56	0.581	5.086	0.000	63.95
Improvement of teaching quality	28	27	3.44	0.830	2.779	0.010	60.89
Impact of Developmental Review Program	28	27	3.60	0.521	6.097	0.000	65.02

Correlation between the deferent Determinants

The correlation between the deferent determinants and developmental review program impact is presented in Table 6. All the correlations were positively statistically significant at 0.01 level.Thus,it can be found that there is significant relationship between determinants for the three groups. The direction of the correlation is evident in Figure 1. This denotes that any increase in any element of the development review program could have its impact in enhancing the standard four.

Table 6. Spearman's Correlations of the Determinants for the three groups

Element	Students Learning Outcomes	Students Evaluation	Educational Support for Students	Teaching Quality	Impact of Developmental Review Program
Students Learning Outcomes	1.000				
Students Evaluation	0.748	1.000			
Educational Support for Students	0.688	0.761	1.000		
Teaching Quality	0.678	0.716	0.830	1.000	
Impact of Developmental Review Program	0.857	0.897	0.923	0.906	1.000

Correlation is significant at the 0.01 level (2-tailed).

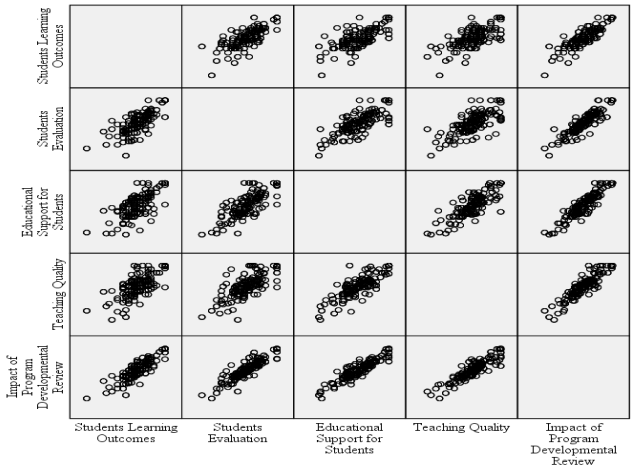

Figure 1. Spearman's Correlations of the Determinants for the three groups

Testing the Developmental Review Program Impact with Different Groups

In this phase, the researcher tested developmental review impact with different groups to know the variances in

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DRPI of different groups under study. One Way ANOVA that compares the means of the samples or groups was done to make inferences about the population means. Table 7 presents the results of ANOVA.

The Table consists of four parts. The first part contains the descriptive statistics, i.e., actual means and Std. deviation for the different groups. The second part (Test of Homogeneity of Variances) provides the Levene test. It can be see that the value of $p = 0.087 > (\alpha = 0.05)$, denoting that the variances of dependent variable in the three groups are equal; i.e., not significantly different. Thus, the variances are homogeneous. The third part presents the results of the ANOVA test. The results denote that F there is no statistically significant difference in the mean among the three groups ($F = 0.827$, $p = 0.827 > \alpha = 0.05$). The Post hoc test shows higher impact of developmental review program in enhancing the standard four in the accounting program. The means of the students, graduates, and teaching staff were 3.469, 3.525, and 3.642 respectively.

Table 7. Test of PDRI Level with the deferent groups of respondents

Part 1 Descriptives

Element	Group	N	Mean	Std. Deviation
Impact of Developmental Review Program	Student	222	3.47	0.69
	Graduate	53	3.52	0.80
	Teaching Staff	28	3.64	0.45
	Total	303	3.50	0.69

Part 2 Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
Impact of Developmental Review Program	3.094	2	300	0.087

Part 3 ANOVA

		df	F	Sig.
Impact of Developmental Review Program	Between Groups	2	0.827	0.439

Part 4Duncan[a,b]

Determinant	Type	N	Subset for alpha = 0.05	
			1	2
Impact of Developmental Review Program	Student	222	3.469	
	Graduate	53	3.525	
	Teaching Staff	28	3.642	
	Sig.		0.241	

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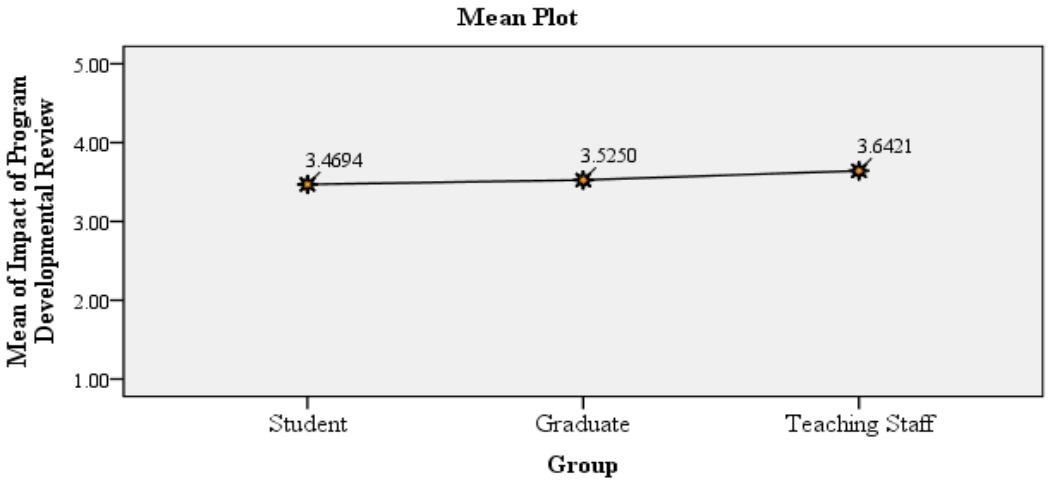

Figure 2. Testing the Impact of Developmental Review Program for the Three Group:

From Table 7 it can be seen that the actual mean is 3.50, which isgreater than the elementary mean of 3. The ***t***value (12.406) isgreater than t_a = 1.962, which shows a high level of statistical significance. In addition, the level of DRPI for accreditation on teaching and learning standard was 62.38%, denoting that there is positive impact of developmental review program towards the implementation of standard four requirements in the program. The Developmental Review Program showed positive impact on the implementation for the four sub standards with the value of *t* for these sub-standards being 14.347, 9.488, 9.043, and 12.110 (Table 8). Hence, it can be inferred thatall the elements strengthen the positive impact of the Developmental Review Program and their practices in accounting program at the university.

Table 8. *t* Test for the Impact of Developmental Review Program in enhancing the standard four in the Accounting Program.

Element	N	df	Mean	Std. Deviation	t	Sig. (2-tailed)	%
Students Learning Outcomes	303	302	3.57	0.688	14.347	0.000	64.18
Students Evaluation	303	302	3.41	0.756	9.488	0.000	60.30
Educational Support for Students	303	302	3.44	0.847	9.043	0.000	61.00
Teaching Quality	303	302	3.56	0.807	12.110	0.000	64.03
Impact of Developmental Review Program	303	302	3.50	0.695	12.406	0.000	62.38

6. Conclusion

Though many studies have been conducted about accreditation of higher educational institutions in general and accounting in particular, no study has been undertaken in the dimension proposed by the researcher. The study was thus conducted to know the impact of developmental review program for Academic Accreditation by NCAAA on enhancing the effectiveness of Standard four – "Education and Learning" in accounting program.

Thus based on the analysis, the researcher has found that there exists a positive impact of development review program towards the enhancement of the standards for criterions and their practices in the accounting program at Sattam Bin Abdulaziz University. However, some practices need to be adopted to improve their implementation. A few of them are stated below:

1. Improve surveysystem for employers about the effectiveness and efficiency of program students

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learning outcomes.

2. Developing and implementing a system of evaluating students' performance externally.
3. Currently the student achievement is not systematically linked to the learning outcomes. There is a need to link the students' achievements with the intended learning outcomes by developing a measurement system.
4. There are multitudes of academic systems that need to be made aware to each student. The Academic systems of the program need to be put across to the students through developing a systematic mechanism.
5. Providing encouraging atmosphere and developing procedures to overcome difficulties faced by teaching staff. Special care need to be put in to improve all facilities for the faculty to develop their intellectual capital. A mechanism need also be in place to followup the aspects related to the development of teaching staff, as well as appropriately rewarding distinguished faculty.

It is expected that more studies will be undertaken to unveil the lacunas and bring in an impeccable system that will bring in a seamless teaching learning process. This will of paramount importance for brining in the badly required positive changes in the educational sector so as to make a bright future.

7. Annexure

Standard Fourth: Learning and Teaching

This standard focuses on evaluation of consistency of students' learning outcomes with National Qualification Framework – NQF and extent of consistency and effectiveness of teaching and evaluation methods with the domains of learning outcomes.

Required Evidences: It can be relied on evaluation of students, graduates and employers to measure the quality of program and learning outcomes as well as statistics of completion of course & program, ratio of students to teaching staff, statistics of qualifications of teaching cadre, strategies of teaching and evaluation for different domains of learning, results of benchmarking with other universities through the samples of students' works, question papers and students' answers.

Examples of Indicators:

- Students' survey about the quality of teaching and filed activities.
- Graduates' survey about the quality of program, skills and knowledge required and needed by labor market.
- Employers' survey about the quality of graduates.
- Ratio of students to teaching staff and employees in the program as whole.
- Graduates employment rates.
- Percentage of success and completion of students from first year to second year.
- Percentages of graduates taken admission for higher studies in approved universities.
- External and independent evaluation of the program based on the criteria of NQF.
- Effectiveness of teaching methods as per the evaluation of students, external observers and faculty members for each domain of knowledge.
- Level of effectiveness of academic guidance and consultations given to students by faculty members.
- Qualifications and percentage of faculty members who have PhD, Master and Bachelor Degrees.

- Appropriateness of qualifications and experience of faculty members for the courses they supervise.
- Opinions of external observers about the quality of approved course books of the program.
- Opinions of students about the course books in terms of its usefulness and understandable.
- Number of annually published researches of faculty members in peer reviewed journals.
- Opinions of consulting and professional bodies regarding quality of courses and whether it can cover the required skills and knowledge.
- Level of participation of faculty members in the activities of professional development related to teaching methods.
- Level of students' satisfaction about the effectiveness of teaching in the program.
- Percentage of appointment of graduate students.
- Percentage of graduates who got higher studies.
- Percentage of students who completed the study year with a grade of "Good".

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STRATEGIES OF INTERACTION WITH A CONSUMER WITHIN THE MARKETING PRODUCT POLICY

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Abstract. A matrix of strategies for interaction with a consumer in the Internet is developed based on the use of two-vector coordinate system: the degree of consumer readiness to purchase and the communication environment. The means of promotion has been analyzed in accordance with the strategy of interaction with the consumer in the Internet. The KPI system for the communication activity of the enterprise in the Internet was proposed on the basis of crowd-technologies. The built matrix of areas of correction of the communication policy allows the company to determine the further direction of correction of communications for each level of communication influence.

Keywords: marketing product policy; strategy; communication policy; consumer; crowd-technologies

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1. Introduction

The marketing activity in the information society acquires new features of functioning both from the enterprise's side and from the consumer's side. The behaviour of consumers under the influence of Internet technologies is changing, which requires a rethinking of traditional processes of marketing activity of the enterprise.

In their papers, researchers (Wang, M., & Qu, H. 2017) emphasize the significant role of information technology in economic relations of market players, which requires new approaches to marketing activities of enterprises. Information technology greatly affects the functioning of each subsystem of marketing, creating new opportunities and threats. In this context, scientists (Homburg, C., Jozić, D., & Kuehnl, C. 2017) proposed an information marketing concept. Information marketing concept is a marketing activity of an enterprise that partially or fully operates on the Internet and uses marketing-specific strategies and business methods for the hypermedia environment to enhance its competitiveness (Markos, E., Labrecque, L. I., & Milne, G. R. 2018). The development of information technology allows you to use individual marketing for the broad mass, satisfying the needs of each client, while covering a large number of orders. In this situation, the building of a system of the long-term marketing interaction of the company with its customers and other market players is becoming increasingly important in order to satisfy all parties in the process of economic interaction.

However, not only the manufacturer has access to information in the information society, but also consumers have the opportunity to get information about manufacturers, attractive offers on the market and the specifics of the process of buying and selling goods. In addition, the consumer not only receives this information, it also distributes it over the Internet and exchanges experience with other consumers and provides advices, using other technologies, and therefore influences further consumer behaviour of other participants.

In the process of this interaction, consumers began to unite into communities and virtual communities (Cole, S. J. 2017). Being in such communities, users actively interact with each other and affect consumer behaviour. In such a situation, enterprises can interact not only with individual consumers, but also with whole groups of consumers, who, unlike the mass market, actively influence each other.

2. Methods

In the process of forming a strategy of interaction with the consumer in the Internet, a qualitative assessment of the communication environment based on the analysis of the information environment that was carried out earlier is required. In order to assess the communication environment, it is necessary to analyze whether it is favorable or unfavorable for the specified manufacturer. The tool recommended to use in this case is content analysis.
The content analysis process involves the following steps:

1. Determination of the totality of the studied sources. Determination of the type of information source (press, Internet, radio broadcasts, etc.). Determination of the type of message (articles, recommendations on the site, publications in social networks, etc.). Determination of the communication side (the consumer who distributes the communication or the representatives of the companies). Determination of message spreading time (month, quarter, year) (Jacobsen, L. F., Tudoran, A. A., & Lähteenmäki, L. 2017).
2. Formation of a sample of totality of messages for analysis by parameters determined in the first stage.
3. Selection of units of analysis. The content units include: concepts expressed in separate terms; themes expressed in paragraphs, parts of texts, articles, publications, etc.; brand names etc.; events, facts, etc.; the meaning of appeals to the potential recipient.
4. Determination of measurement indicators, which include: frequency, direction and intensity. The researcher can measure from one to three characteristics (Lou, L., & Koh, J. 2017).
5. Procedure for encoding information according to the given parameters.

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6. Determination of the results of the content analysis.

Using the matrix developed by the author, we define the strategy of interaction with consumers in the Internet environment (Table 1).

Table 1. The matrix of strategies for interaction with the consumer on the Internet

		Communication environment	
		Favourable	Inappropriate
Degree of readiness of the consumer to purchase	High	Strategy of development of relations-sales (consumers ready to buy)	Consumer return strategy (Potential consumers of competitors)
	Low	Consumer development strategy - actualiazation of the need (Potential consumers)	Potential development strategy (Problematic consumers)

The ready to buy consumers in the matrix proposed are the most promising consumers who are ready to buy, and who need direct targeted communication, aimed at selling the product. In this case, it is advisable to apply a strategy for development relations with the consumer. The implementation of this strategy is possible due to the use of advertising mechanism - targeting.

The next strategy in the matrix is the return strategy. This strategy involves work with potential competitors. These are potential customers who are ready to buy, but do not consider the company as a supplier of the product. This may be due to a lack of information about the supplier or a negative attitude to it. That is, the communication environment is unfavourable to promote the brand (negative feedback, strong competitor's positions in the consumer's perception, poor brand awareness). In this case, it is recommended to use a strategy of returning consumers through the spread of communication, emphasizing the benefits of the product relative to competitors, or the disadvantages of competitors. The work with these consumers involves improvement of the context, spreading the desired information in the company's communications environment and interested consumers.

3. Results and discussions

Internet technologies provide the opportunity to switch from mass marketing to individual. In an increasingly competitive climate, manufacturers aim at customization by creating individual consumer value of goods, adapting the characteristics of the product to the specific needs of the customer, the convenience of the process of buying. Moreover, the role of service is growing, which in some cases becomes more important than the product itself. Therefore, companies should be prepared to provide an individual approach to each customer.

Flexibility of business processes in the Internet allows faster success for enterprises in an interactive environment. Modern marketing activities in the development of Internet technologies are characterized by the following features: on the one hand, there is an economic globalization that applies to all economic entities and their interaction, that is, enterprises use the strategy of mass global marketing. On the other hand, there is a tendency of individualization/marketing localization, which is related to the need for more complete satisfaction of the needs of customers in the conditions of global severe competition from mass to segment/niche marketing (Hilorme, T., Chorna M., Karpenko L., Milyavskiy M. & Drobyazko S. 2018).

That is, marketing activity in the conditions of the information society is formed on the basis of an individual approach to the consumer, in contrast to mass marketing in an industrial society. At the same time, the company does not operate on regional markets, as before, but enter the global market due to the use of Internet technologies.

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The Quadrant "potential consumers" defines consumers who are in a favourable informational environment, but for which the goods are latent need, that is, they are not yet ready to buy. The consumer development strategy implies an active spreading through the context of the communication aimed at actualization of the need at the consumer.

The last quadrant of the matrix is "problematic consumers". For these consumers, you need to work both on the information environment in which they are located, and on the actualiazation of need in the product. For this purpose it is expedient to use the strategy of potential development of consumers. It involves active work at both levels of communication impact, context level aimed at creation of the need in the product, disclosure of new opportunities for the use of the product, the advertising layer of communication aimed at emphasizing the advantages of the product compared with competitors.

In order to implement each of the proposed strategies, the enterprise may use appropriate means of promotion at each level of communication impact (Table 2).

Table 2. Means of promotion in accordance with the strategy of interaction with the consumer on the Internet

Type of strategy	Information level of communication influence	Product level of communication influence
Strategy of development of relations with the consumer	Incite the agiotage around the brand, support the level of anxiety of consumers	Active targeting and retargeting targeted users in social networks and contextual advertising. Proposals for sales promotion (discounts, promotions, quantity limited, etc.)
Consumer development strategy	Create demand for a product category. Actualize the latent need for goods (feedback on the benefits of using the product) Emphasizing the importance of the product category, methods of use	The advertising is focused on the benefits of using the product.
Consumer return strategy	Change the importance of the attributes on which the competitor is more attractive Weaken competitors by weakening the strengths of the brand-competitor	Strategy of differentiation of the brand, emphasis on the strengths of the product. Emphasizing the advantages and uniqueness of the brand. Creation of additional benefits for the consumer. Increase customer after-sales service
Strategy of potential consumer development	Creation a need for product, opening new opportunities for product use	Emphasizing the advantages of the product compared with competitors, and creation of the desired image of the company

So, having defined the strategy of interaction with the consumer in the Internet environment, the enterprise has the basis for development of a communication strategy. That is, the direction of the strategy of interaction with the consumer in the Internet is the basis for the further communication strategy.

The next block is the development of a communication strategy for the enterprise in the Internet environment and in general throughout the information space. In accordance with the chosen communication strategy, an optimal set of marketing communications is formed. Since we are talking about communication in the Internet

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environment, it is advisable to use such Internet communications as contextual and banner advertising, promotion in network communities and in forums for the discussion of products and services. To implement a particular strategy, an enterprise can use such tools as generation of content in the network, management of network communities dedicated to the brand, targeting and retargeting.

The targeting and retargeting mechanisms are very effective tools in the implementation process of crowd-technologies in marketing communications. They provide the opportunity to personalize communications, target the targeted advertisement at a prospective consumer, whose psychographic or behavioural profile indicates the readiness of the consumer to make a purchase (Ponsford, R., et al. 2017). So, the mechanisms of targeting and retargeting considered give the possibility to implement selected strategies of communication policy and strategies of consumer behaviour management.

In order to assess the implementation of the communication strategy, it is recommended to analyze the key indicators of the effectiveness of communications, that is, to analyze the so-called key performance indicators (KPIs). KPIs are indicators of enterprise activity that help organizations achieve strategic and tactical (operational) goals. The use of key performance indicators enables organizations to assess their status and help assess the strategy implementation (Hilorme, T., Nazarenko Inna, Okulicz-Kozaryn, W., Getman, O. & Drobyazko, S. 2018).

To develop our own KPI system, let's take as a basis for the study of an international organization in the field of content marketing Content Marketing Institute. (Oghazi, P., Karlsson, S., Hellström, D., & Hjort, K. 2018) proposed to distinguish key metrics for analyzing the information environment for four content functions: perception, spreading or exchange of information, conversion and sale. The following KPI system of the communication activity of the enterprise in the Internet on the basis of crowd-technologies is proposed (Table 3).

Table 3. KPI system for determination of the effectiveness of the crowdmarketing

Groups composed based on the content functions	Examples of indicators
Return of investment (ROI)	Proceeds from sale; Selling cost; Income (from one followers, a lead, a buyer); The share of regular customers (in social networks compared to other channels).
Efficiency indicator for network information exchange	Number of links to messages; Number of reposts; Comments (quantity/quality); Likes and ratings; Reviews (quantity); Participants and active members.
Indicator of the efficiency of perception of network information	Number of pageviews (post); Viewing time; Number of downloads.
Conversion Rate	Conversions (mail subscription, download, installation of widgets and tools, etc.); Registered users; Number of leads (day, week, month); The cost of the lead.

The indicators used in the given KPI system may be aggregated from the enterprise's internal reporting, in particular from data counters, Internet community administration pages, and sales data. The first three groups of indicators are mostly technical, which complicates their unambiguous efficiency assessment. In general, thanks to

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the KPI system, it is possible to assess the intensity of company promotion in social media by means of distance marketing in comparison with its closest competitors. These indicators provide an opportunity to analyze problem points in the company's communication activities in social media.

Accordingly, it is worth to evaluate the communication strategy to determine further areas for correction of communications. To do this, the following matrix tool is proposed, which makes it possible to determine which components in the communication strategy of the enterprise on the Internet would be appropriate to change (Table 4).

Table 4. Matrix of areas for correction of communication policy

		Information level of communication influence	
		Appropriate	Inappropriate
Product level of communication influence	Appropriate	Maintain existing communication	Change the information level of communication influence
	Inappropriate	Change the product contour of influence	Change both contours of communication influence

The determination of the correspondence of each of the levels of communication influence shall be carried out by means of content analysis and expert evaluation methods, similar to the procedure for determination of the favourability of the communication environment described in this sub-paragraph.

Within the framework of the information society, the Internet network becomes not only a channel of information with the consumer, but also becomes an environment of functioning as manufactures, intermediaries and consumers. It opens up new opportunities for doing business to market entities. In these conditions, the model of communication in the network also changes. There is a different model on the Internet compared to traditional media, which involves the presence of many senders and many recipients of information (Dykha, M., Drobyazko, S., Hilorme, T., Oles, H. 2018, Polozova T.V. 2017).

Such changes in the environment require changes in the approaches and methods of managing marketing activities. In particular, it requires the transition from cyclic marketing management to a continuous process of management. In addition, in conditions where information becomes a key resource for both manufacturers and consumers, the issues of developing new effective communication methods in the hypermedia environment of the Internet are actualized.

Internet communications have their own peculiarities as opposed to traditional marketing communications. This specificity is due to a change in the models of communication in the network and the behavior of subjects on the Internet.

On the one hand, the information is influenced that is generated and circulated, and on the other hand, the user interacts with other users on the Internet. That is, a user in the process of interacting with others can become a member of a group, organization or network. In the conditions of the information society, the Internet becomes a host environment and user interactions in the form of communities, where their own information space is formed that affects the behavior of consumers.

That is, Internet-based marketing communications provide the opportunity to realize both short-term, which includes marketing and long-term (image) communication goals through a wide range of marketing tools that are inherent on the Internet environment but are rather effective along with traditional methods of promotion.The

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main task for an enterprise, when implementing communication activities on the Internet environment, is the formation of an integrated communication strategy in the network and the selection of optimal tools for its implementation.
Traditional approaches and methods for conducting marketing communication activities using enterprises in the conventional mass media are losing their effectiveness on the Internet. This is due to the fact that in the Internet space there is another model of dissemination of information, rather than in the usual media, as well as new types of communications that are inherent to the hypermedia environment, which necessitates the development of new methods and principles of management of communication activities of enterprises on the Internet.

Thereafter, improvement of existing methods of communication activities contributes to the development of social processes of interaction of subjects on the Internet environment. An Internet network from the information dissemination channel is transformed into an interaction environment of communication subjects, forming another information space that has an impact on consumer behavior. The proliferation of social networks and the formation of communities on the basis of Internet technologies are particularly contributing thereon. Such manifestation of social interaction can be used by the enterprise in the process of forming new approaches to communication activities on the Internet.

Advancement with the use of crowd technologies as well as the advancement of traditional communication tools are characterized by complexity in the evaluation of efficiency, due to the fact that all communications are implemented as short-term goals, mainly commercial and long-term goals, designed to build the image and manifest in the long-term period.

Thereafter, crowd technologies are characterized by the mechanism of self-reproduction of communications by users of the network, that is, at first the company promotes certain content on the network, and then the users themselves distribute it, hence the indicators of attraction become important (Polozova T., Beliavceva V., Perepeliukova O. 2018). The second important moment in the implementation of crowd technologies in marketing communications involves a non-linearity of the sales process; the potential customer does not always make a purchase as soon as he has received the information; often this purchase takes place with a delay in time, which complicates the assessment of the efficiency of the communication.

So, by analyzing the economic effect of using the methods of crowd marketing and other methods of promoting on the network, in particular, such as banner and context advertising, the means of crowd marketing are characterized by better economic indicators and, therefore, have a higher level of efficiency by reducing the cost of attracting one customer.

This is due to the peculiarities of the mechanism of the functioning of the crowd marketing, which consists in self-reproduction, that is, members of the communities themselves, on a royalty-free basis, transmit messages to each other, which reduces the total cost of impressions, and, as a consequence, the cost of switching to the site. Due to this, the final price of one order also decreases.

Conclusion

In accordance with the given matrix, the enterprise determines the further areas of correction of communications for each level of communication influence. If communication at both levels is appropriate, that is, the perception of the brand by consumers in line with the positioning strategy, you should support the chosen communication

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policy. If the context impact level is not appropriate to the company's advertising communications, the company can adjust this situation by spreading the desired context, refuting the wrong brand stereotypes among the communities. When the product information contour is inappropriate, this is due to the fact that consumers form a certain image of the product among community members, and the company emphasizes other brand benefits that consumers do not perceive. In this case, it is easier to change the advertising communication than to radically change the image of the brand. When the brand communication does not completely match its image among community members and among individual consumers, it is recommended to change both contours of communication influence. In order to apply the provisions of the concept of distance marketing in the communications activities of enterprises in the market, the scientific and methodological provisions of forming a communication strategy on the Internet have been improved, namely, the structural and logical scheme of formation of the marketing communication strategy on the Internet has been developed. Unlike existing schemes, this scheme is complemented by the stage of building a consumer interaction strategy on the Internet, which is the basis for identification of the consumer communications and networking communities on the Internet. The proposed stage is based on the analysis of the degree of readiness of target customers to purchase and the state of the communication environment of the enterprise.

So, the attraction of Internet technologies in the process of production and exchange between market players helps us to increase the level of efficiency of the enterprise and increase satisfaction of the needs of consumers. The use of Internet technologies provides the opportunity to form competitive advantages for manufacturers of products.
The research of scientific works has revealed that the complex of marketing communications on the Internet, besides traditional means, is also supplemented by specific communication means that are inherent only for the Internet environment, such as functioning of network communities, search optimization, lead generation, targeting, etc. Each of the elements of the Internet marketing communications complex is described and analyzed and the main task of the company's communication activities on the Internet is to develop a strategy of integrated marketing communications that optimally combines these tools to achieve the image and marketing goals of the enterprise.

The theoretical generalization of scientific works and empirical data showed that in the conditions of the development of the information society and the spread of Internet technologies, changes in consumer behavior patterns on the Internet environment are taking place. Accordingly, existing marketing principles of communication activity are losing their effectiveness, which has caused the need to improve the scientific and methodological provisions of marketing communication activities, taking into account the peculiarities of consumer behavior in the Internet space. In the course of the research, the peculiarities of consumer behavior on the Internet were identified, namely the ability to integrate into the networking community and their impact on marketing communications.

The study found that the use of the developed matrix method provides an opportunity to select the optimal strategy for interaction with the consumer on the Internet, based on the diagnosis of the state of the communication environment and the degree of readiness of the consumer to purchase. The developed strategies of interaction with the consumer on the Internet serve as the basis for the formation of a marketing communication strategy for enterprises of tablet computer manufacturers, which is reflected in the corresponding structural and logical scheme of forming the strategy of communication on the Internet.

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SUSTAINABLE ECONOMIC DEVELOPMENT AND POST-ECONOMY OF ARTIFICIAL INTELLIGENCE

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Abstract. The world economy is currently becoming involved into a most dangerous crisis of systemic nature: into the transition from postindustrial type economy to post-economy of artificial intelligence (AI). The portent to such a "transition crisis" manifests itself in the fact that the wage level has become stable in all industrially developed countries, however, the center of revolutionary qualitative change has by now shifted to a change of the employment structure – the proportion of less qualified workers group keeps decreasing, what is more, exponentially. Meanwhile, bearing in mind that live labor is the major source of increment of national wealth in sustainable postindustrial economy, it can be stated that it has reached the limit of its constructive capacities and urgently demands bringing the "personal factor" of production beyond boundaries of the latter. It is "post-economy of artificial intelligence" that is up to this imperative. It is characterized by the priority of the new source of energy and social communicating technology, it forms a brand-new economic basis which exceeds the potential of postindustrial production. What actually happens is the transition from the "economy of scarcity" to the "economy of abundance". This entails new architectonics of a social order. In post-economy of artificial intelligence, software-controlled production, service and transaction structures gain the global nature initially. As a result, "artificial intelligence" appears to be the creative software. In the new situation, the emergence of more complicated forms of economy is inevitable. Market institutions – competition, innovation, marketability – will be put to comprehensive tests too. A bunch of theoretical questions arise that can be answered by the economic science. It is searching for answers to the set questions that is in the focus of attention of this paper.

Keywords: artificial intelligence; post-economy; sustainability; transformational change; fundamental properties; scientific progress

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1. Introduction

Potential economic preferences formed by using artificial intelligence (AI) technologies in traditional and creative sectors of the national economy imply the wide-ranging use of artificial intelligence technologies on the basis of working out the national development strategies that help increase the economic growth rates, labor and capital productivity, diversification of sectoral makeup of production, and improvement of investment climate, because the productivity of artificial intelligence exceeds all existing processes of automation and mechanization. Hence the main task is both to create artificial intelligence technologies and to ensure access to them for as many as possible strategically important economic subjects. The paper discusses priority post-economic, meta-economic and institutional barriers hindering the implementation of artificial intelligence technologies. It provides grounds for particularities of the process of investing into artificial intelligence technologies and estimates the influence of artificial intelligence on the spheres of production and consumption.

In the contemporary conditions, the extent of application of artificial intelligence technologies is expanding, and no sector can avoid their effect. Meanwhile, the influence of artificial intelligence on various spheres of the national economy has a transformational nature and one enhancing the competitiveness. Not only do technologies of artificial intelligence alter the technical basis of production, but they also transform the configuration of social and economic relations being formed in it as well as the mechanisms of developing and fulfilling the optimum economic solutions.

2. Post-economy as an object of social analysis

Social science broadly uses the definition "post-" (post-capitalism, post-industrialism, or post-modernism) which is intended to characterize new social forms emerging as a denial of the already existing ones. It is in this meaning that the category "post-economy" is employed owing to which "the entire history of economic management of the human society can be represented as a chain of transitions from non-market economy to market one, and then, if the ideas of Hegelian dialectic are to be adhered to, from market economy back to post-market or post-economic society" (Ushankov, 2014). Certainly, this is a simplified interpretation of Hegelian dialectic because throughout the economic progress of the humanity the economic achievements never get denied but are preserved and fulfilled in a modified way.

According to the main premise of the scientific theory of public production, it is the difference in the way how its personal and material factors are connected that acts as the difference between stages of economic development. At the early stages of the rise of public production, direct, immediate connection was objectively due to limited social parameters of the emerging economy (Steensma and Lyles, 2000; Čábelková and Strielkowski, 2013; Čábelkova et al., 2015). Back then, its boundaries were specified by the limits of efficiency of the primitive production and consumption commune. As for the genuine economy, it is formed beyond the production and consumption commune, and the humanity will never return to it – losing (with such a return) all its social and technical gains (Abrhám et al., 2015). Conversely, the entire public production practice discovers it develops by no means for confirming the correctness of Hegelian dialectic but obeying the laws of achieving social efficiency.
The authors of this paper are united by the methodology adopted by them for analyzing the social essence of post-economic stage of public production. According to the methodology, the said stage differs from all the previous ones by the fact that within it the economic problems are resolved by scientific and technical revolution, the systemic breakthrough of which takes the shape of "artificial intelligence". Some sketchy success in this direction can already be seen today: communicative technologies that have overcome the monopoly of the state services (mail, telegraph, telephone), service centers that have made independent orders (of tourist trips, transport tickets, state services) possible, and the time wasted for shopping has been replaced with an opportunity of viewing the

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offers remotely (in the Internet-based shops). Accretion of technical and social advance – this is the essence of the post-economic development stage of public production.

3. Artificial intelligence within the coordinates of economic theory

Being the newest form of systemic automation of macroeconomics, artificial intelligence is of interest for both the society and the economists first and foremost as a unique factor of economic growth. Artificial intelligence gains especial economic significance in the status of a self-learning device which can automate processes that for many decades have been believed to be non-automated. No less attention of the economists is drawn by the main consequence of economic growth as a result of fulfilling the production potential of artificial intelligence – optimization of income distribution between labor and capital (see e.g. Nilsson, 1984; Kalyugina et al. 2015; Ehrenberger et al. 2015; Dirican, 2015; Koudelková et al. 2015; Strielkowski and Čábelková, 2015; Chen et al., 2016).

This means that artificial intelligence itself, with its technological, cybernetic, informational and other features, is not and cannot be an object of attention of both the economic science and the economists. Meanwhile, forecasting the influence of creation of artificial intelligence on those essential properties of post-economy the total of which makes up its inherent object uniqueness is quite a different story.

So what fundamental properties of post-economy – as a result of fulfillment of the public production potential of artificial intelligence – are the case?

Numerous special studies have allowed building the most general, abstract, logical model of the efficient economy the integral elements of which are the private property and entrepreneurship emerging on the basis of the latter; the state property serving the interests of the society; the state and private partnership; fair competition of all forms and kinds of property; countering the monopoly abuse, marketability, market principle, innovation, and creativity (Lisin et al., 2015; Lisin et al., 2016; Strelkowski et al., 2016b or Štreimikienė et al. 2016; Zemlickiene et al., 2017; Tvaronavičienė 2018; Tvaronavičienė et al. 2018). These are the "bricks" of which the present-day building of the economy is constructed. With numerous systemic concepts in economics, the quantity and composition of the listed attributes may vary considerably. Anyway, each of the above "brick" will inevitably experience the transformational action of the production and technical potential of artificial intelligence as that is fulfilled.

Pointing out the transformational nature of action of artificial intelligence on fundamental elements of the economy means that the essential properties of the elements will remain the same but the forms they are fulfilled and expressed in will experience important change. With this approach, the task of economic science is to perform preventive forecasting of the expected transformational change in order to introduce the relevant alterations into the mechanisms of functioning of "post-economy of artificial intelligence" and to develop the long-term macroeconomic policy.

4. On methodology of exploring post-economy

With the economic science being made up of generalization of their results, actually, theoretical studies impose special requirements for the nature of reasoning and logic of presentation of the results of the analysis conducted. The principal problem of theoretical research consists in its deductive nature. Moreover, such a deductive nature of theoretical research is the only possible form of conducting it. It goes without saying that situations are quite possible when the final theoretical provisions of a completed study can be backed up by certain economic statistical material. Yet the cases of such a "synthesis" of the essence and the phenomenon are extremely rare,

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which is explained by their failing to coincide within the objective reality fragment under study. Meanwhile, it is exactly such incongruity that keeps generating the ordeals of scientific cognition: had the essence and the phenomenon coincided, there would have been no need of science. For the sphere of economy, economic processes being split into the essence and the phenomenon (and opposition thereof) has turned into the condition of being of all economic forms, institutions and instruments. However, the very division emerges in fact only since the point of production growing on into the *commodity* production (first – simple one, and then – into capitalist one).

Will the "artificial intelligence" work its way through this division and opposition? It is very doubtful because for these economic foundations of the market production form have to wither away – public division of labor and private property for the results thereof. Meanwhile, for such withering away, tectonic change is necessary in the proportion of production (productive forces) and economy (public production forms) (Čajka et al., 2014; Strielkowski and Weyskrabova, 2014; or Strielkowski et al., 2016a).

Therefore, what transformational change in the economy can be forecast with the advent of the "artificial intelligence" phenomenon as that of self-learning programmed devices ensuring the maximum efficiency of production and technological systems?

The authors forecast three essential alterations in the market organization of public production: 1) revival of the "known market" institution; 2) reduction of the sphere and volume of transaction costs; 3) increase of the extent of institutional regulation of the economy. Now the mentioned changes are going to be discussed in the sequence.

1. Saying goodbye to the medieval times proved to be saying goodbye to a special type of market too – one that remained in the economic history as the "direct order market". In those distant centuries, such an institution (a stage necessarily preceding the rise of the full-fledged commodity production) emerged due to the medieval sphere of creation being crammed into the boundaries of the fortress walls of the medieval cities (back then, with subsistence economy being still widespread in agrarian settlements, handicraft industry could only exist in cities). The medieval handicraft market itself was in fact a kind of subsistence production and consumption commune, too. As for nowadays, the revival of market as a "direct order institution" takes place on the contemporary technical substrate which enables each potential buyer (customer) to independently determine the buying method technology – either via a dealer (specialized sales point), or by means of a direct order with the immediate manufacturer. With regard to this, the practice of "mixed buying" can be stated for the present time that is transitional in nature and will be terminated as soon as one of the two forms of buying proves its inaccessible efficiency as compared to the other one. The transition from the "known" market that had prevailed for several centuries to an "unknown" market meant a revolution in organizing the production. In fact, this transition blessed the mastery of commodity forms with non-commodity public production which was then in progress. As soon as production governed by "artificial intelligence" becomes firmly established, the reverse movement will be seen, this time one from the "unknown" market prevailing at present (i.e. from a known manufacturer working for an unknown customer) to the "known" market (i.e. from a known manufacturer working at the order of a known customer). This is also a revolution in economy, and it will have some major consequences.

2. A known market differs from an unknown one by its objectively reducing the quantity of intermediary links. This renders the economy cheaper owing to withdrawal of intermediary economic subjects, which means curbing down the ever-swelling transaction costs.The nearest consequence of decreasing the transaction costs volume is to be the distinct cutback of employment in the intermediary sphere. As a result, tax revenues of the society will go down while the budget spending on supporting the new group of the unemployed will grow. However, the most important consequence will be the spheres of production and consumption drawing closer to each other, i.e. a kind

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of revival of the production and consumption integrity, which changes essentially the structure and mechanisms of functioning of the entire economic system.

3. One more consequence of the fundamental kind is the new way of behavior of the economy. For all centuries, the humankind has been trying to unthread the mystery of the intricate nature of economic development. It has succeeded in it – the cyclical nature of economic dynamics has been revealed, as well as the role of investments, leadership of entrepreneurship, the necessity of macroeconomic state regulation, and the monetary and fiscal instruments of this regulation. Nevertheless, all the above have been concealing the main factor of viability of the economic sphere – the unpredictability of its behavior, the very unpredictability the elimination of which would at the same time mean the end of self-propulsion of the economy. Public regulation of public production has its reasonable scope and, therefore, reasonable limitations. Exactly where the category of "unpredictability" emerges hiding the category of "randomness" behind it, there the scientific treatment of "unpredictability" generated by "randomness" has to be turned to. Specialists studying the importance of unpredictability (randomness) in economic development professionally come to a conclusion which in facts "rehabilitates" the unpredictability. They state that "it is extremely difficult to forecast anything in the economy at present: any unpredictable fact (which could be foreseen in principle too) can radically change the direction of its movement". A conclusion of the Oxford team of physicists and mathematicians saying that "extreme price movements in financial markets happen far more often than would be expected by chance" (The Economist, 2001) is also in line with the thesis.

Unpredictability, randomness, uncertainty, or stochasticity – this integral fundamental property of the economy has for a long time been the subject of special exploration in the modern economic studies enabling the scientists to make some important theoretical conclusions (see e.g. Assessment methods for efficiency indicator, 2013; Malakhov and Pilnik, 2013; Vorontsovskiy and Viyunenko, 2016; Jensen and Palokangas, 2007; Balitskiy et al. 2014). In particular, a group of economists suggested that multiplicativity is inherent in uncertainty too: the higher its extent is, the higher the average rate of "preventive saving" is. Due to this motive, in the uncertain economic conditions, consumers save much more than the usual norms of savings – in order to secure themselves from negative surprises. As a result, higher savings lead to reduced consumption volumes – and entail the bunch of crisis consequences (Fleming, Pang, 2004; Kendrick, 2005).

5. Strategic consequences of post-economy of artificial intelligence

The current development trends of the global world processes bring about the necessity of creating a new national strategy of working out and implementing artificial intelligence. Many countries spend enormous financial funds for supporting research in this area and encourage various innovation and creative projects. On the one hand, artificial intelligence is a global innovation constituent of societal development, and on the other hand – it is a result of human activity. Creation of artificial intelligence is contributed to by players who have vast advantages in the open innovation model – large private business and the state. The range of advance of artificial intelligence will determine its social and economic consequences in the future.

As practice shows, approximately every quarter of a century, there is a revolution of intellectual and digital world that leads to change in the economy. In the last third of the 20th century, transformation has given the humanity the integrated circuits – processors and microchip memory which accelerated the computation immensely. At the end of the last century and the early 21st century, the opportunity of connecting digital processors to each other has been found. Computers united in local and global networks by means of telephone and satellite data transfer. The Internet has become commercialized. It is here that the virtual economy is born, and production processes and other physical actions come to be performed in online systems. So regional character and geographical location lose their relevance.

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The contemporary high-tech digital transformation of the economy which accelerated the creation of artificial intelligence took place in the second decade of the 21st century. It promoted the extensive use of artificial intelligence not only in production but also in other spheres – in medicine, education, consumption, service and attendance etc. As a result, methods and algorithms of recognition have been created. The contemporary production and consumption have gained the computer "eyesight". Importantly, new algorithms of artificial intelligence use the data autonomously and form various groups and associations, which used to be within human powers only.

Artificial intelligence is one of the paramount constituents of the fourth industrial revolution which is characterized by the new and newest technologies drawing closer together and complex social and technical systems emerging that permeate each aspect of human life. New technologies and automation are becoming a part of daily life. These achievements in artificial intelligence already have effect on the contemporary economy both in general and in the aspect of personal well-being and financial opportunities of the society.

Technological achievements in the area of artificial intelligence promise to be comprehensive; their consequences can be seen in the area of health care, economy, security and management, as well as in combination with other new and converging technologies that act as a potential for transforming the current society on the basis of improvement of the decision-making process and the quality of life of the people. However, without reasonable assessment of risks and mitigation of their consequences, artificial intelligence may pose a threat for existing vulnerabilities in both economic system and social structures (Markoff, 2015).

First of all, artificial intelligence destroys the traditional business model and occupies its place while already featuring brand new characteristics of production and competition forms. The society gets an impressive boost and incentives appear for mastering the new technologies – and, as always, it is the most efficient subject that wins. This is why one has to become a part of this process in the present-day economy otherwise one can turn into an uncompetitive subject both in production and in the labor market (looking for a job in post-economy of "artificial intelligence"). It is the sphere of education, professional training, scientific research, startups promoting creation of adaptable systems, adaptable financing, and adaptive rules for emergence of new competitive productions and stimulating the existing ones that become the priorities of development of the society.

The authors believe that the economic consequences of artificial intelligence will include both the direct growth of GDP in sectors that develop or manufacture artificial intelligence technology and the indirect growth of GDP at the expense of a higher productivity in the sectors of the economy that use some forms of artificial intelligence. A higher level of artificial intelligence may well yield both higher revenues and employment within the existing production and creation of a totally new economic activity. The productivity of labor in the existing sectors can be enhanced by means of faster and more efficient processes of production and managerial decision-making, as well as by expanding the knowledge and access to information.

The scale of these economic benefits will largely depend on promotion and dissemination of artificial intelligence. If it is an increasingly more critical, more important component of the consumed products, then it will become an inseparable part of life for many people. Another characteristic of this process should be pointed out. The extent of economic effect of artificial intelligence will vary depending on the region and the country, or rather, on the fact whether the artificial intelligence is the prevailing process of economic activity and, therefore, on the primary factor of influence on economic performance in the regional aspect. In fact, given the current progress to accessibility and open source code of development, artificial intelligence has a potential for overcoming the inequality in income and attracting significant benefits both for the developed countries and for the developing ones. For instance, artificial intelligence has a potential for optimizing the production of foods all over the world by means of analyzing the agrarian regions and identifying the conditions for improving the yield of agricultural

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crops. On balance, the broader and the more profound the application of artificial intelligence in a certain region or economic sector is, the higher the expected economic effect is.

While estimating the future economic consequences associated with innovations such as artificial intelligence, it is important to note that it is difficult to predict in advance what exactly applications of artificial intelligence are going to be commercially successful. Moreover, even if success of a commercial project could be determined, it is still quite complicated to assess the extent of relevance of a positive result of artificial intelligence to economic consequences of its use.

Artificial intelligence as a way for transforming the economic reality has quite an effect on economic development, which first and foremost is expressed in reducing the intensity and strain of labor owing to automation of routine and cognitive tasks. Artificial intelligence technologies will influence both the parameters of national economic systems and the configuration of the world market at the expense of changing the industry priorities, alterations in production and consumption, and transforming the financial institutions.

The large-scale implementation of artificial intelligence technologies must contribute to an increase of labor productivity and reduction of technological and production costs, which is bound to lead to a higher efficiency of production. Alongside with that, the opportunities of artificial intelligence technologies will predetermine the change in the sphere of consumption owing to the improvement of quality of consumer goods, their diversification and personalization.

The action of artificial intelligence technologies on two major spheres of public reproduction – production and consumption – will inevitably accelerate the economic growth rates and produce an overall positive influence on the public welfare. However, it is important to bear in mind any negative consequences, too, that may result from massive implementation of artificial intelligence technologies.

6. The problems of employment in the conditions of post-economy of artificial intelligence

Another problem is the potential net economic of artificial intelligence and not certain mechanisms leading to economic results, with artificial intelligence being likely to influence both the productivity of labor and employment, and other components of economic growth in many sectors. So early as nowadays, researchers pay close attention to the growth of structural unemployment due to release of low-qualified labor with automation of routine work and machines performing a part of cognitive functions. Currently, it is the technologies of "automated" and "auxiliary" intelligence that prevail which are a way for accelerated performance of routine tasks. Transition to more progressive forms of artificial intelligence – the "extended" one and, subsequently, the "autonomous" intelligence which can make more efficient decisions even without any human efforts needed – will lead to freeing up not only low-skilled labor. Meanwhile, there will inevitably appear new jobs and high-tech employment due to the necessity of developing, supporting and operating the artificial intelligence technologies. Such transformation in the labor market will require some relevant measures for regulating the employment and new institutional mechanisms of economic policy. The latter have to be aimed at ensuring an opportunity of learning and further training for workers and at adopting the national doctrines of support for the structural and technological unemployed in sectors which face the greatest scope of implementation of artificial intelligence technologies while having a high percentage of the employed.

Some researchers argue that the growth of high technologies and automation will lead to a marked growth of all kinds of unemployment. With regard to this, they emphasize the increasing "cunning" of artificial intelligence: it can jeopardize both qualified and semi-qualified workers and reduce the size of the middle class (Frey, Osborne, 2017). This is no new reasoning, as the fear of technologies affecting the labor and propelling them into mass

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unemployment was worded by David Ricardo back in the era of industrial revolution – "the substitution of machines for human labour is often very injurious to the class of laborers" (Ricardo, 2003). The economic history of previous "destructive" technologies has shown that employment in certain industries shrunk as a result of technological achievements (matching the net effect of technological advance) but did not lead to its reduction in the long-term cycle. As of today, the labor market is adapted for implementation of new technologies, which manifests itself in new industries being created and, as a consequence, new jobs. This means artificial intelligence ensures a long-term potential of stability for the labor market, even though short-term employment problems are possible.

Another reason of the rapid development of artificial intelligence is the comprehensive automation and cheapening of robotics. For example, within the recent decade, the cost of robots has shrunk by 32%, and for the nearest 10 – 15 years, Bank of America forecasts a further 25% decrease of the prices (Bank of America; GDP budget-level forecast estimates for 2015-2025). According to experts' forecasts, by 2022, there will have been 3 million jobs more in the world labor market while about 7,1 million jobs will have disappeared, "The Future of Jobs" research published by the World economic forum at the beginning of 2017 records (World Economic Forum, 2017). According to the report by Bank of America, 45% of production tasks in the USA will have been performed by robots in 10 years, with the current figure being 10%.

Technologies are increasingly being integrated into life of the society, which creates prerequisites for development of artificial intelligence showing objective trends and opportunities for emergence of new artificial intelligence objects. However, it is the human advance too and not only the technical one that has to become the key factor. Hence one of the most important questions of artificial intelligence consists in it having to eliminate the monotonous human activity, thus freeing up the space for creative work. And, naturally, this will pull up quite a lot of other opportunities for people having a low, an average or a high qualification level. Therefore, people will face a dilemma of either changing their sphere of activity or further training in order to be able to interact with the smart machinery.

At present, one of the promising and universal ways out of the crisis economic situation is the "intellectual" scenario – the focus on digital economy and innovations in creation of artificial intelligence. It will be possible to accelerate the process by implementing more advanced methods: e.g. at the expense of reforming the structure of the labor market using various high-tech solutions for automating both intellectual and physical work. Thus, the reduced percentage of employees can be replenished by robotizing the production, including that of non-manual workers: robots begin to replace people in occupations that require interaction with customers.

Most researchers believe jobs implying a high extent of creativity, analytical thinking or interpersonal communication to be the most stable ones (Atkinson, 2013). Implementation and use of artificial intelligence can drastically change the global economy and increase the inequality of incomes. First of all, it is the low-qualified and low-paid employees who suffer from robotic automation; their moving to postindustrial countries becomes unprofitable and unjustified, given the technological development and higher volumes of the contemporary digital economy. The fear of unemployment following the escalating automation is justified in the developing economies where it may be the question of replenishing the shortage of human capital and not of replacing man with technology. The upcoming transformation of labor market means not termination of employment for people but changing the specialization and emergence of demand for other kinds of work. Economic solutions in artificial intelligence are one of the sectors of global economy which is growing briskly. The next most important factor is the availability of human resources. The majority of the developed countries are creating the economic, intellectual, material and technical base for artificial intelligence to function; the work is being efficiently carried out e.g. in Japan, South Korea, China, in the countries of the European Union and North America. This is why in

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order not to stay behind on the fringes of the world social and economic development, people have to ratchet up actions in creation of digital economy and artificial intelligence.

In conditions of post-economy of artificial intelligence, an increasing quantity of skilled personnel have to be trained in the high-tech sphere. This is practicable by the joint efforts of the state and the largest technological companies and production. The authors believe the problem of shortage of qualified specialists can be resolved not only by education but also with the help of creating artificial intelligence. The latter can solve many problems in production and other spheres of reproduction – automation of routine work, the use of the potential of programmers in solving the complicated questions of technological process, creation of new innovation systems, output of products with a higher added value, and the use of artificial intelligence in the sphere of services – all this ultimately leads to a growth of productivity of labor. Thus, an entire economic and technological helix is created which leads to economic growth and sustainable development.

The emphasis on automation, robotic automation of labor and development of artificial intelligence may be one of the correct directions and the least problem-plagued one for the country, because neither robots nor artificial intelligence, nor various algorithms and applications need food or accommodation and other physiological and social transactions. They also create no load on the urban, production and economic infrastructure. What is essential for this is to develop the existing one and build a new system of education, scientific schools and directions on the basis of development of the competitive market environment.

7. The unique situation of entrepreneurship in post-economy

Artificial intelligence has a positive influence on the economy furthering the development of entrepreneurship. This results in a rapid development of productive powers of the society. Private investments into artificial intelligence grow quickly. Private research and developments, state investments into artificial intelligence have a great influence on the economic growth, and venture capital financing has a high effect as they contribute to the development of innovations and the capacity of the economy to use the existing knowledge for enhancing the productivity of labor.

There is the general opinion about the higher venture capital financing leading to the growth of macroeconomic indicators, such as the quantity of firms, employment and revenues. First of all, venture financing stimulates innovations. Secondly, venture investments cushion the limitations of capital owing to individual people participating in the entrepreneurial activity. Thirdly, investors can stimulate further development of entrepreneurship giving a boost to the market by entrepreneurs' higher expectations from project financing. Finally, venture investors can influence the economy by increasing the probability of other firms financed by large companies' encouraging the outsiders to commence their own entrepreneurial activity in the sphere of high technologies and artificial intelligence.

Creation and development of artificial intelligence in certain industries and spheres may be of mutual interest both for the state and for the business. Market subjects involved in cooperation with directive authorities conduct in-depth research for better understanding and forecasting the development of artificial intelligence, considering, e.g. the circumstances of the region and industries, operation of automated systems at a more detailed level, the influence of timing, wage level, education, and national security. The joint efforts of the state and private sector of this kind can solve social problems, problems of ecology, security, other pernicious consequences of obsolete technologies, encourage and stimulate innovations, avoid centralization and expand independence in the decision-making process.

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The development of artificial intelligence will inevitably bring about the necessity of improvement of the legal framework, including one regulating the protection of the state interests, private life and public security. Meanwhile, there is a need to solve some general problems in maximizing the benefits and minimizing the risks: guiding principles for ensuring the security and investigation of failure processes have to be worked out, transparency systems for decision-making and management processes have to be designed, and public opinion has to be taken into account by means of efficient communication, and so on.

Therefore, the key feature of the current instant consists in artificial intelligence beginning to fulfill its potential for the business and for the state while throughout its history it has been referred to as a factor of significant contribution to the global economic growth.

Artificial intelligence opens up new opportunities for business. Companies are already successfully using the face recognition and voice identification functions for automating the existing products and services. New opportunities are opened up for the big business too. Smart systems are created that are capable of controlling air traffic or performing the integrated medical diagnostics. Such databases can be patented. However, in this market, it is extremely difficult to become the first or a large player. The data of artificial intelligence are frequently contained in open sources so they can easily become the common property.

Thus, the contemporary development of digital technologies leads to emergence of a new structure – virtual autonomous economy – the main element of which will be artificial intelligence that does not depend on people but works along certain virtual algorithms and applications.

There is the temptation of a total administrative control over these processes at the stage of establishment of this area that is still relatively small but the most promising and high-tech one. What is required is the optimum combination of the state and the private business which can make a qualitative takeoff in development of the digital economy and creation of artificial intelligence. The implementation of artificial intelligence will require taking quite a number of institutional, economic and legal measures aimed at regulating the spheres and branches of the national economy in the light of the smart technology transformation.

8. Conclusions and discussions

The main economic and social consequences of the rise of post-economy of artificial intelligence can be worded in general as follows.

First of all, the previous economy, including the postindustrial one based on production, placed into the foreground everything which would lead to economic growth. Meanwhile, in the economy of socially distributing type – where the priority is given to jobs and access to goods and services of mass demand is desirable – the economic growth is only possible if it creates jobs. For instance, in oil mining, hydraulic fracturing of formation can be justified because technologies considering the environmental aspect are taken into account little if at all due to the quantitative growth results being the priority. In conditions of post-economy of artificial intelligence, the mechanism of measuring the economic development level will be changed too. GDP is most suitable for productive, physical economy which does not duly consider the advance in virtual, smart environment. In post-economy of artificial intelligence, the traditional quantitative indicators of economic growth will hardly be able to relevantly reflect the extent of intellectual and social advance in public relationships.
Secondly, non-regulated markets frequently bring about reservation of leading positions for several large companies. The firms losing the competitive struggle rarely get a compensation from the society. Previously, the employees of the firms used to be able to find other jobs, but this is known to be no longer an option in the

economy of artificial intelligence. Economic efficiency of the market economy will be considered insufficient if it leads to generating an immense quantity of unemployed workers.

Thirdly, the spheres of application of artificial intelligence are fairly broad and they encompass both the habitual widespread technologies and the emerging new technologies and directions that are currently far from massive use. The entire diversity can be subdivided according to the criterion of the development "key points". Artificial intelligence is no monolithic subject area. Moreover, some technological directions of artificial intelligence act as new sub-industries of the economy and as standalone entities while at the same time serving most spheres in the economy.

Fourthly, two groups of use of artificial intelligence are subdivided into the physical and the virtual layers, with the virtual one prevailing. Developing the application of artificial intelligence along these lines will lead to using the technologies in traditional industries of the economy all round the perimeter of new value creation and transform them by creating a universal algorithm for almost the entire production and consumption functions range, from simple logistics to company management.

Fifthly, as for post-economy of artificial intelligence, it makes sense to single out two development directions: solving the problems associated with bringing the specialized artificial intelligence systems closer to human capabilities and their integration implemented by the human nature; and creating the artificial intelligence, arguably, a "mind", which would incorporate all the created artificial intelligence systems and would be able to solve many economic and social problems of the humanity.

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SUSTAINABILITY ISSUES OF TERRITORIAL POWER SYSTEMS IN MARKET CONDITIONS

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Abstract. The paper discusses the issue of improving the management system of the energy complex sustainable development at the territorial level from the perspective of ensuring energy security. It proposes the management models of the electric power and heat supply territorial systems development that allow taking into account current trends of expanding the use of market mechanisms to manage territorial energy production and to ensure a balance of interests of management subjects at various organizational levels. Based on a multidimensional statistical analysis for selected groups of Russian regions, it gives recommendations on choosing a priority strategy to reduce the energy intensity of the gross regional product.

Keywords: territorial formation; electric power and heat supply systems; sustainable development, energy strategy; market mechanisms; balance of interests

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1. Introduction

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Ensuring energy security is a major task of national economic importance, the solution of which is one of the priorities of the state's economic activities. The state as a subject of management has an energy function in the form of a set of areas of economic activity aimed at ensuring the reliable functioning and sustainable development of territorial power supply systems, forming markets of energy resources and products and regulating legal relations of their participants and price limits for the goods and services (Blum et al., 2012; Goldthau et al., 2012; Ang et al., 2015; Štreimikienė et al., 2016; Augutis et al., 2017; Newbery et al., 2018).
The adopted market model of power system management, peculiar to territorial entities of Russia with an open type of power supply systems, requires coordination of the development strategies of its facilities on the part of the energy providers that perform their management and the territorial bodies of state administration in order to ensure the necessary level of energy security to respond to external and internal challenges of reliability and efficiency of integrated power supply to local consumers in the medium and long term (Balitskiy et al., 2014; Chernenko, 2015; Lisin et al., 2015; Strielkowski et al., 2016; Tvaronavičienė 2018; Brożyna et al., 2018).

The conflict of interests caused by the market and expressed in the difference of ideas about the efficiency of the power supply service at different levels of management of its facilities (region and energy providers) leads to a mismatch of the management system of territorial energy production. While the criterion of energy efficiency on the part of the state is operating economy (the most efficient use of natural fuel and energy resources, the low cost of energy production) in the context of ensuring a given level of reliability, the criterion on the part of energy providers is profitability, that is, the compliance of economic objects with a competitive technological infrastructure that allows them to extract income in various trade sectors of the energy markets using the market forces (Wüstenhagen et al., 2007; Goldthau et al., 2012; Salas-Fumás et al. 2016; Tvaronavičienė 2017; Razminienė, Tvaronavičienė 2017; Rausser et al., 2018; or Kashintseva et al., 2018, Shakhovskaya et al., 2018).

Currently, when shaping the regional energy policy by the bodies of state administration of the energy complex in Russia, the interests of territorial energy providers are not taken into account, which leads to ineffective mechanisms for implementing energy programs, and the conditions outlined in the energy strategy under which the energy providers will be able to fulfill the government's requirements become unreachable (Lisin et al., 2014; Hughes et al., 2013; Lisin et al., 2015; Bilan et al., 2017).

In the context of the ongoing liberalization of economic relations in the energy sector and the expansion of the use of market-based management mechanisms, comprehensive implementation of the strategic priorities of the state energy policy requires improvement of the management system of the energy sector development from the perspective of ensuring effective interaction of government bodies with market participants and self-regulating organizations that are subjects of management at various organizational levels. Adequate reflection of the interests of management entities is the basis for the formation of a set of criteria for decision making in regard to development and functioning of territorial power systems.

2. Improving the management model of the territorial electric power supply system

To develop a management model of the electric power supply system development at the territorial level, we will conduct a functional and component decomposition of the management organization of its production subsystems, heat and power supply systems.

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The basis of the power supply system management at the territorial level is the developed scheme and program for the development of the power industry in the region for a long-term period. The following regulatory documents are used in this regard (Energy Strategy of Russia, 2014; Lisin et al., 2018a; Lisin et al.m 2018b):

- documents of territorial planning in the field of energy production,
- rules for technological connection of consumers,
- regional program of energy saving and energy efficiency improvement,
- guidelines for power systems design,
- methodological recommendations for the development of a scheme and program for the development of the electric power industry of a country subject for a 5-year period.

The background information for the development of a scheme and program for the development of the region electric power industry is as follows (Proskuryakova, 2017; Strielkowski et al., 2017):

- forecast of electric energy demand,
- information on applications for technological connection,
- the scheme and program for the development of the unified energy system (UES) of the country, as well as reports on its functioning,
- proposals of the UES system operator.

The scheme and program for the development of the electric power industry in the region makes it possible to form an investment program for the development of territorial electric power industry facilities. In this case, the existing model of managing the power supply system development has the following disadvantages:

- there is no consideration of the strategies and programs of innovative development of territorial generating companies, which leads to the inconsistency of the program with objective trends in the development of the industry in market conditions, and further causes a mismatch of power supply system management at the territorial level,
- there is no consideration of the future development of heat supply systems associated with operating modes with power supply systems, when organizing integrated power supply to consumers, as well as being combined by the complex interrelation of heat and electricity as goods,
- there is no specialized control over the compliance of the developed scheme and the program for the development of the electric power industry with methodological recommendations.

To eliminate these disadvantages, the authors proposed a model for managing the power supply system, shown in Figure 1.

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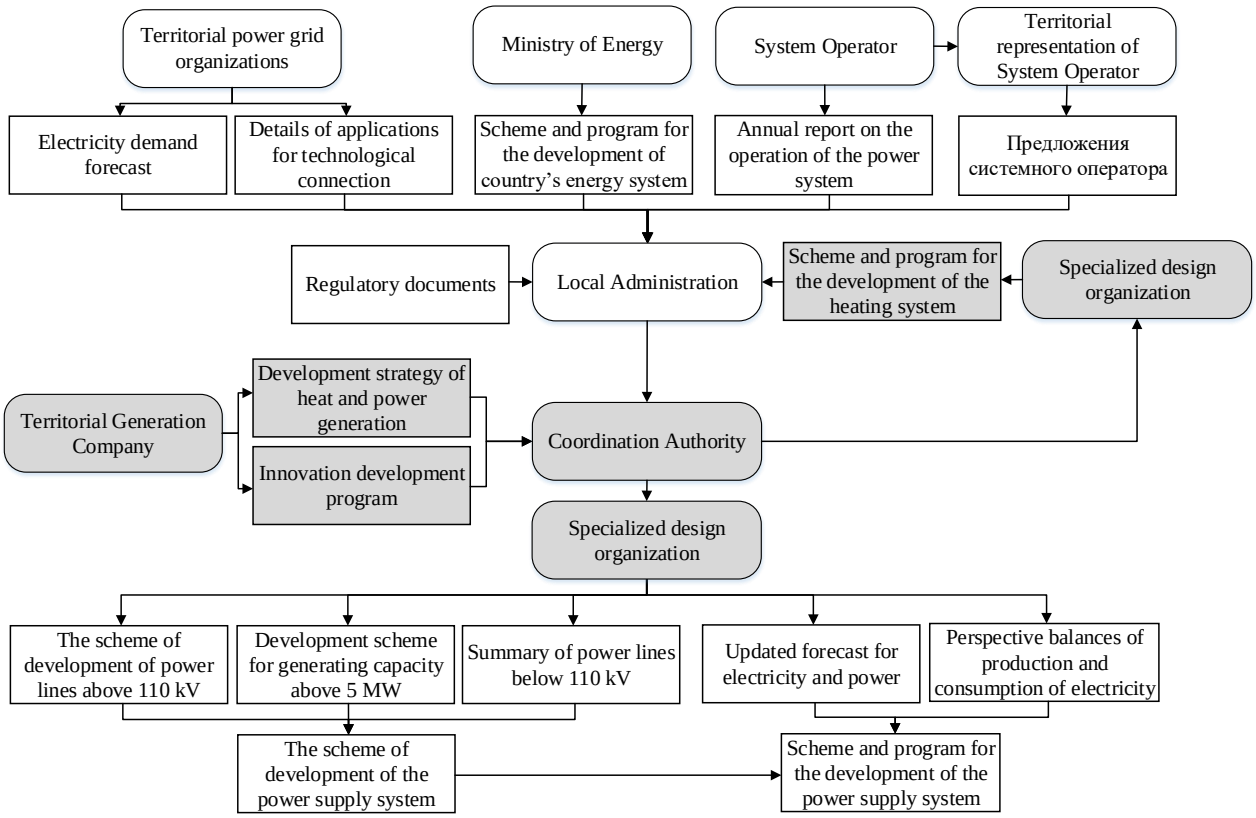

Figure 1. An improved model for managing the power supply system development of a territorial entity
Source: own development

Improving the quality of management will be facilitated by the creation of a coordinating management body that will allow coordination of management at various organizational levels between territorial executive authorities and territorial generating enterprises, adequately reflecting the interests of management subjects, both in the field of electric power and heat supply. Also its creation will allow:

- carrying out joint planning of the development of heat and electric power supply systems,
- ensuring the development of integrated power supply of a territorial entity on the basis of an economical combined production of energy products,
- improving the quality of schemes and programs for the development of heat and electric power supply systems based on the allocation of specialized design organizations.

3. Improving the management model of the local heat supply system

In contrast to the management of the power supply system, management of the heating system development is in fact fully implemented at the territorial level. Herewith, there are three main types of heat supply management system (Lisin et al., 2016; Lisin et al., 2017; Stennikov et al., 2016):

- based on administrative management, when the heat supply company submits to the administration of the territorial entity,

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- based on private management, when the heat supply company is in private ownership (in particular, of the territorial generating company),
- based on a concession agreement, when the assets of the municipal heat supply company is transferred to trust management; at the same time, the administration retains property rights, but it does not participate in the management of the heat supply company.

The administration of the municipal entity performs the functions of management of municipal heat supply companies. The main criterion for management is budget efficiency, while ensuring affordable heat for consumers. At the same time, the administration also often represents consumers, exercising direct management of budget organizations and enterprises operating the available housing.

Forming the tariff for thermal energy, it actually determines the cost of heat for its own consumption. Therefore, the tariff for heat of the municipal heat supply companies will almost always be lower than that the one established by the regional energy commission. In turn, this affects the underfunding, reducing the reliability of the heating system and the quality of heat supply to consumers. Also, a change of administration can lead to a reorganization of a heat supply company due to its unprofitability (Lisin et al., 2017; Li et al., 2015; Borelli et al., 2016).

Opposite according to the management criterion of municipal heat supply companies are private heat supply companies whose task is to ensure the wealth of owners, an indicator of which is the return on equity, which characterizes the income of shareholders. This management criterion assumes an increase in the price of heat while reducing the costs of production and sale of heat energy. Hence, this model of management contributes to the increase in value added through the implementation of measures to improve the quality of energy supply to consumers and the introduction of new technologies, allowing them to implement energy saving and energy efficiency programs. The cost of heat will be higher than that of municipal heat supply companies, but in general, the reliability and quality of heat supply to consumers increases. At the same time, this management model becomes relevant only when full payment is made (or approached to it) of heat by consumers, in other words, the operation of the heat market with a free pricing mechanism (Lisin et al., 2016; Paiho et al., 2015).

An intermediate management option is to implement it on the basis of a public-private partnership mechanism, which in this case implies the conclusion of a concession agreement by the municipal administration with an entrepreneur. Within the agreement, the management of the heat supply company is transferred to a private person who attracts investments to resolve issues of technological modernization of fixed production assets and improve the quality of heat supply in order to make a profit. At the same time, the municipality retains property rights. In this case, the management criterion, on the one hand, is the profitability of investments, on the other hand, it is the attraction of private investments to increase the reliability and economy of heat supply, as well as reduce budget expenditures. The multiplicity of management criteria leads to the need to balance the interests of the state and business.

Also, a significant drawback of management on the basis of concession agreements is the lack of economic incentives for an entrepreneur to direct profits to the capitalization of municipal property. Thus, a large part of the profit is spent on increasing private property, while the municipal one does not actually develop. In turn, often a change in administration leads to the seizure of municipal property and its return to administrative management due to the absence of other mechanisms of influence. Thus, the previously created heat supply infrastructure is lost.

Heat supply management is influenced by heat consumers with whom heat supply companies enter into heat supply agreements. At the same time, in the centralized heat supply systems, the main consumer is available

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housing. The interaction of end users with heat supply companies is carried out through a management company operating available housing that does not have an economic interest in energy saving, and the installation of appropriate accounting equipment is an additional expense. Thus, the interests of the consumer as a buyer in the heat market are not actually represented (Lisin et al., 2017; Postnikov et al., 2018).

An improved model of the heat supply system management, which allows taking into account the above identified drawbacks, is presented in Figure 2.

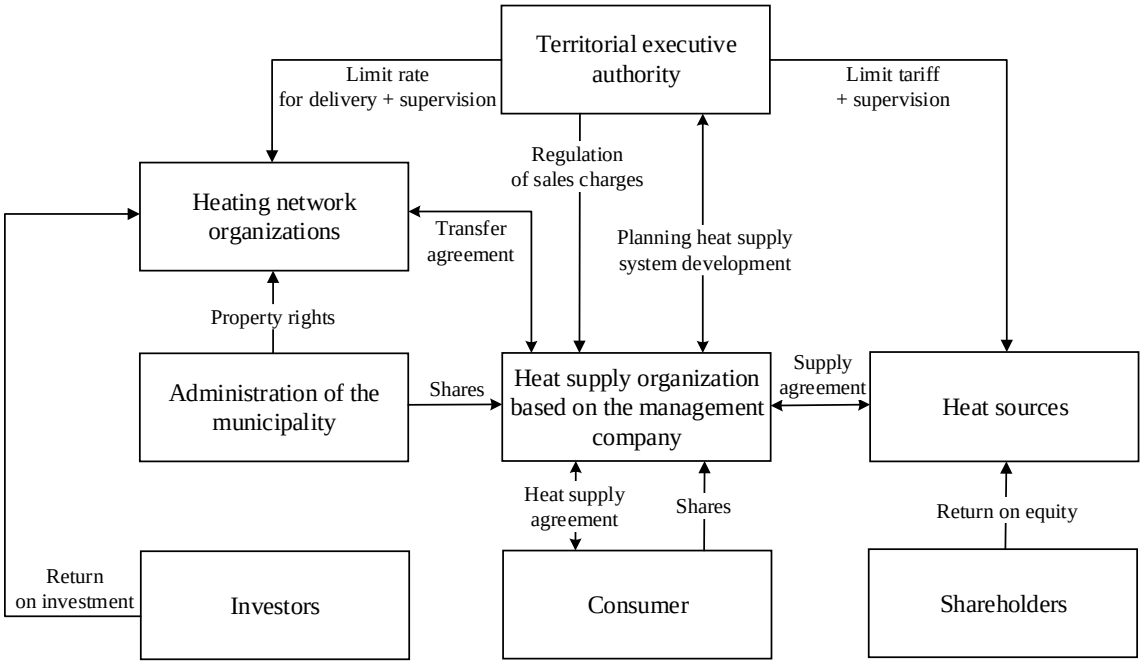

Figure 2. Improved model of the heat supply system management of a territorial entity
Source: own development

The proposed management model involves creation of a heat supply company on the basis of the management company and implementation of the following activities:

- incorporation of the management company at the expense of the owners of residential premises and the administration of the municipal entity,
- transfer of the heat supply system management to the management company, as well as determination of criteria for the choice of heat suppliers,
- provision of the management company with the long-term planning function for the development of the heat supply system and the development of investment programs to reduce heat consumption,
- securing the management company of the function of distributing funds between heat producers and heat supply companies.

It is also assumed that the heat supply companies will be under municipal administration or operate on the basis of concession agreements, when the property rights are reserved for the administration. In this case, the management company can also be a concessionaire and perform the functions of managing the heat supply company, exercising control over the operation of the heating networks. This is especially advisable when there is a local natural monopoly in the field of heat transport.

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It is advisable to allocate heat sources to individual enterprises and to share them, which will lead to an improvement in the heat supply management system through the development of competition among heat producers. Accordingly, access to heating networks shall be organized under the same conditions. Such an approach allows solving the problem of loading by heat supply companies operating heating networks and their own heat sources, despite the most economical loading options.

Consumers realize their economic interests through the incorporation of a management company representing them in the heat market. Thus, a market buyer is formed which is interested in reducing heat consumption. At the same time, only the management company is liable to consumers, which also improves the quality of management.

4. Proposing a methodology for choosing a priority strategy for improving energy security at the territorial level

The energy strategy provides for an individual approach to the development of power supply systems of the country's regions from the perspective of ensuring energy security. It is based on the volume and structure of demand for primary and transformed energy, estimated using a forecast of the production of the gross regional product (GRP) (Lisin et al., 2018; Kiriyama et al., 2014; Melas et al., 2017; Osorio et al., 2017).

The regions of Russia have been challenged with ensuring the reduction of the energy intensity of the country's gross domestic product by 1.5 times by 2035 through the implementation of regional state programs for improving energy efficiency (the energy saving potential in the whole country is estimated at 40%). Figure 3 shows the contribution of the energy intensity of the gross regional product to the energy intensity of the gross domestic product of the country.

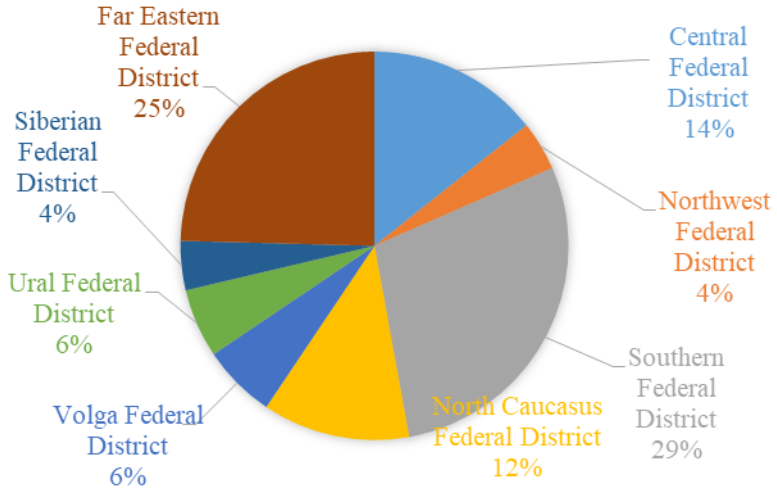

Figure 3. The contribution of the energy intensity of the gross regional product to the energy intensity of the gross domestic product of the country by federal districts
Source: own development based on (Statistical Compendium of Russian Federal Service of State Statistics, 2016)

The required reduction in the energy intensity of the GRP is achieved by the following types of strategies (Energy Strategy of Russia for the period up to 2035, 2014; Bogoviz et al., 2018; Senderov et al., 2018):

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- reducing the loss of energy resources and ensuring their energy saving in various sectors of the region's economy (primarily, the energy sector),
- increasing the growth of GRP due to the organization of low-energy production facilities, in other words, the development of small business and the services sector,
- decommissioning of old and inefficient production equipment and optimization of operating modes of the power system,
- development of energy efficient production technologies by the regional energy complex.

Production, technological and structural differences and peculiarities of regional power systems determine different priorities and scenarios for the implementation of these strategies. These differences are taken into account by the developed methodology for the typology of the energy systems of territorial entities of the country, which is based on a multidimensional statistical analysis of structural and functional indicators according to a complex model of criteria. The results of a multidimensional statistical analysis of the general power supply systems of the regions, obtained by the k-means clustering method, are presented in Table 1.

Table 1. Results of clustering of regional power supply systems

System of criteria for the power system			Groups of regions							
			I	II	III	IV	V	VI	VII	VIII
External links	absent		+	+						
	present				+	+	+	+	+	+
Type and origin of fuel	transported fossil fuel	gas			+	+	+			
		coal								
	local fossil fuel	gas	+	+				+		
		coal	+	+				+	+	+
	nuclear fuel						+			
	hydroenergy		+		+		+	+		+
Production scheme	combined		+	+	+	+	+	+	+	+
	separate			+		+		+	+	
Manufacturing capacity	excess		+	+		+	+		+	
	shortage				+			+		+
Heat demand	moderate				+	+	+			
	high		+	+				+	+	+
Electrical energy consumption density	low				+	+				+
	high		+	+			+	+	+	

Source: own development

The implemented typology made it possible to compile generalized characteristics of the power systems of isolated and open regions of the country. Thus, groups I and II represent the types of power supply systems of territorially isolated regions (5 subjects). Their delimiting feature is the use of renewable energy sources (primarily, hydropower) in electricity supply. With its development, the share of thermal power plants, producing only electricity, is significantly reduced. The power supply systems of open regions (80 subjects) are characterized by a much wider typification and represented by groups III - VIII:

- power supply systems of the regions of the non-production sphere of the European part of the country (19 subjects),
- power supply systems of post-industrial regions of the European part of the country (23 subjects),
- power supply systems of industrial regions of the European part of the country (15 subjects),
- power supply systems of energy-intensive industrial and raw materials regions of the Asian part of the country (11 subjects),

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- power supply systems of industrial regions of the Asian part of the country with a declining production scale (7 subjects),
- power supply systems of the regions of the non-production sphere of the Asian part of the country (5 subjects).

Table 2 shows the correlation of strategies for reducing the energy intensity of the GRP with the groups of region's power supply systems identified as a result of the typology carried out.

Table 2. Correlation of strategies for reducing the energy intensity of the GRP with the groups of region identified as a result of the typology carried out

Power supply system group	Priority strategy for reducing energy intensity of the GRP
I	Development of energy-efficient production technologies to improve the efficiency and capacity utilization factor of the power supply system
II	Reducing the loss of energy resources and ensuring their energy saving in energy sector
III, VIII	Development of energy efficient production technologies that increase the efficiency of the power supply system in the context of uneven energy consumption
IV	Reducing the energy intensity of production due to its restructuring and development of the service sector
V, VI	Reducing the loss of energy resources and ensuring their energy saving in energy sector
VII	Decommissioning of old and inefficient production equipment and optimization of operating modes of the power system

Source: own development

As it appears from the conducted analysis, for regions with isolated power supply systems, the choice of a priority strategy for reducing the energy intensity of the GRP is largely determined by the structure of the energy sources used, primarily by the use of renewable energy sources. Whereas, for regions with open energy systems, the choice of a strategy for reducing the energy intensity depends on their economic base of sustainable growth and the state of the energy infrastructure.

5. Conclusions

The presented developments form an improved model for managing the development of a territorial energy complex, including current market and state instruments for managing heat and power supply systems that allow increasing the level of energy security of territorial power supply systems.

Separation of power system management (as a technical system) by individual organizational units (enterprises) based on management decomposition and feedback management allowed us to harmonize the performance criteria of management entities located at different organizational levels. In turn, the reflection of the interests of the management subjects at various organizational levels is the basis for making decisions on the development and functioning of the territorial energy supply system.

Due to the wide variety of territorial power supply systems and the presence of significant differences in their structure and operating conditions, determining the choice of their development strategy, a methodology for typologizing power systems has been developed based on conducting multidimensional statistical analysis according to a complex model of criteria. The most effective strategies for reducing energy intensity have been proposed for each selected group of power supply systems of the Russian regions.

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