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Efficiency of Innovation Activity Funding as the Driver of the State's National Economic Security*

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ABSTRACT

Purpose. The article is devoted to an analysis of the impact of innovative enterprises activity on ensuring the indicators of state economic security. The main emphasize was made on the innovative component analysis of the economic security in Ukraine. Place and role of stimulating innovative activity to achieve sustainable socio-economic development and improve competitiveness of the economy is analyzed in the article. *Methodology*. In the article economic security of Ukraine analyzed by using two methodological approach: Methodological Recommendations on calculating the level of economic security of Ukraine, approved by the order of the Ministry of Economic Development and Trade of Ukraine and the Global Competitiveness Index. *Finding*s. The authors determined which sectors innovation activity can increase the growth rates of economic security and which state support methods should be used to maximize the growth of innovation activity. The conducted research made it possible to find out that the activation of innovation activity as a factor in the economic security formation of the state, which operates in developed countries, is not used properly in Ukraine. Such trends in innovation development of Ukraine are connected, first of all, with low (least critical) level of science funding by the state (primarily applied character, innovation and technology transfer) and low level of funding by economic entities themselves.

INTRODUCTION

The problem of ensuring economic security of the country is one of the key aspects in the macroeconomic policy of developed and developing countries of the world (Bednar and Halaskova,

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2018; Bhowmik, 2018; Fashina et al., 2018; Lyeonov et al., 2018; Milovic and Jocovic, 2017; Nguedie, 2018; Soylu et al., 2018; Vasylieva et al., 2018). The economic security of the state characterizes the condition of the national economy, which protects national interests, resistance to internal and external threats, the ability to develop and protect the vital interests of people, society, and the state. Vital interests represent a set of needs that ensure the existence and progressive development of personality, society and state (Kouassi, 2018; Vasilyeva et al., 2018; Wachowska, 2018). The importance of considering innovation in the context of ensuring economic security of the state is explained by the fact that innovative activity can bring a qualitative leap of the national economy due to realizing full scientific and technical potentials as well as define state from external and internal threats (Ginevicius et al., 2018; Ilie et al., 2017; Karaoulanis, 2018; Khan, 2018; Meyer and Neethling, 2018).

The issue of the national economic security formation through the innovation development of economic entities, as well as the link between them, was investigated by numerous scholars and scientists. H. Barnett (1960) by accepting the fact of existing correlation between research and development and economic growth, examined the paths open to the government in selecting its policy. T.C.R. van Someren and S. van Someren-Wang (2013) conducted a comparative analysis of the structure and innovation policy extent of the state in China, the USA and the EU and its impact on economic growth and development of countries. The hypothesis that the high innovation activity of the state's economy is ensured by the leading role of the state in the scientific and technical field and by determination of national priorities and the active influence of the state on the innovation development process of the economic entities through a balanced system of economic stimulation instruments is put forward and confirmed. A broad retrospective analysis (1945-2012) of the innovation impact on the US economy growth has been conducted by L. Weiss (2014). Author showed link between technological leadership, domestic manufacturing and skilled employment growth as well as way of transformative innovation to the strength of its national security state by example of USA. D. Leyden (2016) developed a National Systems of Entrepreneurship-based theoretical model of the entrepreneurial environment that explain the mutual influence of the public and private sectors in national economic growth through innovation development.

Impact of innovative enterprises activity on ensuring the indicators of state economic security is highly discussed in Ukrainian scientific literature. O. Pabat (2012) developed theoretical and methodological bases for assessing the impact of innovative factors on the state economic security. V. Loyko (2015) formed a system of indicators for the determining an innovative component level of the economic security of the national economy as a modeling and prognosticating objects. Author determined factors that influence the formation of an innovative component of national economic security (innovation infrastructure, venture investment, technology transfer, intellectual potential of the nation, innovation risk insurance at the state level). The scholars O. Sergienko et al. (2015) developed a set of economic and mathematical models for assessing the competitiveness and social and economic development of the state in order to ensure effective strategic economic security management.

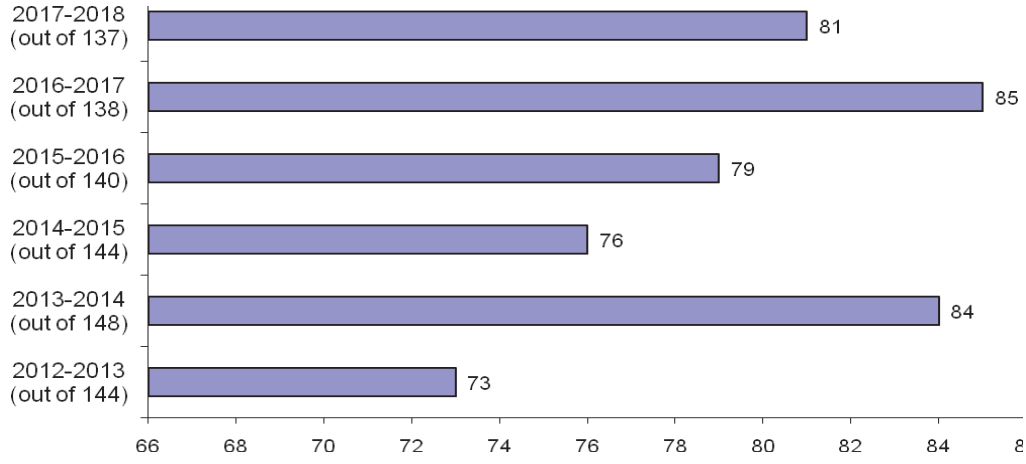
O. Lyulyov and H. Shvindina (2017) studied the problems of industries' instability, how clusters and states influences on the countries' economy. On this bases they proposed model that has proven its efficiency as at the public administration levels so at the micro level management. T. Vasylieva and V. Kasyanenko (2013) presented the technique for the integral assessment of innovative potential of national economy (IANE) based on the theory of sets and carries out the analysis of the dynamics of its structure-forming components for Ukraine during 2004-2011. T. Kolmykova et al. (2013) analyzed the role of government in stimulating the development of the national industry. Made conclusion that structural reforms must be directed to support basic research in priority areas of science and technology, the creation of high technology, the introduction of innovations in different sectors of the economy, and especially in the industrial complex.

Literature review shows, the issues of economic security of the state and the innovation development trajectory of enterprises are considered mostly separately and declaratively. The lack of formalized research on the impact of innovative enterprises activity on ensuring the indicators of state economic security leads to a lack of a clear national strategy for providing economic security through an innovative breakthrough. There are no clear formalized studies that will give an idea in which sectors innovation activity will increase the growth rates of economic security, which sectors need to be stimulated and which state support methods should be used to maximize the growth of innovation activity. The present paper is structured as follow. In the next section we make an innovative component analysis of the economic security (on the example of Ukraine). In the section 2, using econometric models, we analyze the innovation development trends of economic entities in Ukraine. The section 3 and 4 details scientific and scientific and technical activity funding trends in Ukraine and its effectiveness.

1. THE INNOVATIVE COMPONENT ANALYSIS OF THE ECONOMIC SECURITY IN UKRAINE

In accordance with the Methodological Recommendations on the estimation of the economic security level of Ukraine, approved by the order of the Ministry of Economic Development and Trade of Ukraine (2013), economic security is a condition of the national economy, which preserves resilience to internal and external threats, ensures high competitiveness in the global economic environment and characterizes the ability of the national economy to achieve sustainable and balanced growth. The components of economic security are: industrial, demographic, energetic, foreign economic, investment and innovation, macroeconomic, food, social, financial security, and therefore economic security is an integral indicator. We agree with Djalilov et al (2015), that economic security of Ukraine can be calculated not only in accordance with the Methodological Recommendations on calculating the level of economic security of Ukraine, approved by the order of the Ministry of Economic Development and Trade of Ukraine (2013), but also according to the Global Competitiveness Index. According to the ranking of countries based on the Global Competitiveness Index of the countries, the rating of Ukraine is constantly changing and occupies the worst positions in recent years (Figure 1). The indicators deteriorated especially in 2016-2017 (it is 6 positions below in comparison with 2015-2016).

Figure 1. Ukraine's rating according to the Global Competitiveness Index of countries



Source: Compiled by the authors on the basis of data from reports of the World Economic Forum (The Global Competitiveness Report, 2012-2013; 2013-2014; 2014-2015; 2015-2016; 2016-2017; 2017-2018).

The Global Competitiveness Index of countries consists of a large number of indicators grouped into 3 main sub-indexes: "Basic requirements", "Efficiency enhancers" and "Innovation and sophistication factors". The main sub-indexes, innovation indicators of place and technological development in them are represented in the Table 1.

Table 1. The Global Competitiveness Index of Ukraine

The Global Competitiveness Index	*2014-2015 (out of 144)*	*2015-2016 (out of 140)*	*2016-2017 (out of 138)*	*2017-2018 (out of 137)*
	76	*79*	*85*	*81*
Index Component				
1. BASIC REQUIREMENTS	**87**	**101**	**102**	**96**
1.1 Institutions				
1.2 Infrastructure				
1.3 Macroeconomic environment				
1.4 Health and primary education				
2. EFFICIENCY ENHANCERS	**67**	**65**	**74**	**70**
2.1 Higher education and training				
2.2 Goods market efficiency				
2.3 Labor market efficiency				
2.4 Financial market development				
2.5 Technological readiness	85	86	85	81
2.5.1 *Technological borrowing*	114	103	97	111
Availability of latest technologies	113	96	93	107
Firm-level technology absorption	100	100	74	84
FDI and technology transfer	127	117	115	118
2.6 Market size				
3. INNOVATION AND SOPHISTICATION FACTORS	**92**	**72**	**73**	**77**
3.1 Business sophistication	99	91	98	90
Local supplier quantity	80	61	62	63
Local supplier quality	83	80	79	67
State of cluster development	128	124	125	108
Value chain breadth	79	70	97	94
Control of international distribution	82	86	91	95
Production process sophistication	95	68	71	72
Extent of marketing	79	81	80	74
3.2 Innovation	81	54	52	61
Capacity for innovation	82	52	49	51
Quality of scientific research institutions	67	43	50	60
Company spending on R&D	66	54	68	76
University-industry collaboration in R&D	74	74	57	73
Gov't procurement of advanced technology products	123	98	82	96
Availability of scientists and engineers	48	29	29	25

Source: Compiled by the author on the basis of data from reports of the World Economic Forum (The Global Competitiveness Report, 2014-2015; 2015-2016; 2016-2017; 2017-2018).

According to the data on the sub-index "Basic requirement" there is a slight improvement (on 6 positions from 102 to 96 out of 137 countries). We observe a deterioration according to two other sub-indexes. Analyzing the technological availability indicators of the “Efficiency enhancers” sub-index and the indicators of the “Innovation and sophistication factors” sub-index, it can be noted that the most problematic are the factors of the latest technologies availability and development, the factor of foreign direct investment attraction, the state of cluster development, and government procurement of advanced technology products. Only the indicator of the scientists’ and engineers’ availability is quite high and is improving every year. Ukraine has lost a small number of

positions in terms of "Capacity for innovation" (51 position out of 137 countries in 2017-2018 compared to 49 positions out of 138 countries in 2016-2017). Thus, the analysis of the Global Competitiveness Index values has shown that Ukraine loses its positions in a global competitiveness. The innovation factor that works in developed countries is not used to the proper extent in Ukraine, which provokes deterioration of the remaining indicators.

Bogma (2016) based on data Ministry of economic development and trade of Ukraine and Methodological Recommendations on calculating the level of economic security of Ukraine (2013) considered the level of economic security on Ukraine (Figure 2).

Figure 2. The level of economic security of Ukraine by components, %

	2011	*2012*	*2013*	*2014*	*Changes 2014 up to 2013*
Economic security as a whole	50%	48%	49%	45%	-4%
Energy security	32%	34%	39%	45%	6%
Financial security	48%	46%	50%	36%	-14%
Production security	57%	53%	53%	52%	-1%
Macroeconomic security	47%	38%	40%	33%	-7%
Investment and innovation security	36%	37%	35%	30%	-5%
Social security	59%	62%	64%	57%	-7%
Food security	92%	93%	86%	94%	8%
Demographic security	52%	45%	46%	46%	-
Foreign economic security	35%	30%	32%	35%	3%
Levels of economic security, %					
	0-19% – critical level of economic security				
	20-39% – dangerous level of economic security				
	40-59% – unsatisfactory level of economic security				
	60-79% – satisfactory level of economic security				
	80-100% – optimal level of economic security				

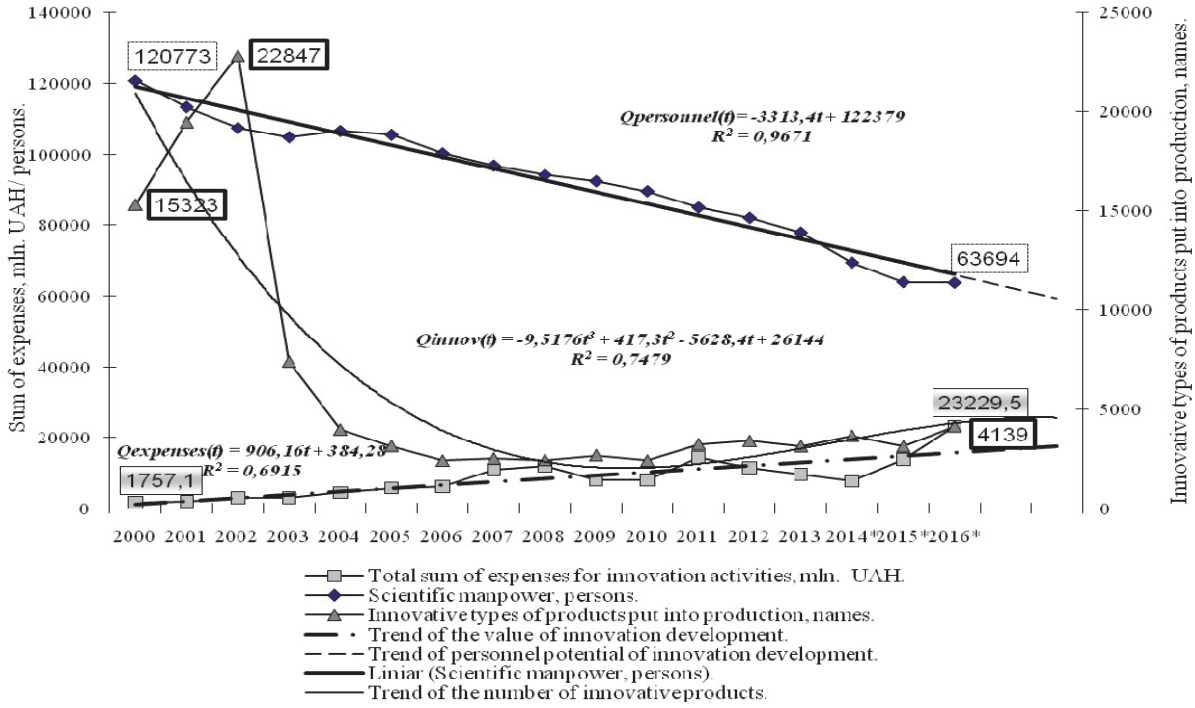
Source: Bogma O.S. (2016).

As we can see, the overall level of economic security and the majority of its components has a negative tendency to decrease. The overall level of economic security is an unsatisfactory one. The level of the "Investment and innovation security" component decreases every year and has dangerous level. Thus, the represented data correlates with the mentioned above indicators values of sub-indexes of the Global Competitiveness Index of the countries (see Table 1) and reaffirms the thesis that innovation, which is the locomotive of development in the developed countries, does not work at an adequate level in Ukraine.

2. INNOVATION DEVELOPMENT TRENDS OF ECONOMIC ENTITIES IN UKRAINE

Since 2000, the Ukraine has declared that the purpose of modern development is implementation of an innovative model of development. However, the regression analysis of time trends development of scientific, scientific and technical activity and innovation activity indicators of enterprises allowed to draw conclusions about the reduction of innovation processes in Ukraine (Figure 3).

Figure 3. The innovation activity of industrial enterprises research results in 2000-2016



Source: Calculated by the authors on the basis of data from State statistics service of Ukraine (Scientific and innovative activity of Ukraine, 2016, 2017).
Note: The data is given without taking into account the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and a part of the antiterrorist operation zone.

The trend of the acquired innovative types of products volume changes (Q_{innov}) over the period from 2000 to 2016, can be characterized by the equation (1):

$$Q_{innov}(t) = -9{,}5176t^3 + 417{,}3t^2 - 5628{,}5t + 26144, R^2 = 0{,}7479 \quad (1)$$

where t is time characteristics of innovation development (in the analysis this is a year), $t=1,\ldots,n$.

Based on the above equation, it can be noted that the volume of acquired innovative types of products is reducing every minute. Analyzing the dynamics of changes in this indicator over 2009-2016 (Figure 3), it can be noted that during 2009-2016, there is a slight increase, then the decrease of the acquired innovative types of products volume. There is no stable growth trend, but the forecast trend for the next 2 years still has a positive dynamic. As a result of the study of the expenditures trends volume for scientific and scientific and technical work ($Q_{expenses}$), representing the "Sum of expenses for innovation activities" over the period from 2000 to 2016, the following equation (2) was obtained:

$$Q_{expenses}(t) = 906{,}16t + 384{,}28, R^2 = 0{,}6905 \quad (2)$$

In this model, the expenses of innovation development are generated by the expenses on the research and development, the acquisition and acquirement of new technologies, the preparation of production for the innovations implementation, the purchase of machinery and equipment, which are associated with the innovation implementation and other expenses. Based on the above equation, it can be noted that the expenses of innovation development increases by 906,16t every

next moment of time. The research of personnel potential of innovation development is characterized by such equation (3):

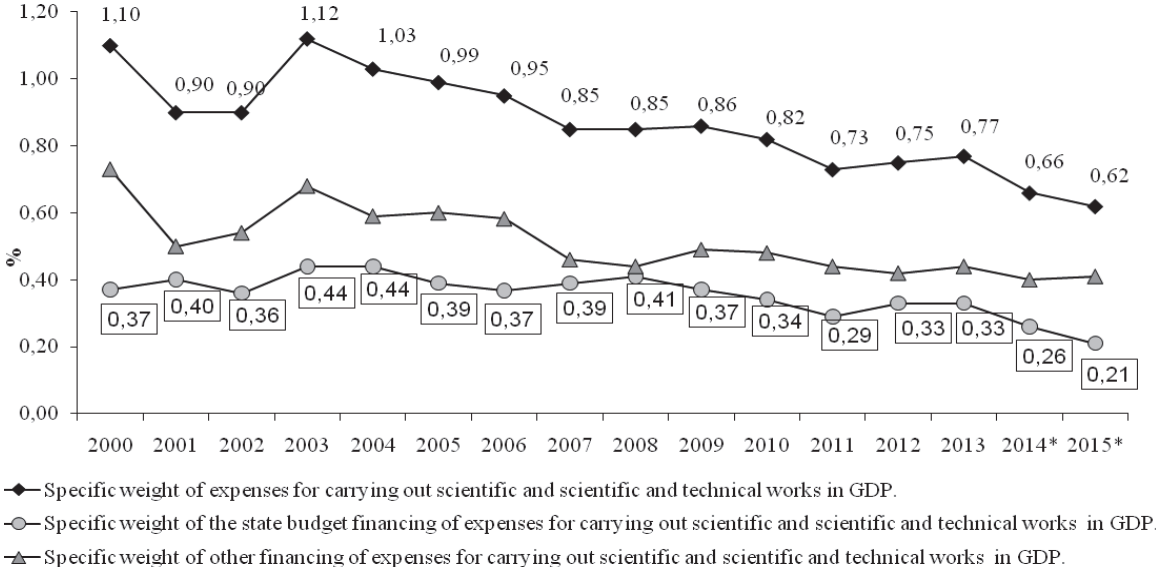
$$Q_{personnel}(t) = -3313{,}4t + 122379, R^2 = 0{,}9671 \quad (3)$$

Based on the above equation, it can be noted that the number of scientific and scientific and technical works performers (doctors and candidates of science, researchers, technicians, auxiliary staff) decreases by a value of 3313,4*t* every next moment of time.

3. SCIENTIFIC AND SCIENTIFIC AND TECHNICAL ACTIVITY FUNDING TRENDS IN UKRAINE

The above-mentioned trends are determined by the low level of governance in innovation development in Ukraine. Thus, funding of scientific and scientific and technical activities in Ukraine is extremely low and has a negative tendency to decrease. The indicator of the specific weight volume expenses of scientific and scientific and technical works funding in 2000-2010 fluctuates at the level of 0.82-0.99% and did not exceed 1.12%, and from 2010 it is basically decreased to 0.62-0.75% (Figure 4), while it has been proved that the innovation development model requires expenses on science funding at least 2% of GDP, according to the European strategy for economic development "Europe 2020: strategy of reasonable, stable and comprehensive growth " and not less than 3% of GDP (Fedulova and Androshchuk, 2014). But a number of Ukrainian researchers proved, that this indicator should be even higher in Ukraine, due to the following reasons: first, due to the low level of GDP per capita, secondly, due to the deformed structure of the economy and industry, and thirdly, due to the extremely low level of innovation funding in the last ten years (Myroshnychenko and Matvieieva, 2017; O. Zakharkin, 2014; Vasilyeva, et al., 2013).

Figure 4. Volume dynamics of scientific and scientific and technical works funding in GDP

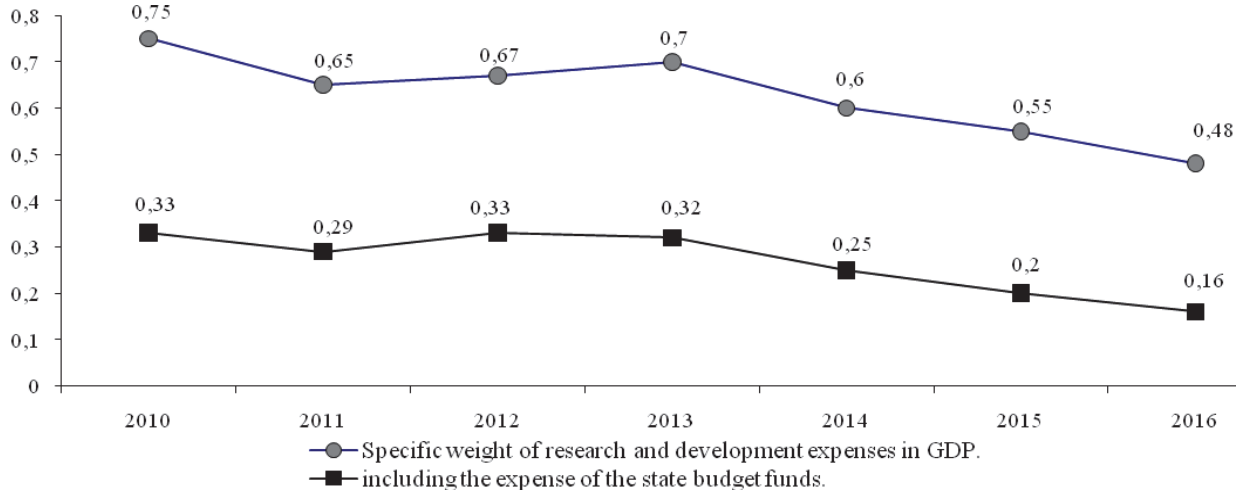


Source: Calculated by the authors on the basis of the data from State statistics service of Ukraine (Scientific and innovative activity of Ukraine, 2016) and data from Ministry of Education and Science of Ukraine (The state of science and technology development, the results of scientific, scientific and technical, innovation, technology transfer for 2015, 2016).

Note: The data is given without taking into account the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and a part of the antiterrorist operation zone.

The data on expenditures for the scientific research and development implementation over 2010-2015 were recalculated in 2016, to compare the domestic data with global indicators in accordance with the new methodology of organizing and conducting state statistical observation "Implementation of scientific research and development", which is introduced since 2016 (excluding expenses for implementation of scientific and technical services). Trends according to the new data are shown in Figure 5.

Figure 5. Specific weight of research and development expenses in GDP (according to Eurostat)



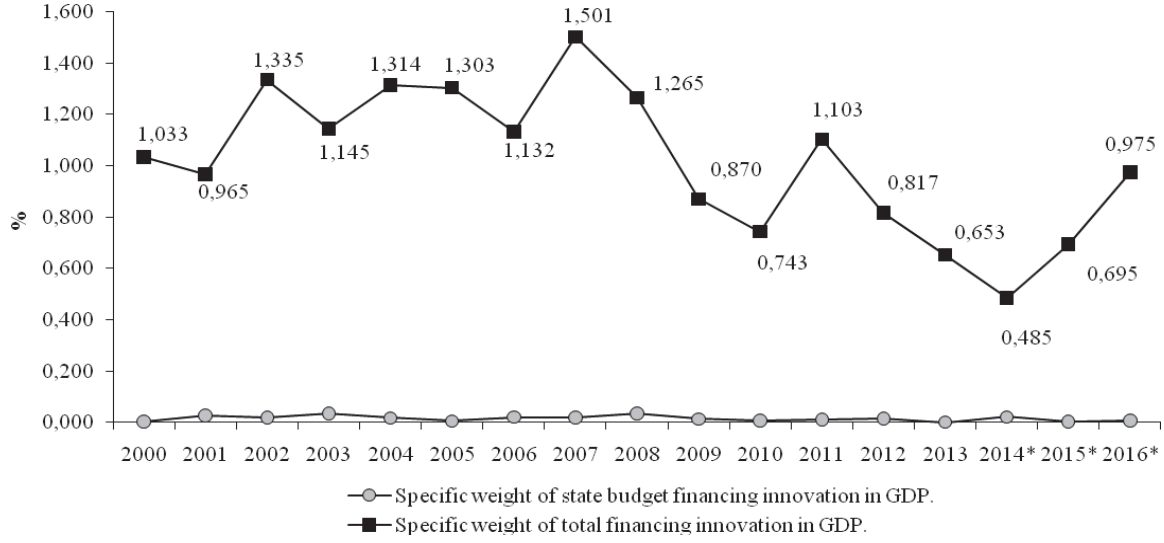
Source: Calculated by the authors on the basis of the data from State statistics service of Ukraine (Scientific and innovative activity of Ukraine, 2017) and data from Ministry of Education and Science of Ukraine (The state of science and technology development, the results of scientific, scientific and technical, innovation, technology transfer for 2016, 2017).

Thereby, according to the new data (compared for an adequate comparison with world the data), funding of scientific and scientific and technical activities in Ukraine is approximately 30% lower than relying on the data, calculated according to the old methodology. At the same time, the research intensity of the GDP countries of the EU-28, according to the data in 2015, averaged 2.03%. It was higher than average in Sweden – 3.26%, Austria - 3,07%, Denmark – 3,03%, Finland – 2,90%, Germany – 2,87%, Belgium – 2,45%, France – 2.23%.

The scientific research funding in most countries is a function of the state. It is legally established that the share of budget expenditures on various stages of scientific and scientific and technical work funding should amount to at least 1.7% of GDP in Ukraine (paragraph 2 of the Article 48 of the Law of Ukraine " On Scientific and Scientific and Technical Activity "(2015), however, the volume of such funding in 2000-2010 fluctuated within 0.4% of GDP, which is 4 times less than the fixed rate of budget funding of science, and in 2010-2015 (according to new data, Figure 5) even within the range of 0.33-0.16% of GDP, which is almost 9.5 times less than the fixed rate of budgetary funding of science. Thus, science funding in Ukraine is always low compared to the world leaders and does not correspond to the practice of most developed countries.

The funding research of innovation activity in Ukraine has shown that it is even lower than the science funding (Figure 6, Figure 7).

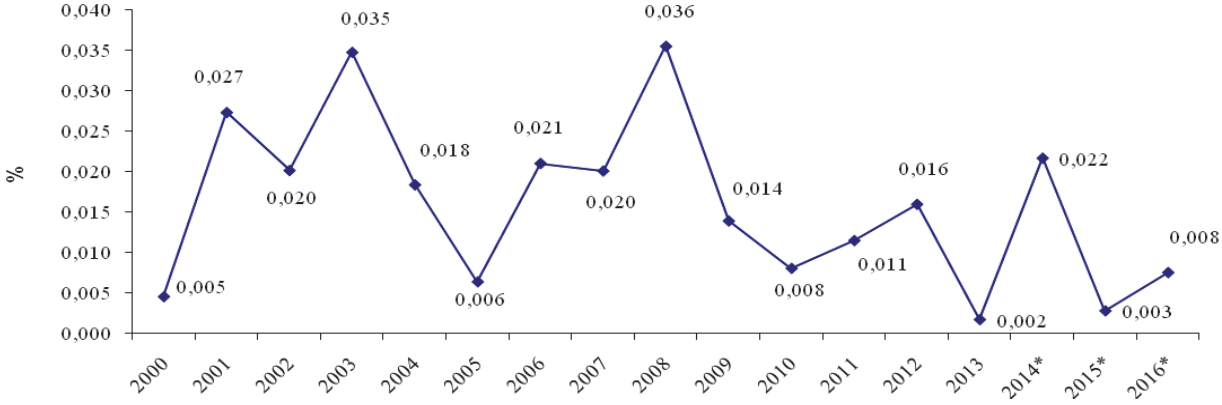
Figure 6. Dynamics of innovation activity funding in GDP



Source: Calculated by the authors on the basis of data from State statistics service of Ukraine (Scientific and innovative activity of Ukraine, 2016).
Note: The data is given without taking into account the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and a part of the antiterrorist operation zone.

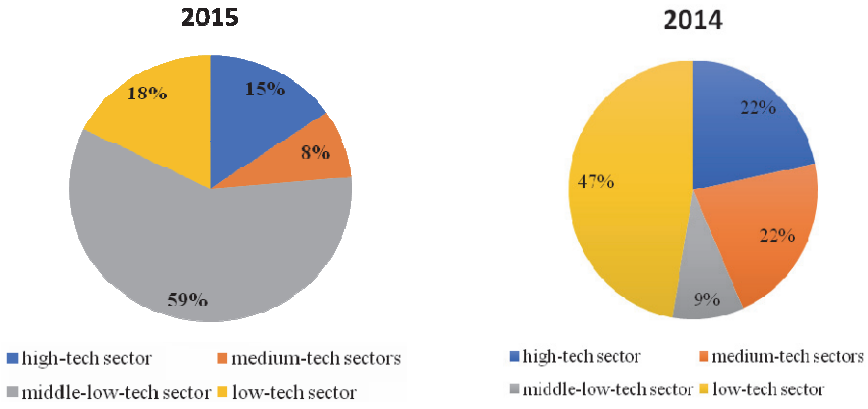
While analyzing trends, it is necessary to mention the growth of the total amount of innovation activity funding in 2015 and 2016 (Figure 6), in this case this increase is ensured by the enterprises expenditure growth. The state budget funding of innovation activity in 2000-2010 fluctuates from 0.002-0.036% of GDP (Figure 7) and in 2015 it was 0.003% of GDP, in 2016 it increased to 0.008% of GDP.

Figure 7. Dynamics of state budget funding of innovation activity in GDP



Source: Calculated by the authors on the basis of data from State statistics service of Ukraine (Scientific and innovative activity of Ukraine, 2016).
Note: The data is given without taking into account the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and a part of the antiterrorist operation zone. In the innovation activity funding structure (Figure 8) there are mixed trends.

Figure 8. Innovation activity funding structure of industrial enterprises by the technological sectors in 2014 and 2015, %



Source: Calculated by the authors on the basis of data from Ministry of Education and Science of Ukraine (The state of science and technology development, the results of scientific, scientific and technical, innovation, technology transfer for 2015, 2016).

Thus, compared to 2014, the funding share of low-tech sector decreased by 62% (from 47% to 18%), however, the funding share of high-tech and medium-tech sectors also decreased by 45% (from 44 % to 23%). The significant share of funding (59%) falls on the middle-low-tech sector, which is not a positive phenomenon.

4. EFFECTIVENESS OF INNOVATION ACTIVITY FUNDING

In developed countries, the ratio of scientific works and innovation funding is 1:5 (Volkov et al., 2007). The distribution of funds between different stages of the innovation process is unbalanced in Ukraine (Figure 9). This is explained by the fact that the majority of funds (mainly state-owned), which are used for scientific and scientific and technical developments funding are used inefficiently. Their results do not have the proper practical application, and the cost of implementing scientific developments far exceeds the investment opportunities of enterprises.

Figure 9. The ratio of scientific and scientific and technical works funding to the amount of innovation activities funding

Source: Calculated by the authors on the basis of data from State statistics service of Ukraine (Scientific and innovative activity of Ukraine, 2016).

The data regarding the implementation state of scientific and technical products (STP), created in 2016 in the context of state funding sources and in the context of priority areas given to confirm the above-mentioned thesis. The results of scientific and scientific and technical developments do not have the proper practical application in the Table 2 and on Figure 10.

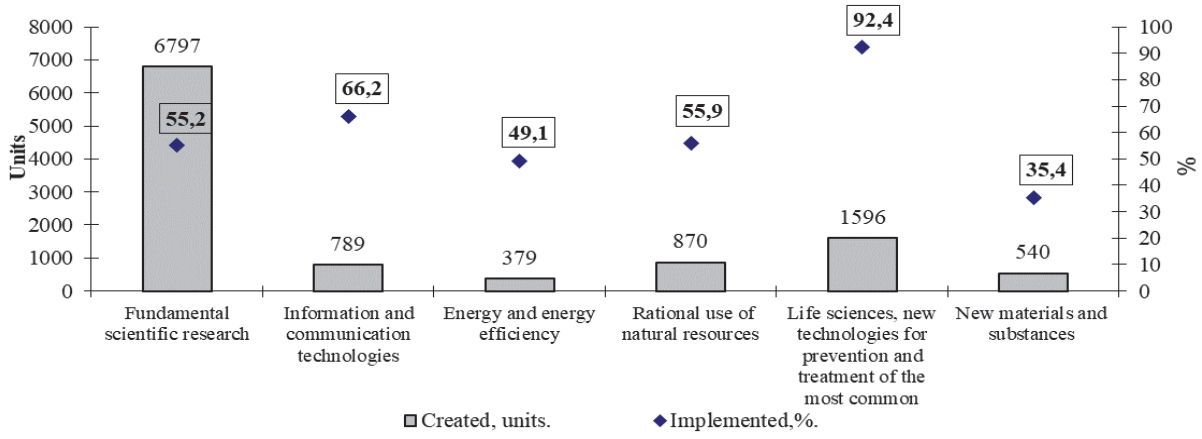
Table 2. The implementation state of the created STP in 2016

Scientific and technical products (STP)	*At the expense of general and special funds of the State Budget of Ukraine*			*Including priority areas*		
	Created	*Implemented*	*Implementation, %*	*Created*	*Implemented*	*Implementation, %*
Types of products	910	394	43,30	368	142	38,59
including equipment	528	316	59,85	247	112	45,34
Technologies	1337	934	69,86	808	541	66,96
Material	724	201	27,76	451	113	25,06
Plant species and animal breeds	226	128	56,64	215	121	56,28
Methods, theories	5025	3029	60,28	3953	2161	54,67
Other	9541	6915	72,48	5176	3532	68,24
Total	18291	11917	65,15	11218	6722	59,92

Source: Summarized by the authors on the basis of data from Ministry of Education and Science of Ukraine (The state of science and technology development, the results of scientific, scientific and technical, innovation, technology transfer for 2016, 2017).

Table 2 shows that on average only 65.15% of the created STP is implemented. The share of implemented STP in priority areas is about 60%. In the structure of the STP, in general, and in priority areas, in particular, fundamental scientific research is prevailing. In accordance with world practice it's a must. However, today, taking into account the macroeconomic situation in Ukraine, consumers of STP and the significant share of these consumers are subjects of economic entities and it requires applied research. Figure 9 shows that the share of applied research implementation is 92.4%. Therefore, it is necessary to revise the structure of budget expenditures in priority areas with an increase in applied research funding.

Figure 10. Distribution of the established and implemented STP amount in priority areas in 2016.



Source: Calculated by the authors on the basis of data from Ministry of Education and Science of Ukraine (The state of science and technology development, the results of scientific, scientific and technical, innovation, technology transfer for 2016, 2017).

The main problem of innovation development governance in Ukraine is the lack of system management of the innovation process by the state. The scattering of managerial functions between a large number of government bodies leads to the absence of common goals, objectives, incoherence and inconsistence.

Thus, the management of scientific and scientific and technical activities is actually carried out by separate units of two ministries: The Ministry of Education and Science of Ukraine (the Scientific and Technological Development Department), the Ministry of Economic Development and Trade (the Intellectual Property Department). To date, the central executive body has not actually been identified, which would have taken measures to implement a unified innovation policy as such, and a unified innovation policy in the production sector, in particular. Today, two central executive bodies are obliged to take part in the formation and implementation of the state innovation policy: The Ministry of Education and Science of Ukraine (the Innovation and Technology Transfer Department) and indirectly the Ministry of Economic Development and Trade (the Economic Strategic and Macroeconomic Forecasting Department, the State Investment Projects and Development Support Department, the Investment Involvement Department). Additionally, on October 25, 2017, the Innovation Development Council was created, which is a "temporary consultative and advisory body of the Cabinet of Ministers of Ukraine, formed to study the problematic issues related with the implementation of state policy in the innovation development field, ensuring effective co-operation between the Cabinet of Ministers Ukraine, bodies of executive power, civil society, economic entities and innovation activity entities with the purpose of developing, organizing, coordinating and implementing measures, mechanisms and conditions for innovation development of the national economy, the creation of innovation infrastructure and the reforms implementation in the innovation activity field".

CONCLUSIONS

The conducted research made it possible to find out that the activation of innovation activity as a factor in the economic security formation of the state, which operates in developed countries, is not used properly in Ukraine. Thus, the analysis of the Global Competitiveness Index values has shown that Ukraine is losing its position in global competitiveness, although the ability to innovate

(Ukraine is in 51 positions out of 137 countries) and the human resources availability (Ukraine in 25 positions out of 137 countries) is still at a high level. This is also confirmed by the Global Innovation Index data (innovation potential is available, but it is not used properly). The analysis of the innovation and investment component of Ukrainian economic security has also shown that investment and innovation security is decreasing every year and is in a danger zone. Such trends in innovation development of Ukraine are connected, first of all, with low (least critical) level of science funding by the state (primarily applied character, innovation and technology transfer) and low level of funding by economic entities themselves. It has been found that mainly the areas of development and projects of the medium-tech sector are funded. It has been established that on average only 65.15% of the created STP is implemented. The share of implemented STP in priority areas is about 60%, while the share of applied research implementation is 92.4%. Therefore, it is proposed to reconsider the structure of budget expenditures in priority areas, with increased funding for applied research.

The analysis of governance of innovation process has shown that there is no systematic management of the innovation process in Ukraine. There is no coordination and coherence between the majority of authorities. In return, there is no growth level roadmap of economic security through an innovative breakthrough of economic entities.

Thus, the further research will be devoted to the mathematical formalization and modelling of the most effective priorities structure of innovation development of enterprises and optimization of the state instrument system stimulation of innovation activity, which will allow to ensure the growth of economic security of the state in the shortest possible time.

REFERENCES

Barnett, H. J. (1960), "Research and Development, Economic Growth, and National Security", *The Annals of the American Academy of Political and Social Science*, Vol. 327, No. 1, pp. 36-49.

Bednar, P., Halaskova, M. (2018), "Innovation performance and R&D expenditures in Western European regions: Divergence or convergence?", *Journal of International Studies*, Vol. 11, No. 1, pp. 210-224. doi:10.14254/2071-8330.2018/11-1/16

Bogma, O. S. (2016), "Analysis of economic security of Ukraine main components", *Scientific bulletin of the Uzhgorod National University*, Vol. 8, Part 1, pp. 11-14. (in Ukrainian).

Bhowmik, D. (2018), "Financial Crises and Nexus Between Economic Growth and Foreign Direct Investment", *Financial Markets, Institutions and Risks,* Vol. *2,* No. 1, pp. 58-74. doi:10.21272/fmir.2(1).58-74.2018

Cabinet of Ministers of Ukraine (2017), Resolution of the Cabinet of Ministers of Ukraine of "About creation of Council for innovation development" dated October 25, 2017, No. 848**,** available at: http://zakon2.rada.gov.ua/laws/show/895-2017-%D0%BF (in Ukrainian).

Djalilov, K., Lyeonov, S., Buriak, A. (2015), "Comparative studies of risk, concentration and efficiency in transition economies", *Risk Governance and Control: Financial Markets and Institutions*, Vol. 5, No. 4, pp. 178-187.

Fashina, O. A., Asaleye, A. J., Ogunjobi, J. O., Lawal, A. I. (2018), "Foreign aid, human capital and economic growth nexus: Evidence from Nigeria", *Journal of International Studies*, Vol. 11, No. 2, pp. 104-117. doi:10.14254/2071-8330.2018/11-2/8

Fedulova, L. I., Androshchuk, H. O. (2014), "Features of development of the innovation policy of the European Union: challenges for Ukraine", *Problems of Science*, Vol. 7-8, pp. 40-46.

Ginevicius, R., Gedvilaitė, D., Stasiukynas, A., Cepel, M. (2018), "Integrated Assessment of the Socioeconomic Systems' Development", *Economics and Sociology*, Vol. 11, No. 1, pp. 11-21. doi:10.14254/2071-789X.2018/11-1/1

Ilie, C., Antohi, I., Sorici, C. (2017), "Graphic Analysis of the Romanian Employment Evolution under the Influence of Industries between 2000 and 2016", *Transformations in Business & Economics*, Vol. 16, No. 2A (41A), pp. 532-551.

Karaoulanis, A. (2018), "Strategic Transformation and Innovation towards Blue Ocean Creation in a Changing Corporate Reality", *Business Ethics and Leadership,* Vol. 2*,* No. 2, pp. 49-55. doi:10.21272/bel.2(2).49-55.2018

Khan, Md Yusuf Hossein (2018), "The Effectiveness of Entrepreneurial Activities for Economic Development: A Route to Innovation and Job Generation", *SocioEconomic Challenges,* Vol. 2*,* No. 2, pp. 32-40. doi:10.21272/sec.2(2).32-40.2018

Kolmykova, T., Telizenko, A., Lukianykhin, V. (2013), "Problems of modernization and development priorities for industrial complex", *Problems and Perspectives in Management,* Vol. 11, No. 4, pp. 28-34.

Kouassi, K. B. (2018), "Public Spending and Economic Growth in Developing Countries: a Synthesis", *Financial Markets, Institutions and Risks,* Vol. 2, No. 2, pp. 22-30. doi:10.21272/fmir.2(2).22-30.2018

Leyden, D. (2016), "Public-sector entrepreneurship and the creation of a sustainable innovative economy", *Small Business Economics*, Vol. 46, No. 4, pp. 553–564. doi:10.1007/s11187-016-9706-0

Loyko, V. V. (2015), "Innovative component of economic security of the national economy", *Visnyk KNUTD. Se*riya Ekonomichni nauky, Vol. 4, pp. 113–124 (in Ukrainian).

Lyeonov, S. V., Vasylieva, T. A., Lyulyov, O. V. (2018), "Macroeconomic stability evaluation in countries of lower-middle income economies", *Scientific Bulletin of National Mining University*, No. 1, pp. 138-146.

Lyulyov, O., Shvindina, H. (2017), "Stabilization Pentagon Model: application in the management at macro- and micro-levels", *Problems and Perspectives in Management*, Vol. 15 No. 3, pp. 42-52. doi: http://dx.doi.org/10.21511/ppm.15(3).2017.04

Milovic, N., Jocovic, M. (2017), "Impact of Foreign Direct Investment on Competitiveness of Montenegrin Economy", *Transformations in Business & Economics*, Vol. 16, No. 1 (40), pp. 222-232.

Ministry of Economic Development and Trade of Ukraine (2013), Order of the Ministry of Economic Development and Trade of Ukraine "On Approval of guidelines for the calculation of economic security of Ukraine" dated October 29, 2013 No. 1277, available at: http://consultant.parus.ua/?doc=08U1H409F0 (in Ukrainian).

Ministry of Education and Science of Ukraine (2016), The state of science and technology development, the results of scientific, scientific and technical, innovation, technology transfer for 2015. Kyiv: Ukrainian Institute of Scientific, Technical and Economic Information. (in Ukrainian).

Ministry of Education and Science of Ukraine (2017), The state of science and technology development, the results of scientific, scientific and technical, innovation, technology transfer for 2016. Kyiv: Ukrainian Institute of Scientific, Technical and Economic Information. (in Ukrainian).

Meyer, D. F., Neethling, J. R. (2017), "Meaurement of the Enabling Developmental Environment: A Comparative Study in a Developing Region", *Economics and Sociology*, Vol. 10, No. 4, pp. 67-82. doi:10.14254/2071-789X.2017/10-4/6

Myroshnychenko, Iu., Matvieieva, Yu. (2017), "Innovation activity as a factor of ensuring the economic security in Ukraine", In Proceedings of International scientific conference *Anti-crisis management: state, region, enterprise*, Le Mans, pp. 92-96.

Nguedie, Y. H. N. (2018), "Corruption, Investment and Economic Growth in Developing Countries: A Panel Smooth Transition Regression Approach", *SocioEconomic Challenges,* Vol. 2, No. 1, pp. 63-68. doi:10.21272/sec.2(1).63-68.2018

Pabat, O. V. (2012), *Economic security of the state: innovative factors*, Institute of Regional Research of NAS of Ukraine, Lviv (in Ukrainian).

Sergienko, O. A., Morozova N. L., Shavlak M. A. (2015), "Modeling of structural elements of coun-

try's economic security in multidimensional systems of assessment and analysis", *Bulletin of the University of Banking*, Vol. 1, pp. 132-139. (in Ukrainian).

Someren, T.C.R. van, Someren-Wang, S. van. (2013), "Innovation Policies in China, the USA, and the EU", In: Innovative China. Management for Professionals. Springer, Berlin, Heidelberg, https://doi.org/10.1007/978-3-642-36237-8_3

Soylu, O. B., Cakmak, I., Okur, F.(2018), "Economic growth and unemployment issue: Panel data analysis in Eastern European Countries", *Journal of International Studies*, Vol. 11, No. 1, pp. 93-107. doi:10.14254/2071-8330.2018/11-1/7

State statistics service of Ukraine (2016), Scientific and innovative activity of Ukraine, Kyiv, available at: www.ukrstat.gov.ua (in Ukrainian).

State statistics service of Ukraine (2017), Scientific and innovative activity of Ukraine, Kyiv, available at: www.ukrstat.gov.ua (in Ukrainian)

Vasilyeva, T., Lyeonov, S., Adamickovc, I., Bagmet, K. (2018), "Institutional Quality of Social Sector: the Essence and Measurements", *Economics and Sociology*, Vol. 11, No. 2, pp. 248-262. doi:10.14254/2071-789X.2018/11-2/17

Vasilyeva, T. A., Leonov, S. V., Lunyakov, O. V. (2013), "Analysis of internal and external imbalances in the financial sector of Ukraine's economy", *Actual Problems of Economics*, Vol. 150, No. 12, pp. 176-184

Vasylieva, T., Lyeonov, S., Lyulyov, O., Kyrychenko, K. (2018), "Macroeconomic stability and its impact on the economic growth of the country", *Montenegrin Journal of Economics*, Vol. 14, No. 1, pp. 159-170. doi:10.14254/1800-5845/2018.14-1.12

Vasylieva, T. A., Kasyanenko, V. O. (2013), "Integral assessment of innovation potential of Ukraine's national economy: A scientific methodical approach and practical calculations", *Actual Problems of Economics*, Vol. 144, No. 6, pp. 50-59. (in Ukrainian).

Verkhovna Rada of Ukraine (2015), Law of Ukraine "On scientific and technical activity" dated November 26, 2015. No 848-VIII. Information from the Verkhovna Rada of Ukraine, available at: http://zakon3.rada.gov.ua/laws/show/848-19 (in Ukrainian).

Volkov, O. I. et al. (2007), *Economics and organization of innovation activities,* Center for educational literature, Kyiv (in Ukrainian).

Wachowska, M. (2018), "Consequences of the Post-Accession Migration of Polish Inventors for the Innovative Potential of Poland: 2004-2012", *Economics and Sociology*, Vol. 11, No. 1, pp. 311-324. doi:10.14254/2071-789X.2018/11-1/20.

Weiss, L. (2014), *American Inc.?: Innovation and Enterprise in the National Security State*, Cornell University Press, Ithaca/London.

World Economic Forum, "The Global Competitiveness Report 2012-2013", available at: http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2012-13.pdf

World Economic Forum, "The Global Competitiveness Report 2013-2014", available at: http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2013-14.pdf

World Economic Forum, "The Global Competitiveness Report 2014-2015", available at: http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2014-15.pdf

World Economic Forum, "The Global Competitiveness Report 2015-2016", available at: http://www3.weforum.org/docs/gcr/2015-2016/Global_Competitiveness_Report_2015-2016.pdf

World Economic Forum, "The Global Competitiveness Report 2016-2017", available at: http://www3.weforum.org/docs/GCR2016-2017/05FullReport/TheGlobalCompetitivenessReport2016-2017_FINAL.pdf

World Economic Forum, "The Global Competitiveness Report 2017-2018", available at: https://www.weforum.org/reports/the-global-competitiveness-report-2017-2018

Zakharkin, O. O. (2014), "Value-based management on the basis of stakeholder approach within the bounds of innovative development enterprise", *Actual Problems of Economics*, Vol. 160, No. 1, pp. 149-157. (in Ukrainian).