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Research paper

Innovational and investment security of modern development and assessment of the result of the mechanism of its supply on the state and regional levels

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Abstract

Purpose of the article is to analyze the concept of production competitiveness and develop framework of cost management. A variety of cost management techniques requires the identification of their relationship with the requirements of operations management. Identified seven key concepts of operations management, analyzed their essence, information requirements. Systematized cost management techniques accordance with modern concepts of operations management such as: standart-costing, break-even analysis, direct-costing, life-cycle costing, target costing, value analysis, functional analysis, activity-based costing, sensitivity analysis, JIT-costing, kaizen costing, activity-based cost management, value-chain analysis. The aim of the article is the establishment relevance of costing methods with the key concepts of operations management companies.

The article deals with the problems of formation of innovational and investment security and its influence on the economic development of Ukraine and the macro-environment favorable for business development. For this purpose the integral indicator of Ukraine's economic security and its components are calculated: investment-innovation, production, demographic, energy, foreign economic, macroeconomic, food, social, and financial.

Significant deterioration in the macroeconomic environment in Ukraine during 2014 – 2017 yrs. was accompanied by a decline in its competitive position at the global level and the ability to compete with other major investment-friendly countries for foreign investors in the world. The main attention is paid to the identification of modern factors of influence that promote or hinder the development of innovation and investment activities. There are revealed the reasons for the formation of negative trends in the development of innovation activity in the system of ensuring economic security of the state, which is amplified by the low level of its investment attractiveness as a whole, as well as the limited investment opportunities for further development of the country.

The conceptual model of the mechanism for providing innovative and investment security at the state and regional levels, aimed at technological modernization of the economy, is proposed. It is argued that the effectiveness of this mechanism is ensured through the commercialization of the results of innovation activities. The approach to assess the effectiveness of the mechanism of commercialization of innovations and their impact on the formation of innovation and investment security of development in the regions of Ukraine, which takes into account the intensity of the production of new knowledge; the speed of transforming new knowledge into specific technologies, products, services; the effectiveness of innovation and investment activity; the level of perception of changes or the readiness of enterprises for the implementation of innovative technologies; network technological readiness of the region, etc. This approach is important from the point of view of implementing of the European methodology of a reasonable specialization of the regions of the country.

Keywords: economic security, innovational and investment security, effectiveness of the mechanism of innovations commercialization, country, region, smart specialization.

1. Introduction

The problems of innovation and investment security are relevant for many countries of the world, and the study of its impact on the state of economic security of the country and its regions enables to identify in a timely manner the risks and threats that arise in this sphere, to adapt the mechanisms of providing innovation and investment development and to identify key problems in its realization taking into account the influence of global, national, regional factors. These problems under modern conditions are of special urgency for Ukraine. This is especially important in the context of implementing of the European practice of smart specialization of the regions in Ukraine. It is successfully implemented in almost 180 regions of Europe, has proved its practical effectiveness at the regional level and can be used in Ukraine. The success of regional strategies of intelligent specialization is largely due to the effectiveness of existing mechanisms for the commercialization of innovative technologies at the national and regional levels.

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According to the current legislation of Ukraine, economic development is understood as economic development, which enables to maintain resilience to internal and external threats and to meet the needs of the individual, family, society and the state. The innovation and investment activity, which is connected, first and foremost, with the following tendencies of the Ukrainian economy development, such as: reduction of the gross domestic product, decrease of investment and innovation activity, plays an important role in the system of ensuring economic security of the state; level of development of scientific and technical and technological potential, curtailment of research on strategically important directions of innovation development; weakening of the system of state regulation and control in the sphere of economy; instability in the legal regulation of relations in the innovation and investment sphere of the economy; lack of an effective program to prevent financial crises; growth of credit risks, etc.

The purpose of the article is to study the impact of innovation and investment activity on the state of economic security in Ukraine, as well as the effectiveness of the current mechanism for providing of innovation and investment security, which will speed up the modernization of technological development at the state and regional levels.

2. Analysis of recent publications.

Problems of economic security are widely discussed in the scientific literature. The study of issues of economic security is devoted to a number of scientific works by L.I. Abalkin [1], H.A. Pasternak-Taranushenko [2], V.M. Heits [3], Z.S. Varnalii [4], S.V. Onyshchenko [5], O.S. Vlasiuk [6], V.K. Senchahov [7] and others. Novikova K.I. analyzed the main indicators of investment and innovation security of Ukraine as a component of economic security, carried out a SWOT analysis of the current state of innovation and investment activities, identified comparative advantages, challenges and threats [8]. Bilyk V. explores the main characteristics of innovation-investment component of economic safety of enterprises of Ukraine, introduction of innovative factors into the system of economic security of the state, possible results of state innovation policy in ensuring economic security of the country [9]. I. Kornilova examines and summarizes the experience of the financial support of innovative development of the world economy, which occupied a high position in the world economy and demonstrates active dynamics of innovation growth [10]. Zatonatska T. investigates the world experience of formation of state investment policy and mechanisms for its implementation [11]. Shekhlovych A. M. solves a set of tasks regarding an improvement of theoretical and methodological and applied principles of the formation and implementation institutional mechanisms to ensure innovative security of Ukraine. It is proved that low governance efficiency by the implementation of institutional mechanisms of providing innovative security is a cause of the lack of innovation activity of subjects of the real sector and critically low level of the state innovative security [12].

T. Antropova, I. Ishmuradova, V. Minsabirova, F. Gazizova, R.Temirbulatov analyze the formation of innovative economy in Russia and emphasize the ineffectiveness of established innovation institutions. They are exploring new directions for ensuring economic security in a context of increasing internal and external risks that related to global social and economic processes; rightly argue that, in today's economic security, the creation of a fundamentally new institutional environment focused on increasing the competitiveness of the economy through innovation, technological breakthroughs, nanotechnology development; an increase in its structure of production, corresponding to the post-industrial technological way, modernization and innovative development as economic security is a condition promoting the entry of the economy into progressing development course [13].

A. Ianioglo, T. Polajeva developed the system of economic security ensuring and proposed a mechanism for increasing the innovation activity of enterprises in developing countries, for example, the Republic of Moldova [14].

The scientists in their works discuss widely the problems of foreign investment in strategic competition with managed economy, as well as possible policy options and US investment strategies that can adapt to promoting innovation, mitigating national security risks and equal conditions for economic competition [15].

Wehrlé, F. and J. Pohl (2016) devoted their research to the investment component of economic security, as many countries have become ever more open and welcoming for foreign investment, and the level of awareness of risks for national security has been increased due to or related to international investments [16].

The research of innovation and investment development of different countries is reflected in international reports. For example, OECD (2016) explores a new stage in the development of innovation and the potential of digital technologies. This is a more complex approach to innovation in education. Innovation does not take place in a vacuum, but requires openness and interaction between systems and their environments. This is also important in ensuring innovation and investment security OECD [17]. Innovative aspects of the UK national security problem are covered in the National Security and Infrastructure Investment Review: Impact Assessment [18].

In recent years a great deal of attention from academics and practitioners from different countries has attracted attention to the new methodological approach to implementing of Smart Specialization, which is directly related to the effectiveness of the mechanisms of commercialization of innovations and innovation and investment security of the country and its regions. This methodology has been found to be practical in 180 regions of Europe, promoted by the European Commission, independent institutions and international organizations, the UNO (UNIDO), the World Bank, the OECD head-office, the key provisions of "smart specialization" are highlighted in the works by Foray D. [19].

Summarization and systematization of scientific works on the research of investment-innovation security problems and their impact on the state of economic security of Ukraine testifies to the expediency of studying the effectiveness of the existing mechanism of providing innovation and investment security that will speed up the modernization of technological development of regions and the country as a whole.

3. Evaluation of innovational and investment security in the system of economic security of Ukraine.

The problem of innovation and investment security in Ukraine requires assessing its importance in Ukraine's economic security system. The initial concepts for assessing the economic security of the state and its innovation-investment component are as follows:

1) economic security is the state of the national economy, which makes it possible to maintain resilience to internal and external threats, to ensure high competitiveness in the global economic environment and characterizes the ability of the national economy to achieve sustainable and balanced growth;

2) components of economic security are: industrial, demographic, energy, foreign economic, investment-innovation, macroeconomic, food, social, financial;

3) investment and innovation security is the state of the economic environment in the country, which encourages domestic and foreign investors to invest in expanding production in the country, promotes the development of high-tech production, integration of research and production sphere in order to increase efficiency, deepening the specialization of the national economy on creation of products with a high share of value added.

Carrying out of corresponding calculations has been carried out by means of selection of the indicators, which most fully characterize

each component of economic security of Ukraine. The main results of the calculations are presented in table 1.

The basis of the calculations is based on the existing Methodological Recommendations on Calculating the Level of Economic Security of Ukraine (Order of the Ministry of Economic Development and Trade of Ukraine) [20].

Table 1. Integral assessment of the level of economic security of Ukraine in 2010 –2015.

Security	2010	2011	2012	2013	2014	2015
Economic security	0,53	0,53	0,51	0,50	0,49	0,47
Industrial security	0,63	0,64	0,59	0,61	0,63	0,57
Demographic security	0,47	0,46	0,45	0,45	0,46	0,43
Energy security	0,31	0,32	0,34	0,38	0,36	0,37
Foreign economic security	0,39	0,37	0,38	0,34	0,36	0,37
Innovation and investment security	0,36	0,39	0,35	0,38	0,30	0,34
Macroeconomic security	0,36	0,33	0,40	0,42	0,33	0,29
Food security	0,90	0,92	0,93	0,95	0,94	0,95
Social security	0,54	0,56	0,58	0,59	0,52	0,46
Financial security	0,45	0,42	0,45	0,44	0,43	0,39

Note. The range of characteristic values of security level: optimal level of security (1,0-0,8), satisfactory level of security (0,79-0,6), unsatisfactory level of security (0,59-0,4), dangerous level of security (0,39-0,2), critical security level (0,19-0) [20]. Calculations were made by Fursova N.A. [21-22]

The analysis of the factors determining the state of innovation and investment security of the country suggests that nine of the total set of indicators selected for the assessment of innovation and investment security (14 indicators) tend to decrease. Consequently, the existing innovation and investment policy of the country is not sufficiently effective (tab. 2).

Table 2. Dynamics of changes in the factors influencing the integral assessment of innovation and investment security of Ukraine (according to the official methodology)

Innovational and investment security	2010	2015	2015 - 2010, (+-)
Gross fixed capital accumulation, percent of GDP	18,1	13,5	- 4,6
The ratio of the value of new fixed assets to the volume of capital investments, percent	67,9	79,3	11,46
Integral index of investment profitability of the business environment, percent	5,0	12,4	7,39
The ratio of net foreign direct investment growth to GDP, percent	5,0	6,8	1,77
The ratio of loans granted to non-financial corporations and households for the acquisition, construction and reconstruction of real estate (cumulatively, adjusted for the exchange difference), percent of GDP	9,6	7,9	-1,66
The share of products sold in the competitive markets of the country, the percentage of total production (as of the beginning of the year)	48,3	42,7	-5,60
The size of Ukraine's economy, as a percentage of world GDP	0,96	0,46	-0,50
Share of the volume of scientific and scientific work performed in GDP, percent	0,9	0,64	-0,26
The ratio of expenses for scientific and scientific works at the expense of the state budget, percent of GDP	0,34	0,21	-0,13
The number of specialists who carry out scientific and technical work, to the number of employed population (per 1 thousand people)	7	6	-1,01
Share of enterprises that introduced innovations in the total number of industrial enterprises, percent	11,5	15,2	3,70
Share of realized innovative products in the volume of industry, percent	3,8	1,4	-2,40
The ratio of export of royalty, licensed services, computer and information services, scientific and design development, services in architectural, engineering and other technical sectors, as a percentage of GDP	0,018	0,006	-0,01
The share of people who reported that over the past 12 months have been using the Internet (household surveys), percentages	22	48,9	26,90

It should be noted the increase of the influence of investment factors, in particular, the growth of indicators of the ratio of the value of new fixed assets to the volume of capital investment, which improved by 11.46 percentage points; integral index of investment favorable business environment – 7.39 percentage points; the ratio of net growth in direct growth of net foreign direct investment growth to GDP – by 1.77 percentage points. Among the innovation factors, it is an evil sign of a growth of 3.70 percentage points of the share of enterprises that introduced innovations in the total number of industrial enterprises.

Identification of the main threats to the state's economic security as a result of the influence of innovation and investment development factors makes it possible to ascertain the complications of the realization of Ukraine's national interests in the economic sphere. Thus, among the aggregate of internal threats to the stable innovative development of the state, it is necessary to highlight the low technological level of most branches of the national economy, the high level of material and energy intensity of production, low quality of production and, consequently, the low competitiveness of the national economy; loss of a significant part of the scientific and technical potential, positions on important areas of scientific and technological progress; low investment activity and investment of capital mainly in intermediary and financial activities at the expense of production, etc. According to the main external threats, the irrational structure of exports, excessive export of raw materials, as well as dependence on imported energy sources should be attributed; low level of formation of financial, organizational and information infrastructure for supporting the competitiveness of Ukrainian exports; excessive openness of the Ukrainian economy, etc. At the same time, this situation is rather dynamic and complicated (or varied) as a result of active changes in the external and internal environment of enterprise development.

4. Evaluation of influence of modern formation factors in innovational and investment security of Ukraine development (2016 –2017 yrs.).

Investment component of economic development of Ukraine. In 2017, economic growth in Ukraine was slow; however, consumer and investment demand was rapidly recovering. The volume of nominal GDP amounted to 821.3 billion UAH (GDP per person – 19320 UAH, that is, less than 600 €), which is a critically low indicator, although there has been some revival in its growth recently. Compared to similar periods in 2016, the GDP growth was: in the 1st quarter of 2017 – 28.15%, in 2nd – 22.72%, and in 3rd – 22.73% (Fig. 1). At the same time, slow structural changes in the economy, low efficiency of state banks and weakness of the legal system remain significant obstacles both for innovation activity and investment activity (Fig. 1 – 2, tab. 3).

The results of economic activity of enterprises did not promote their innovative activity: in January–September 2017, 29.7% of large and medium-sized enterprises were loss-making (before taxation), in terms of the main sectors of the economy, this was as follows: in agriculture, forestry and fisheries, the economy – 9.9% of loss-making enterprises, in industry – 30.5%, in construction – 27.2%, wholesale and retail trade – 41.0%. During this period, the profitability of operating activities of large and medium enterprises in the country as a whole was 10.1%; In terms of economic activity, the situation was as follows: agriculture - 3.8%, industry – 8.3%, construction – 4.0%. The most profitable sectors were

trade, financial services, real estate services. The interest coverage ratio (Interest Coverage ratio4) for the real sector increased from 2.3 to mid-2016 to 4.3 at the end of the second quarter of 2017, and it accounted for 6.8 in lucrative enterprises.

The increase in profits led to an increase in solvency of enterprises and their investment activity, demand for credit bank resources, and a decrease in the number of bad borrowers among enterprises that stopped servicing loans during the crisis.

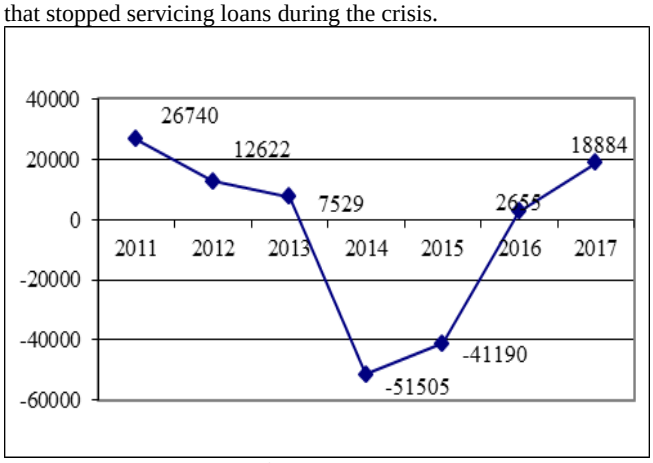


Fig. 1: Changes in real GDP of Ukraine in 2011 – 2017 yrs. (mln,USD)

Table 3. Capital investment by sources of financing

Capital investment structure	Used capital investment in January–September 2017	
	mln UAH	in % to total volume
Total	259545,0	100,0
incl. at the expense of		
funds of the state budget	5271,6	2,0
funds of the local budgets	17420,9	6,7
own funds of enterprises and organizations	188572,6	72,7
bank credits and other loans	14187,3	5,5
funds of foreign investors	4790,4	1,8
funds of the population for housing construction	21951,7	8,5
other sources of financing	7350,5	2,8

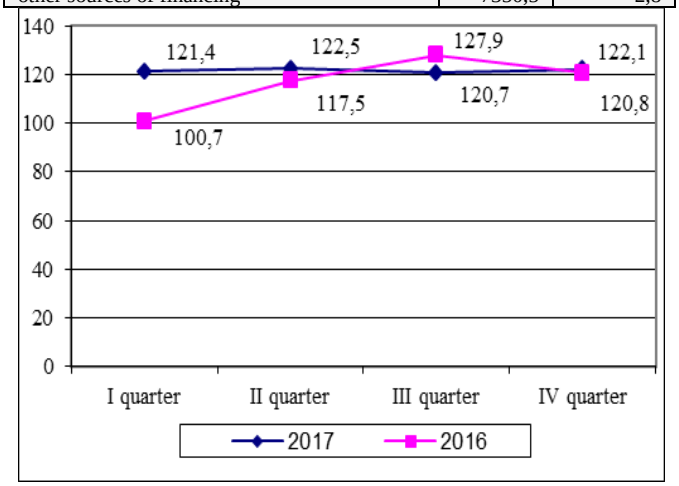


Fig. 2: Capital investment index (as a percentage of the corresponding period of the previous year)

After a three-year pause, Ukrainian banks regained profitability, had stable funding, started lending to the population and business, but low operating efficiency of state banks remained a serious source of risks. However, the criteria for assessing the solvency of borrowers have become tougher: now Ukrainian banks require borrowers to fully disclose their ownership structure, provide information on financial statements and liquidity of collateral. Adoption of the NBU Resolution "On Approval of the Regulation on Determining the Size of Credit Risk by Bank of Ukraine for Active Banking Transactions" (No. 351 dated June 30, 2016) and the transition of the banking system into the international practice of defining non-performing exposures / loans (NPE / NPL) estimate the real level of unemployed loans in Ukraine. Their share turned out to be the largest in world practice in the history of observation.

Banks significantly increase the portfolio of loans to individuals, encouraged by a rapid increase in nominal household incomes after the crisis. By the level of distribution of loans to individuals Ukraine is one of the last places in Europe: the ratio of loans to GDP is only 3.6%. This is a low indicator, even taking into account the lower level of economic development of the country. At present, volumes of unsecured loans, small in size, with an effective rate somewhere more than 40% are growing lively. At the same time, there is hardly any long-term mortgage lending available: mortgages make up less than 5% of new loans.

An increase of inflation by the end of 2017 (to 13.7%) and in 2018 led to an increase in the discount rate of the NBU from 12.5% (May 2017) to 17 5% per annum (April 1, 2018) and further strengthening of inflationary risks, which provoked a more tight monetary policy.

During 2017, the inflow of currency funds of corporations, including state-owned enterprises, accelerated. In the structure of the banks' liabilities, the funds of the population and businesses, which gradually replace external borrowings, dominate. This funding structure increases the risk of liquidity, since internal resources are generally short-lived.

Today, two key risks to the banking sector are the dominance of low-performing government banks and a significant proportion of problem loans in portfolios of financial institutions.

A key short-term challenge for Ukrainian banks is the introduction of an international standard for financial reporting 9 (IFRS 9). The transition to a new standard may have a noticeable but one-time impact on the equity of banks. The impact on regulatory capital will be smaller, since it is determined on the basis of prudential reserves.

At the same time, the dynamics of foreign investment is not enough to stimulate innovation development in critical areas of activity: in January-September 2017, foreign investors from 76 countries of the world invested $ 1218.2 million in the economy of Ukraine. US direct investment (equity). In particular, the dynamics of direct investment from EU countries can be considered as a downward trend: in 2010 – 31 538.4 million dollars, in 2017 – 27 465.5 million dollars respectively with the maximum amount of their revenues in 2013 – $ 41 132.3 million.

The structure of foreign investment in the economy of Ukraine is imperfect in terms of stimulating innovation. The largest volumes of direct investment revenues were sent to industrial enterprises – $ 464.4 million, institutions and organizations that carry out financial and insurance activities – $ 248.8 million.

In March 2015, the IMF approved a four-year Extended Funding Program for Ukraine (EFF) worth 17.5 billion dollars. US $ 12.3 billion SDR. To date, the country has received four tranches worth a total of 8.7 billion dollars. The United States (6.2 billion SDRs), the last one – in April. Since then, Ukraine has failed to meet all the conditions for completing the next revision of the IMF program. According to NBU forecasts, Ukraine will receive 3.5 billion dollars before the completion of the current program of cooperation with the IMF.USA with two tranches. In this case, the country will receive about 12.2 billion dollars in total. USA. The key macroeconomic risk for the financial stability of the country over the coming years is the cessation of cooperation with the IMF. The lack of financial support from international institutions will make it more difficult to refinance over $ 20 billion sovereign and guaranteed state debt with maturity in 2018–2020. In general, the stabilization of Ukraine's economy in the near future depends on the actions that the government will take and the provision of continued international financial support from Ukraine by international donors and international financial institutions.

Innovative component of economic security of Ukraine. According to the State Statistics Service of Ukraine, in the period from 2014 to 2016, the share of innovative enterprises was 18.4%. Surveys conducted in Ukraine only in the field of services, show: in the first quarter of 2018 the indicator of business confidence in the service sector increased compared to the fourth quarter of 2017 to 1 pc and is (-5%), which is the result of the unfavorable business situation for October–December 2017 – (-5%); the state of demand for services (volumes of services realization) for October–December 2017 was evaluated as (-1%), with the expectation of this indicator in the first quarter of 2018 amounted to (-9%) (Fig. 3).

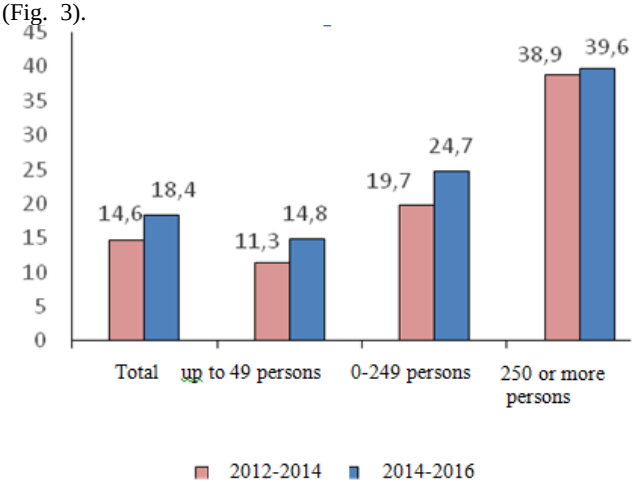


Fig. 3: Distribution of Innovatively Active Enterprises by the Number of Employees in the Ukrainian Economy,% (based on the results of the research 2012-2014 and 2014-2016 yrs)

Table 3. Distribution of enterprises in 2014-2016 by types of innovations and number of employees (percentage of total surveyed enterprises)

The number of employees	innovative active enterprises	Including introduced		
		technological innovations	technological and non-technological innovations	technological innovations
The whole	**18,4**	**5,0**	**6,8**	**6,6**
incl. the number of employees				
up to 49	14,8	3,8	4,9	6,1
50–249	24,7	7,3	9,8	7,6
250 and more	39,6	11,5	19,9	8,2

The main consequences of the strengthening of innovation and investment risks and threats in Ukraine. The main effects of macroeconomic development and its innovation-investment component were: the failure of the state of the main productive assets in the leading industries, agrarian complex, life support systems; exacerbation of the problem of maintenance of complicated technical facilities in an appropriate technical condition; the imbalance of reproductive processes and the strengthening of structural deformation in the economy; the growth of the critical dependence of the national economy on the external markets; low rates of expansion of the domestic market; Preservation of raw materials products with a low share of value added in the structure of exports.

The negative effect of the revealed trends in the development of innovation in the system of ensuring economic security of the state is aggravated by the low level of its investment attractiveness as a whole, as well as the limited investment opportunities for further development of the country. It should be noted that the developed debt dependence of the state (the ratio of the state and guaranteed by the state debt to GDP – 78.55%), the critical amounts of public external and internal debt (in particular, the ratio of gross external debt to GDP – 53.10%, the ratio of official international reserves to the volume of gross external debt – 13.29%); the growth of the share of foreign capital in strategic sectors of the economy is dangerous for Ukraine's economic independence; the ineffectiveness of antitrust policy and the mechanisms of state regulation of natural monopolies, which complicates the creation of a competitive environment in the economy, only exacerbate the existing risks and threats in the innovation and investment sphere that impede the stabilization of the country as a whole. The current situation of reducing debt sustainability over a long period of time (exceeding the level of public debt over 50% of GDP), along with the action of a number of other factors (political and economic), does not contribute to the investment attractiveness of the country.

Under such conditions the questions of impact assessing of innovation and investment activity on the state of Ukraine's economic security, establishing the effectiveness of the current mechanism for providing innovation and investment security at the state and regional levels are becoming of exceptional importance.

5. Results of the mechanism for providing innovational and investment security in Ukraine.

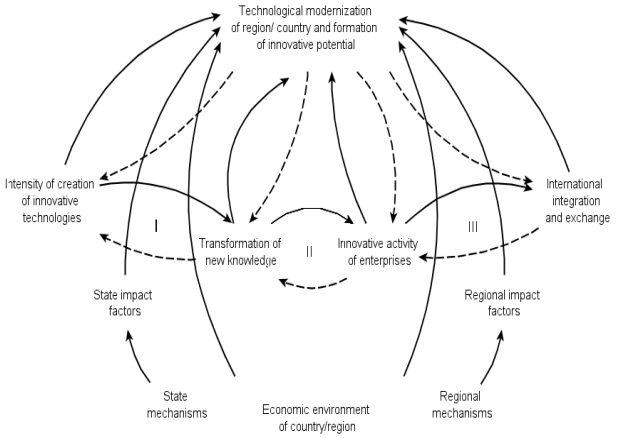
The mechanisms for ensuring innovation and investment security and reducing its negative impact on the development of the national economy as a whole are constantly modified and transformed under the influence of national and regional factors, the strengthening of globalization processes and the level of openness of the national economy, which collectively determine the competitive positions of the subjects of scientific and technical and innovation activities in regional, national and international markets for intellectual products and innovations. The objective of the mechanism of providing innovation and investment security at the national and regional levels is to ensure technological modernization of the economy. The complexity of the formation and implementation of this mechanism lies in the fact that it represents an integrated model of interaction of all participants in innovation and investment development. The effectiveness of this mechanism is ensured through the commercialization of the results of innovation activities aimed at generating profit from the market realization of intellectual property rights, taking into account the interests of a wide range of stakeholders [23 25].

Fig. 4 schematically reflects the process of commercialization of innovative technologies, reveals the complexity of interconnections between its main participants.

Accordingly, the process of commercialization of the results of innovation activity is considered as a complex of organizational and economic measures aimed at profit and other market benefits from their introduction or sale. The key evaluation parameters of the national and regional potential for the commercialization of innovative technologies should be:

- the intensity of the production of new knowledge as an indicator of the formation of intellectual rent in the system of action of national and regional factors of modernization of economic development;
- the speed of transforming new knowledge into specific technologies, products, services;
- the share of innovative technologies in the creation of the gross regional product (gross value added);
- the level of perception of changes or the readiness of enterprises for the implementation of innovative technologies;
- network technological readiness of the region;
- the level of financing of scientific, scientific, technical and innovative development of the region;

the presence of a network of objects of innovation infrastructure, which provides acceleration of innovation development.



The environment for the formation of market relations:
I - markets of intellectual products;
II - innovation markets;
III - international markets of scientific-technological and innovation exchange

Fig. 4: Conceptual model for forming the mechanism of commercialization of innovative technologies (developed by the authors)

To study the peculiarities of the mechanism of commercialization of innovative technologies and its impact on technological modernization of the country and the region, assessment of its influence on the formation of the model of innovation development of regions and the country as a whole and the identification of the force of influence of factors influencing them, seven subsets of indicators were identified:

W1 – indicators of economic development of the country and region;
W2 – indicators of state factors of influence on innovative development;
W3 – indicators of regional factors of influence on innovative development;
W4 – indicators of intensity of production of innovative technologies;
W5 – indicators of the rate of transformation of innovative technologies;
W6 – indicators of innovative development of the region;
W7 – indicators of international integration.

On the basis of the correlation analysis, significant indicators were selected that characterize the selected subsets. The subsets W1, W2, and W3 determine indicators that reflect the impact of factors on the country / region's innovation development. The subsets W4, W5, W6 and W7 determine the indicators reflecting the potential of commercialization of scientific and scientific and technical developments in the country / region.

Denote by xijk the exponent value Xij for k region. The set of all such values is the information-analytical base of the research. To determine integral estimates for each subset of indicators, we determine the normalized values of the indices using equality

$$z_{ijk} = \frac{x_{ijk} - x_{ij}^{\min}}{x_{ij}^{\max} - x_{ij}^{\min}} \quad (1)$$

where $x_{ij}^{\max}$ *and* $x_{ij}^{\min}$ – correspondingly the maximum and minimum value of the Xij for all regions of the country. Normalized indicators are dimensionless, and the set of their values is a range from 0 to 1, which makes it possible to add these indicators in determining integral estimates.

The proposed integral estimates are determined using equality

$$B_{jk} = \frac{\sum_{i=1}^{n_j} z_{ijk}}{n_j}, \quad (2)$$

where Bjk – integral estimate of k region for the exponents of the j-th subset, zijk is the value of normalized indices for k region, nj is the number of indices in the j-th subset. Next, for all regions, the corresponding integral estimates are determined: V1k = (B1k + B2k + B3k) / 3 and V2k = (B4k + B5k + B6k + B7k) / 4. These estimates determine the influence of the selected factors on the region's innovative development (V1k assessment) and potential commercialization of scientific and scientific and technical developments for this region (assessment V2k). The next step is to determine the integral assessment of the ability to transform innovative technologies, which is determined by the equation: Rk = (V1k + V2k) / 2.

The results of the calculations carried out according to the presented methodological approach in the generalized form are presented in Fig. 5 [23].

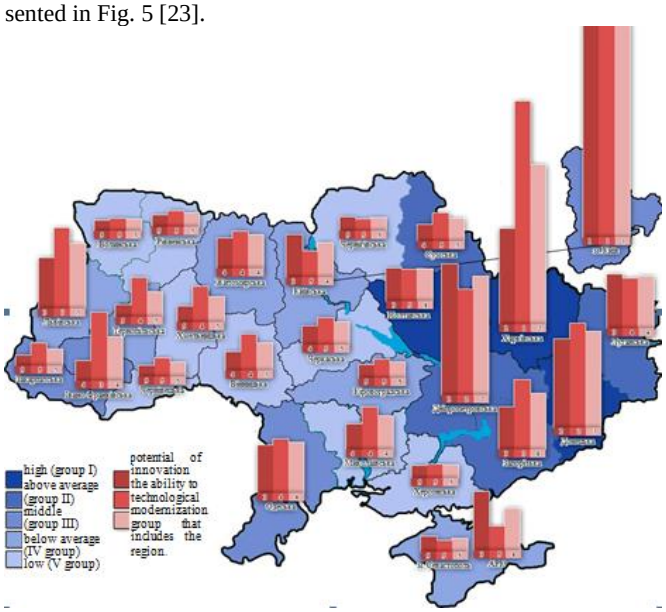


Fig. 5: Cartogram of the effectiveness of the commercialization innovations mechanism and their influence on the formation of innovation and investment security of development in the regions of Ukraine, 2015 (developed by the authors)

Cartogram of the effectiveness of the commercialization innovations mechanism and their influence on the formation of innovation and investment security of development in the regions of Ukraine includes grouping of regions of Ukraine according to the integral assessment:

1) the effectiveness of the mechanism of commercialization of innovative technologies
- high (group I)
- above average (group II)
- middle (group III)
- below average (IV group)
- low (V group)

2) the combined influence of factors of innovation development
- the potential of innovation development
- the ability to technological modernization
- group that includes the region.

The effectiveness of innovation activity is calculated on the basis of the volume of implemented innovative products in the middle of the country and beyond [23]. The results of the calculations showed that the innovative activity of the regions of Ukraine is highly differentiated, therefore the system of managerial influences at the national and regional levels should take into account the differences of each region, the peculiarities of its innovative potential structure, the intensity of innovation activity within the individual stages of the innovation process.

6. Conclusions

The research has shown the existence of significant correlations between the integral indicator of innovation and investment security and the effectiveness of the mechanism for providing innovation and investment security in Ukraine, whose main component is the mechanism of commercialization of innovations. The obtained results of the study form a clear idea of the effectiveness of the mechanism of management of innovation and investment security and ensuring the economic security of the country as a whole. For all selected indicators, the coefficients of correlation with the effective indicator of the implementation of innovation products, the corresponding determination coefficients, and the actual values of Fisher's criterion are determined. The obtained results allow to clearly identify the reasons for the formation of innovation-investment security and its impact on the economic security of the region / country, to identify the problems of modernizing the regions of Ukraine, to identify and assess the level of regional differentiation of identified factors of influence, to form the basis for making managerial decisions in the field of innovation- investment development of the region / country. The obtained data essentially reflect the level of perception of changes or the level of adaptability of business entities to the production and practical implementation of innovative technologies at the level of each region, as well as the effectiveness of the current mechanism for financing scientific, scientific, technical and innovative development of the region.

The developed methodological approach is the basis of a comprehensive assessment of the ability to create, implement, promote an intellectual product on the market based on the accumulation of available resources, as well as to ensure the economic efficiency of commercialization processes and, on this basis, provide access to the market of innovative technologies, their practical implementation and technological modernization of the region or country in general.

In modern conditions, an effective mechanism for the commercialization of innovative technologies at the national and regional levels must first of all provide easy and quick access to new knowledge in solving specific problems of the development of the firm, region, country, globalized world space, and promote the formation and development of intellectual capital a nation that is the primary source of intellectual rent as the main source of economic development under modern conditions and the content of the very process of commercialization in the market conditions.

The obtained results can be used to ensure the realization of regional strategies of innovation strategies for smart specialization in Ukraine, taking into account the experience of the European Union [26].

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