

Oleksandra Hryhorian **CONSIDERATION OF THE PECULIARITIES OF THE MECHANISM OF STIMULATING INNOVATIVE ACTIVITY**

2022 and 2023 are considered the most conflictual years of the Cold War. The confrontation between Israel and Hamas, the escalation of tensions between Serbia and Kosovo, Sudan, Yemen, Karabagh are some of the hot spots that threaten the stability of peace and the world-class economy. 183 armed conflicts were counted for 2023, which is the highest figure for 30 years, and military aggression on the territory of Ukraine has reached the most destructive scale. Research work is an attempt to create a multipolar world, thanks to scientific activity due to the consequences of armed conflicts on the territory of Ukraine.

The most important condition for economic growth on the platform of quality renewal of production is the reduction of costs, the production of a quality product, service, and the introduction of innovation. Thus, the object of the study is the dependence of targeted financing of innovations as a direction that will contribute to increasing the level of innovative development of enterprises. It also considers the dependence of targeted financing of innovations as a way to increase the level of innovative development of enterprises under the known impact of military operations on the territory of Ukraine. The problem of the research is the state of innovative development of Ukraine, the factors that caused it, the tools of influence and stimulation from the state, such as tax incentives, attracting investors for the development of small and medium-sized businesses through the creation of favorable economic conditions, using the example of the Diia City tax regime. It also the dependence of targeted financing of innovations, as a direction to increase the level of innovative development of enterprises under the known effects of military actions on the territory of Ukraine. The obtained results are due to such factors as the impact of military aggression on the territory of Ukraine, the pandemic and post-pandemic period, which had negative consequences such as a decrease in the planned volume of production due to the downtime of enterprises, a decrease in labor productivity, changes in the established raw material supply system. The study of the special regime of «Diia City» indicates a positive growing level of interest of investors, in particular foreign ones, in attracting funds for the development of various sectors of the economy, most of all in the field of information services, which contributes to the processes of digitization and integration of Industry 4.0. The results can be used for the strategic planning of economic entities during the war period and the post-war recovery of the economy of Ukraine, where the attraction of innovations is one of the key elements of economic prosperity, and tax incentives are a tool of the state regulatory apparatus.

Keywords: innovation, innovative activity, mechanism for stimulating the introduction of innovations, Diia City, stakeholder.

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1. Introduction

Innovative development is a holistic, narrower concept than development. In [1] gives the concept of development as a purposeful, regular process of state change in all spheres and within and outside the envelope of the object, where there is movement only forward, the impulse to the goal is the synergistic effect of all elements of the development system (object) under by the action of the factors of progress, extended recovery and reproduction, includes the transformation of structural elements of the object, growth, growth. This innovative development is considered as an economic category at the macro level (as a country, region, industry) and macro level (at the scale

of enterprises). Enumerating the point of view of a number of researchers regarding the understanding of the concept of innovative development, let's consider it appropriate to present our vision of this interpretation, where innovative development is a process aimed at meeting the needs of the population in a given state, taking into account the increase in the quality of life of labor resources, where the driving force is the economy of the state. based on the creation and implementation of NTP achievements [1].

According to the author, the low rating of Ukraine in terms of innovative contributions is due to such factors as the lack of political and social stability, high inflation and rapid devaluation of the national currency, and the obsolescence of most industrial equipment (Fig. 1).

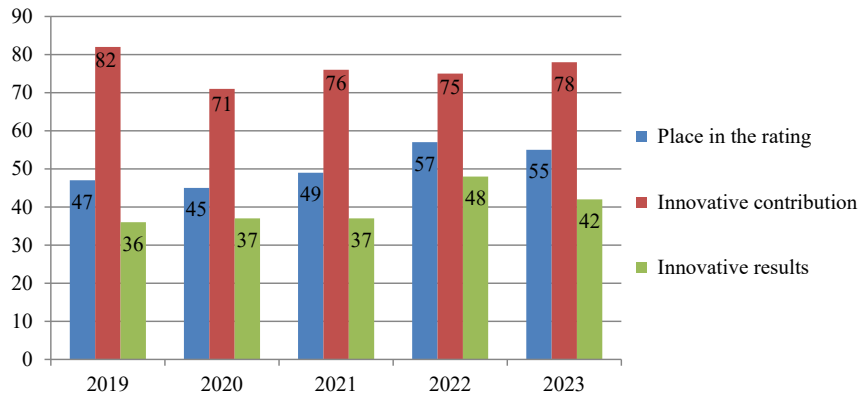


Fig. 1. Ukraine's place in the GLOBAL INNOVATION INDEX 2019–2023 rating [2]

As can be seen from Fig. 1, the place of Ukraine in the GLOBAL INNOVATION INDEX rating in 2023 compared to 2019 decreased by 8 positions, however, compared to 2022 it rose by 2 positions, which indicates a positive trend, similarly in the category of innovative results, where Ukraine rose in 6 positions in 2023 compared to 2022.

Among the most common classifications of models of innovative development of the economy in the economic literature are American, Asian, European, imitative, alternative.

The analysis of innovative activity is important for assessing the directions and rates of development of individual industries and the economy as a whole. Among the factors of influence on the innovative activity of the enterprise, tax instruments of influence occupy a prominent place. Foreign specialists and experts interpret the tax policy measures of Ukraine as quite normal by the standards of the European Union, and the rates correspond to the rates of the countries of the European Union. 18 % personal income tax rate, 18 % corporate income tax rate, 20 % value added tax rate, 22 % social contribution rate with an additional 1.5 % military levy [3, 4]. Ukraine's tax policy of maintaining low income tax rates is a reasonable tool in the period of hostilities, making it possible to avoid taxation of wartime profits [3, 4]. In such a period, the interest of investors in companies engaged in communal services, consumer goods, and real estate grows. It is important for investors to remember that higher dividend yields do not always indicate attractive investment opportunities, as a stock's dividend yield can be increased as a result of a decline in the stock price [5]. In [6] pays considerable attention to the topic of stimulating the creation and development of startups, small and medium-sized enterprises. The development of small and medium-sized businesses has a beneficial effect on the economy of the state. To stimulate the process, the state uses such tools as simplification of legislation, institutional structure, the basis of policy development, public-private consultations of small and medium-sized enterprises [7]. The implementation of innovations using labor productivity, products, and marketing innovations is important for the effectiveness of small and medium-sized businesses [8].

The aim of the article is the development of theoretical-conceptual and methodical provisions and scientific and practical recommendations regarding the formation of an economic mechanism for managing the innovative development of enterprises.

It is necessary to realize the set goal by solving the following objectives:

- determine the essence of the economic mechanism of managing the economic development of enterprises

and investigate the peculiarities of its functioning at industrial enterprises;

- highlight the concept of management of innovative development;
- propose formation of structures of innovative potential of enterprises depending on existing problems and aspects of their activity;
- analyze the innovative component as an important factor in the development and importance of introducing innovations into the activities of industrial enterprises;
- improve the methodical approach to the evaluation of the quality of innovative products as a component of the economic management of the innovative development of enterprises;
- develop a methodical approach to determining the impact of the innovative component in the economic mechanism of managing innovative development on the volume of production and the efficiency of enterprises.

The object of the research is the dependence of targeted financing of innovations as a direction that will contribute to increasing the level of innovative development of enterprises.

The subject of the research is the identification of certain groups for which it is possible to observe the dependence of some changes in their condition on the known effects of military actions on the territory of Ukraine.

2. Materials and Methods

The theoretical and methodological basis is the fundamental provisions in the management of innovative development of enterprises, which are highlighted in the works of scientists. The results obtained taking into account the combination of general scientific and special methods of scientific research, namely:

- the method of system analysis of the formalization of complex structures – for the study of the theory of innovative development and the formation of the mechanism of implementation of business entities;
- statistical methods of data processing, the method of grouping, factor analysis – for the assessment of the current state and changes in the innovative development of enterprises;
- arithmetic mean, mean squared (standard) deviation, error of the mean value, coefficient of variation to assess the homogeneity of the studied groups, correlation analysis to determine the degree of connection between indicators.

3. Results and Discussion

The mechanism of structural and qualitative renewal of production and the creation of market infrastructure become possible thanks to investments that positively affect the processes of renewal and market transformations for all economic entities from the moment Ukraine entered the path of market relations and transformations. When the market is competitive, demand and supply affect the price until it is set at a level where demand equals supply, this is one of the main statements of economic theory. Let's take into account the fact that innovative demand from enterprises is the main factor in the demand for loan funds. The activity of innovative entrepreneurship involves a qualitative new process. Such a process is reflected in the transition from the material composition of the long-term success of the entrepreneurial spirit in the market to its intangible characteristics. This characteristic combines knowledge, opportunities, information resources, which in the process of creating consumer value, globalization leads to a trans-economic system between countries and the possibility of entering new markets.

An important aspect is taxes for the IT sector. Each subject of entrepreneurial activity develops and analyzes the taxation system for its activity. A correctly chosen taxation system will affect the transparency of business, optimal taxation of operations and reliability of accounting. This is important during the period of martial law and post-war reconstruction. Special rules of taxation, where preferential taxation has been introduced, are embodied in the tax regime «Action. City» in 2022, where by the end of 2022 – 450 companies were registered, in September 2023 – 686 residents of Diia City. Residents received a special legal status, liberalization of labor relations and special taxation. It has become easier to attract investment in startups thanks to the introduction of a tax on withdrawn capital instead of an income tax.

In accordance with the Law of Ukraine «On Amendments to the Tax Code of Ukraine» and other legislative acts of Ukraine on ensuring the balance of budget revenues dated November 30, 2021 No. 1914 [9, 10].

Promptly obtaining valuable analytical information from a large array of data is one of the foundations of cyber-physical systems. Such a system includes the development of autonomous robots, in virtual and physical reality, where errors are tracked quickly and cheaply, implementation of system integration both horizontal and vertical. Such opportunities allow combining in a single space all management systems and participants at both the macro and macro levels, the development of cyber security, the widespread introduction of the industrial Internet of Things, the introduction of additional (adaptive) production of three-dimensional printing, virtual reality, deepening the processes of using cloud technologies. On the territory of Ukraine, military operations have been going on for a long enough time, and this allows researchers to pay attention to innovations in the period of special circumstances [11].

Stages of diagnosing the risk of loss of innovative capabilities of the enterprise. Risks are elements of the results of any business and making business decisions. Innovative activity is also associated with risk, where the risk is influenced by certain factors on the results of activity that cannot be accurately calculated. Instability of supply and demand, increased competition, rapid pace of technology

development and aging of equipment, sharp changes in currency exchange rates, as well as such factors as a pandemic, military operations on the territory of the state, create conditions under which there are risks of loss of innovative capabilities of the enterprise to implement innovative projects, which negatively affects economic efficiency of innovative activity. Innovative projects, as a rule, are quite risky and require the formation of new approaches to the problem of risk management of the loss of innovative capabilities of the enterprise, which necessitated the development of an algorithm consisting of 3 parts: analytical, practical and informational.

The process of managing the risk of loss of innovative capabilities of the enterprise has four stages:

1 – «identification of the risk of loss of innovative capabilities of the enterprise», which boils down to the occurrence of possible problems. Such aspects are manifested in the form of an imbalance of the structural components of the enterprise's innovative capabilities due to external or internal factors. This leads to an increase in costs, a decrease in the volume of product sales, a decrease or decrease in the volume of profit compared to a certain period. Identified risks must be diagnosed and ranked in terms of their priority. Qualitative risk analysis is used for this. It can be the method of analogies, the analysis of the appropriateness of costs, the method of expert assessments;

2 – «diagnosis of the risk of loss of innovative capabilities of the enterprise». Factors influencing the risk of loss of innovative capabilities of the enterprise are gathered into a single system, and the degree of influence of each factor on the enterprise's capabilities is determined (calculated);

3 – development of measures to minimize and neutralize risk;

4 – analysis and assessment of the effectiveness of risk management.

Among the causes of risks:

- reduction of planned production and production volumes, which occurred due to downtime of equipment, reduction of labor productivity, lack of material, its quantity or quality, defective products, lack of energy carriers;
- increase in costs due to overspending of raw materials, materials, fuel and energy resources, transportation, overhead and trade costs, moral and physical wear and tear of equipment;
- increase of the wage fund;
- increase in deductions and tax payments.

The following factors also affect the risks: socio-economic, natural-climatic, production-economic. Risks are influenced by each of these factors that arise in the course of business entities' activities.

One of the methods of qualitative risk assessment is the method of expert assessments. A group of 8 experts has been formed. Assessment of consistency of expert actions and reliability of expert assessments is an important point of expert procedures. The reliability of the evaluations is guaranteed that in the case of consistency of the actions of the experts, the existing methods of determining the reliability of the expert evaluations are based on an assumption. Most often, for these purposes, the concordance coefficient (agreement) is used, the value of which allows to judge the degree of consistency of experts' opinions, and as a result, the reliability of their assessments [12].

The key to the rapid economic and social development of the country in the world market, the state's competitiveness

depends on the wide application of innovative technologies and the active support of the state. Ukraine joined the program of the Eastern European Partnership – a foreign policy initiative of the European Union (hereinafter referred to as the EU) after an interest in studying the European experience in stimulating the development and implementation of innovative technologies in industries arose. The European Union is forming a pan-European innovation system, where the task is to take the leading place in the region in terms of the level of innovative development [13]. In order to become competitive, the state must support its own scientific innovation potential. Structural technological changes in the spheres of activity of business entities and the introduction of the latest scientific and technical developments and technological processes are formed by innovation. The value for society is taxes, which can act as a positive means, stimulating the activities of economic entities, taxation should not create obstacles for economic growth; moreover, it is designed to promote it [14]. According to the author, it is precisely the stimulation of innovative activity, the creation of favorable conditions, under the objectively determined interests of the state and business entities, as well as consumers through the optimal adjustment of tax mechanisms. Digitization of the production process and activity, interest in innovations and their implementation. The essence of the form of influence on innovation activity is the refusal of the state from part of the tax revenue in exchange for the increase in the volume of innovative products, taking into account the priorities determined by the state [14]. It leads to a successful balancing between the fixed and regulatory function of the tax system, it is necessary to find and create means of stimulation, which leads to successful results, increasing the income of the enterprise and the state budget. The state advocates a reasonable policy and spends the accumulated funds on the further development and functioning of such elements as the economic, legal and defense, and social spheres. Creating favorable conditions through the optimal adjustment of tax mechanisms to the objectively determined interests of the state, in the opinion of the author, will make it possible to reduce tax pressure, give an impetus to the dynamic development of stimulating innovative activity and interest business entities and consumers who are interested in innovation and digitalization of production and end product-oriented activities. Indirect methods of state management in the form of influence include tax stimulation of innovative activity, and the essence consists in the state's refusal of a part of tax revenues in exchange for an increase in the volume of innovative products, taking into account the priorities determined by the state. The amount of tax revenues increases due to the increase in the volume of production of such products. For the state, tax incentives become profitable if the amount of tax revenues exceeds the amount of tax benefits provided.

Budget lending of priority innovation projects, technological innovation parks, interest-free full, partial up to 50 % for the use of the involvement of the project executors of the necessary funds and (or) other subjects of innovative activity – refers to tax instruments.

The hypothesis regarding the dependence of targeted financing of innovations as a direction that will contribute to increasing the level of innovative development of enterprises is considered. One type of economic stimulus considered through indirect tax incentives includes tax reductions in research-related enterprises, where there are

investment incentives and tax credits that can reduce or exempt certain taxes for a certain period, for companies that invest in innovations. This leads to new jobs, an increase in the budget of the economy after a certain time. The conducted analysis aims to single out certain groups for which it is possible to observe the dependence of some changes in their condition on the known effects of military actions on the territory of Ukraine. The author used statistical methods for mathematical processing of the results. The arithmetic mean is determined by dividing the sum of individual indicators by their number (n):

$$\bar{X} = \frac{\sum x_i}{n}.$$

The mean square (standard) deviation was calculated using the formula:

$$\delta = \sqrt{\frac{\sum (x_i - \bar{X})^2}{n}}.$$

The error of the average value is determined by the formula:

$$m = \frac{\delta}{\sqrt{n-1}}.$$

To assess the homogeneity of groups, let's use the coefficient of variation, which is calculated according to the formula:

$$v = \frac{\delta}{x} \cdot 100 \%.$$

To determine the reliability of the differences between indicators, let's use (different groups for one time period) the simplified Student's t -test:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\delta_1^2}{n_1} + \frac{\delta_2^2}{n_2}}}.$$

Compare the obtained t with the tabular value of $t_{\text{крит}}$. It is provided that the probability has a level of 95 % ($\alpha=0.05$).

To determine the degree of connection between indicators (the same group, different years), let's use Spearman's rank correlation, the correlation coefficient:

$$\rho = 1 - \frac{6 \sum d_i^2}{n(n^2 - 1)},$$

where $d_i = x_i - y_i$ – the difference between the ranks of each observation.

To assess the closeness of the connection, let's use the Chaddock scale (Table 1).

Table 1

Chaddock scale

ρ	Tightness (strength) of correlation
less 0.3	weak
from 0.3 to 0.5	moderate
from 0.5 to 0.7	noticeable
from 0.7 to 0.9	high
over 0.9	very high

A diverse approach allowed the author to more deeply analyze, evaluate and propose constructive approaches to the development of innovative entrepreneurship with the help of state regulation.

Let's determine the correlation for indicators with Table 2.

As can be seen from Table 3, such indicators as the number of introduced innovative products and the number of enterprises engaged in innovative activities reflect the closest correlation. Since the correlation of two indicators is commutative ($R_{X,Y}=R_{Y,X}$), only the lower part of the matrix is filled – the upper part is mirrored to it. The main diagonal (gray color) reflects the correlation of the indicator with itself, that is, it is always equal to 1.

A red «null» marker indicates that there is not enough data to determine a correlation – that is, the samples have a single point of intersection or none at all.

Indicators where the correlation reflects only the general trend of changes are highlighted in blue – for those pairs of indicators where one of the indicators has only two values, by which one can only note the direction of the trend – growth or decline.

For visualization, a graph in Fig. 2 is provided for the correlation between indicators «1» and «3».

It can be seen from the graph that the trend line (blue dashed line – the number of introduced innovative products, units) for indicator «1» is increasing, that is, on average,

there is an increase in the number of introduced innovative products. For indicator «3», there is a decrease (red dotted line – the number of enterprises that engage in innovative activities), that is, the correlation between them is $R_{1,3}=-1$. Analyzing the obtained results according to the Chaddock scale (Table 1), it is possible to find that for five pairs of indicators (highlighted in green) a high degree of correlation is observed, and for one – $R_{2,10}$ – very high (highlighted in purple). Based on the fact that these indicators are interconnected in such a way that indicator «2» (Total volume of expenses by areas of innovative activity) includes indicator «1» (Volume of expenses for innovation at the expense of own funds), it can be assumed that changes in the volume innovation costs are determined by the investments of the enterprises themselves. It is found that the difference between the values of the indicators and in 2015–2018 the financing of innovations took place exclusively by the efforts of the enterprises themselves, and the share of participation of other investors (the state, communities, etc.) was 0%. In other words, these indicators during the first four years of observation are multicollinear and cannot be considered as separate indicators.

Values showing a high negative correlation are highlighted in orange. That is, for indicator «9» and indicators «1, 2, 10» the inverse relationship is statistically significant and the growth of one indicator with a high probability causes the decrease of the other.

Table 2

Innovative activity of enterprises, 2015–2020

No.	The name of the component	2015	2016	2017	2018	2019	2020
1	The number of introduced innovative products (goods, services), units	3136	4139	2387	3843	2148	4066
2	The total volume of expenses by areas of innovative activity, million USD	364.48	612.91	240.57	321.37	–	615.55
3	The number of enterprises engaged in innovative activities, units	–	–	–	8173	–	2283
4	Volume of realized innovative products (goods, services), USD million	–	–	–	1032227	–	1570204
5	The number of organizations engaged in SCIENCE, units	978	972	963	950	950	769
6	The number of introduced new technological processes, units	1217	3489	1831	2002	2318	–
7	The volume of costs for innovation by production direction, USD million	–	–	–	207330	–	660367
8	The volume of expenses in the direction of the GDR, thousand USD	364.47	–	–	321.37	375.22	380.12
9	The number of purchased and transferred new technologies in Ukraine and abroad, units	651	543	1131	832	885	–
10	The volume of costs for innovation at the expense of own funds, million USD	364.47	612.91	240.56	321.37	375.22	462.12
11	The number of workers employed in the GDR, persons	122504	97912	94274	88128	79262	78860

Note: according to data [15, 16]

Table 3

Correlation of innovative activity of enterprises

No.	1	2	3	4	5	6	7	8	9	10	11
1	1	–	–	–	–	–	–	–	–	–	–
2	0.813411	1	–	–	–	–	–	–	–	–	–
3	–1	–1	1	–	–	–	–	–	–	–	–
4	1	1	–1	1	–	–	–	–	–	–	–
5	–0.39867	–0.54991	1	–1	1	–	–	–	–	–	–
6	0.448411	0.81854	null	null	–0.0508085	1	–	–	–	–	–
7	1	1	–1	1	–1	null	1	–	–	–	–
8	–0.34373	0.795476	–1	1	–0.4501229	–0.05149	1	1	–	–	–
9	–0.71644	–0.85102	null	null	–0.5261572	–0.39707	null	–0.116	1	–	–
10	0.650679	0.923059	–1	1	–0.1966016	0.811212	1	0.796827	–0.84115	1	–
11	0.007241	–0.29987	1	–1	0.5527129	–0.42881	–1	–0.104	–0.45607	–0.03359	1

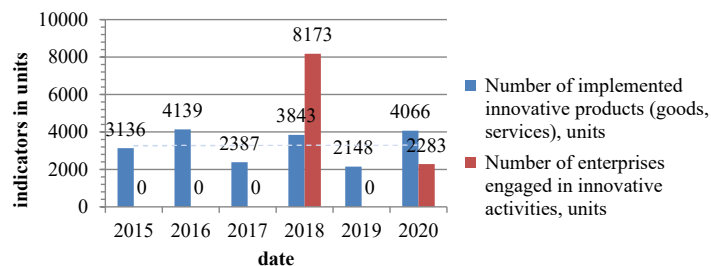


Fig. 2. Correlation between the indicators «Number of implemented innovative products (goods, services)», «Number of enterprises engaged in innovative activities»

Therefore, investments in innovative activities take place primarily at the expense of the enterprises themselves, which are interested in the development of these business entities, obtaining the best results on the sales markets and in the economic indicator of attractiveness in monetary terms. The driving force behind these processes is revenue-generating innovation. The hypothesis of targeted financing of innovations is mathematically substantiated, as a direction that promotes the development of economic entities thanks to the introduction of innovations. Competitiveness and success in the market, an effectively formed management mechanism without innovative activity can be critical and dangerous. Timely data analytics, monitoring, tax tools to optimize production processes and sales markets, where there are mechanisms to stimulate and support the creative environment in improving innovative culture, will help improve the efficiency of production processes. Currently, the state pays special attention to fundamental scientific research to end or abolish martial law in Ukraine, to issues such as national security and defense, the introduction of energy-efficient resource-saving technologies and alternative energy sources, the creation of an industry of nanomaterials and nanotechnology, quality medical care and treatment. State tax incentives are a mechanism of the effective economy of the state, which works in special military conditions. An effective policy of balanced tax rates regulates the inflow of monetary units to the state budget. These measures are aimed at preserving the natural environment and post-war reconstruction [17]. Armed conflicts, especially those that fall under the category of large ones with more than 10,000 dead, pose a threat to global stability and have negative effects on economic, food, and environmental aspects. This leads to an imbalance on the world stage. The worsening of international stability is observed the most in the last 30 years, the number of regional armed conflicts has reached the value of 183 [18, 19]. The development of Ukraine's post-war recovery economy is aimed at technological progress in order to solve environmental and economic problems in order to be a reliable partner of the European Union. In order to have an effective result in the development of business entities, development concepts are developed that are aimed at overcoming crisis situations of various origins. The author sees tax incentives and financing of innovative activities at enterprises as important additional research.

4. Conclusions

The current state of the economy of Ukraine in the conditions of military aggression and post-war recovery requires special attention to innovations, the economic mechanism for managing the innovative development of

enterprises, the mechanism for stimulating the introduction of innovations in the activities of business entities, as a driving force that makes it possible to create new products and services that satisfy modern needs and bring profit. An important lever of business entities is financing, in particular at their own expense, the innovative activity of the object, which is the driving force of the economy. The process of transformation of the values of each employee of the enterprise in the interests of innovative development of the enterprise, where interests motivate each person to perform certain work. The employee acquires values formed at the object of business entities, which meet the requirements of the founders, managers, stakeholders and employees of the enterprise regarding their behavior, interaction, where the development of corporate culture is achieved. Return on investment is an indicator that summarizes the results of the company's work, as an internal result of the company's management, which is externally attractive for the investor to attract investments to the investment object. In the period from 2015 to 2018, financing of innovations took place thanks to such sources as bank loans – 30107.87 thousand USD, funds from local budgets 28622.01 thousand USD, funds from non-resident investors – 75774.77 thousand USD, own funds of enterprises – 445995.68 thousand USD, i. e. mostly interested entrepreneurs in the development of their business. The conducted regression analysis proved the presence of a high correlation between the total amount of expenses in the areas of innovative activity and the amount of expenses for innovations at the expense of own funds, confirmed that the implementation of innovative activities has an indirect effect on investment interest in innovations. Stimulation of the implementation of innovative activities by domestic economic entities is expedient for the purpose of further evaluation and forecasting of the value of enterprises, to determine the innovative business strategy for the development of a separate economic entity – an enterprise.

Conflict of interest

The author declares that she has no conflict of interest in relation to this research, whether financial, personal, authorship or otherwise, that could affect the research and its results presented in this paper.

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Use of artificial intelligence

The author confirms that she did not use artificial intelligence technologies when creating the current work.

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