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РОЗВИТОК ІННОВАЦІЙНОЇ ДІЯЛЬНОСТІ ПРОМИСЛОВИХ ПІДПРИЄМСТВ В УКРАЇНІ

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Анотація. У статті розглядаються основні проблеми та перспективи розвитку інноваційного сектору української економіки. Використання економетричних інструментів дослідження впливу інноваційної активності підприємств на макропоказники дозволили виявити, що основними перешкодами на шляху впровадження інновацій у діяльність промислових підприємств України є інституційні фактори. Таким чином, описаний аналітичний набір інструментів є основою методу стратегічного моніторингу інноваційного розвитку підприємництва.

Ключові слова: інноваційна політика, інноваційна діяльність, інноваційний розвиток, статистичний аналіз, економетричний аналіз.

Innovative Activity Development of Industrial Enterprises in Ukraine

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Abstract. The article deals with the main problems and perspectives of the development of the innovation sector of the Ukrainian economy. Using econometric tools is proven. the main obstacles to the introduction of innovations in the activities of industrial enterprises of Ukraine are institutional factors. Thus, the described analytical toolkit is the basis of the method of strategic monitoring of innovation development of entrepreneurship.

Key words: innovation policy, innovation activity, innovation development, statistical analysis, econometric analysis.

1 Introduction

The variability of innovative development can raise the issue of ensuring its manageability through the creation of targeted, interrelated changes with the allocation of key characteristics and factors of this type of development, to which the authors of research [2] include:

- innovative goals, innovative results of production activity (goods, services, efficiency, competitiveness, etc.) in a tactical and strategic plan;
- innovative means of achieving goals (factor-innovation in the form of new technology and technology, new organization and motivation of labor force and production);
- possibilities of reproduction of innovation orientation on a balanced basis for the management system to possess all organizational, managerial, resource and motivational conditions for it;
- specific methods of marketing research;
- a sharp increase in the volumes of information and its continuous accumulation;
- increase in the depth of forecasting and its multivariate nature.

Analyzing the results of studies [2, 3], we can conclude that the effectiveness of innovation development is achieved in the terms of mandatory increase in the depth of forecasting and planning of each option. At the same time, in our opinion, it is necessary to take into account and determine the driving force of such development.

Ukraine's economy has its own traits, which impose additional restrictions on both the range of instruments used and the ultimate effectiveness of the policies being implemented. An oligarchic component means - when the choice of policy instruments in Ukraine is made in favor of a limited group of stakeholders.

The most typical example of this is the discreteness of policies and instruments that are focused on current, not future goals. In Ukraine, the predominance of the political component is more pragmatic when adopting strategies for innovation development, fiscal and economic decisions.

From the point of view of the methodology of making strategic decisions, due to the fact that traditional management technologies based on the construction of formal models and the exchange of formal knowledge, such instruments are not present today - there is a need to use economic and mathematical tools for controlling existence and development of socio-economic systems. The quality of management decision-making requires new tools for adequate forecasting and control that allow to coordinate interests and influence on decision-making.

The question of the current state and development of innovation activity is the subject of research by many leading foreign and domestic scientists. An analysis of recent scientific publications has shown that some important aspects of the problem under study remain insufficiently considered and require further study: features and factors of innovation activity, distribution of innovation costs, etc.

At the end of the twentieth century P. Krugman, based on the modeling of the influence of innovation development and technology transfer on international trade established [4]:

- in the presence of the same level of labor productivity, higher incomes will be observed in a country with a higher level of innovation development;
- innovative development on equal terms (political, economic, institutional) contributes to the flow of capital into technologically growing industries and activities.

Thus, if technology transfers from developed countries to less developed, then due to the difference in wage levels this will contribute to the growth of the production of innovative products in less developed economies and thus reduce inequalities in their development.

Relevance of the outlined problem and its practical significance implies research of tendencies and directions of innovative development of industrial enterprises, diagnostics of the external environment and identification of problems and limitations of their economic growth [5]. For the introduction of technologies V and VI technological processes it is

advisable to establish a special procedure for stimulating the innovation activity of enterprises, in particular through tax policy and lending.

Solving the tasks of the transition to an innovative way of development requires the development of methodological tools and the implementation of system analytical studies and predictive assessments, especially in terms of identifying the parameters of innovation activity and stimulating the introduction of innovations.

The purpose of the paper is to investigate the state of innovation activity of industrial enterprises of Ukraine in the long-term perspective, to identify the main tendency of development and to determine the directions of stimulation of innovation entrepreneurship using econometric methods and models.

2 Task

- to carry out a statistical analysis of innovation activity of industrial enterprises of Ukraine;
- determine the list of growth parameters and the average rate of growth of innovation activity;
- identify important factors of innovation activity of industrial enterprises and estimate the level of influence of growth parameters on macroeconomic indicators.

3 Features of industrial enterprises innovative activity formation in Ukraine

Traditionally, the government proposes the same list of recommendations: to increase financing, to improve existing laws and programs, to create a new government body and to accelerate the creation of innovative infrastructure — various parks, techno-polices and venture funds.

1. Enterprises are turning to science and new technologies and introduce innovations to maintain competitiveness and increase the efficiency of their activities. In the big business of Ukraine, there is practically no competition between producers, but there is competition for proximity to power and public resources. In this case, it is more appropriate to invest in corruption schemes and in selective enforcement schemes, which is also an element of corruption. The opaque business environment created in the country is quite familiar and even comfortable for Ukrainian business leaders, which allows them to function successfully without introducing innovations [6].

2. This is the main reason for the non-innovation of the big Ukrainian business. Other factors of innovation activity of industrial enterprises include the following: the overall technological backwardness of the Ukrainian industry in relation to the level of production of advanced countries; modernization of the production base at the expense of foreign purchases of technological second-hand; low business interest in domestic science because of the lack of sufficient experience in the creation of samples of modern technology and technology "turnkey", with the necessary guarantees of their quality and a high level of service [8].

3. The ineffectiveness of transformational changes in economic policy, innovation activity stimulating are determined by the effect of such factors. First, because they represent and protect the interests of the innovative passive big business [9]. Secondly, most resources are spent to support the functioning of the country's socio-economic complex, not its development, which requires entirely other information and analytical tools using. Thirdly, in the legislature and in the executive branch there is a conviction that the basis of innovative economies is a well-funded science, and the problems of innovation development can be solved by adopting correctly written laws. Fourth, domestic legislators and civil servants are not responsible for long-term prospects for the country's subordination, but only for its state of 1-3 years in advance, while innovative economies are created over a decade. Fifthly, the concentration of almost all resources of the country in several financial-industrial groups, despite the fact that determining element of such development is the small and medium innovative business.

Thus, the listed factors of innovation activity of industrial enterprises of Ukraine formation do not allow to solve complex problems of long-term innovation development [3, 9, 10, 11].

Overcoming innovation-simulation activity and attempts to expand the economic system, innovation transformation will be useless without the presence of relevant institutions and institutional environment.

Innovative economies of the most successful countries are created and operated, relying on the existence fundamental conditions: entrepreneurs; highly competitive environment; advanced science; financial institutions and financial resources; innovation infrastructure; institutional environment for innovation development.

Thus, for the successful deployment of innovative transformations in the economy, the subjects of innovative behavior (entrepreneurs) should be necessarily represented, as well as there is a competitive business environment that stimulates such behavior, that is, the necessary first two conditions from the list below are necessary.

Obstacles to the innovations introduction are:

- an alternative way of making a profit because the benefits of economic power to the rental income maximization path have become a cost for innovation development;
- significant transaction costs of innovation activity, due to the lack of an organizational scheme for managing the process of promoting innovation and innovation management in modern business [12]. In economic practice, the needs of development and innovation of production renewal, and short-term financial interests, are not dominated. The introduction of innovations through those network structures, in which the modern business is executed, simply plummet into a large number of organizational problems and their associated costs;

- inconsistencies in the timing of economic planning and the short-term interests of entrepreneurs through the domination of arbitrariness and the possibility that income, property, enterprise position and personal freedom will be lost, that is, low level of economic security;
- profit or individual income can only be guaranteed by incorporating into the system of government, but not by investing in innovation or personal investment in knowledge;
- lack of appropriate educational infrastructure for innovation activities (training systems for science, qualified engineers, technologists, designers, highly skilled workers, etc.);
- tools of innovation policy, which can be implemented through the definition of priorities, goals, tasks, tools and the influence of institutions in the direction of ensuring the innovation development of all spheres.

The basic principles of the formation of the policy of innovation development are:

1. A program-targeted approach that identifies priorities and strategies for innovation activity, from which regional and sectoral development strategies and programs must be agreed upon.
2. Balance of development, aimed at optimal use of internal and external benefits and ensuring conditions for the transition to innovation development.
3. Institutional system of consistency of organizational, economic, legal, infrastructural and managerial regulatory influences in the direction of promoting innovative development.
4. Financial security requires a balanced formation of sources of financing for innovation development with the involvement of public and private investment.
5. Information and consultation provision providing for the full access to information about innovative objects and subjects and a wide range of consulting services for innovation activities.
6. Social and environmental orientation. The toolkit for regional innovation policy should be based on the priority of improving living standards and environmental safety of the environment.

Given the priority of the institutional system in the implementation of innovation policy, the production should be based on the target orientation, vertical and horizontal integration of regulatory influences, innovation infrastructure that covers the horizontal links of the innovation process subjects. The system of institutional regulation of innovation development should include its own subjects of governance (authorities, innovation infrastructure, social and public institutions) and their own institutional regulation of innovation development.

4 Overview of the models of description of innovative processes

Formation of an innovative type economy is extremely important, especially in the context of globalization, taking into account the role of innovation as a determining factor of competitiveness, scientific and technological and social progress, and ensuring a positive dynamics of economic development in general.

Historical review of the evolution of innovative processes from simple linear to more complicated nonlinear models was carried out by R. Roswell [5].

The first stage (50-60-ies of the twentieth century) — approaches to the analysis of the innovation process as a linear research, scientific and technical, production and marketing activity, which later became known as the "technological push" concept, the main ideas of which were limited to assertion, that the output for the innovation process is the scientific and technical preconditions. The theoretical foundations of this concept were laid down in the writings of M. Tugan-Baranovsky, J. Schumpeter, K. Freeman, N. Rosenberg, R. Nelson and others [5, 9, 10].

The Austrian economist J. Schumpeter in 1912, in the book "The Theory of Economic Development", proposed a concept of innovation, on the basis of which he took the idea of "new combinations". Among the combinations that generally form the structure of the innovation process, the scientist called the following: the launch of a new product or a known product of a new quality; the introduction of a new, still unknown, method in production in a specific field; penetration to a new market - known or unknown; obtaining new sources of raw materials or semi-finished products; organizational restructuring, in particular, the creation of a monopoly or its elimination. In further works by J. Schumpeter, the term "new combination" is replaced by the term "innovation", which became a scientific category [9].

The second stage is connected with the emergence in the late 1960s of the concept of "demand challenges", whose supporters, in particular, G. Less, E. von Hippel and J. Shmuckler noted that the determining factor of innovation development is market demand, that is, the market defines new inquiries, and in the linear model, application development leads to new opportunities [5].

The third stage — the beginning of the 70's - the mid 80-ies of the twentieth century — the synthesis of previous approaches led to the emergence of a model of interaction of technological opportunities and market needs, which required the consideration of the relationship between elements of the innovation process.

The fourth stage — from the mid 80's — is associated with a model that describes the integration of enterprises with suppliers, buyers, conducting fundamental research.

The fifth stage — the 90's and the end of the twentieth century — with a model of strategic integration, according to which the company organizes a permanent innovation process, reacting to changes in the external environment. At the same time, in the latter model, a special role is played by close interaction between market participants, feedback between producer and consumer, transfer of technologies and scientific and technical cooperation [11,13,14].

However, the sixth stage (the beginning of the XXI century — and till today) can be singled out, which is associated with the acceleration of the rate of scientific and technological progress on the basis of the development of the IT sphere and due to the transition to the so-called sixth technological way. The sixth technological way is based on systems of artificial intelligence, global information networks and will be characterized by the comprehensive role of science and

technology in the social development. Taking into account these factors is a guarantee of the development of any state of the world and Ukraine in particular [15,16].

5 Parameters of diagnostics of industrial enterprises innovation activity factors in Ukraine

At the present stage of economic activity, the study of the innovative activity of enterprises indicators is of great importance, as the definition of modern trends, problems of the current stage of development, and the estimation of promising indicators of this type of activity are the key to the competitiveness of enterprises in the future. The selection and application of effective forms of innovation implementation can increase enterprises innovative activity and improve economic performance.

At present, the innovation activity of enterprises is measured by several indicators: the number of innovative enterprises, the volume of sold innovation products, the amount of innovation costs, the number of new technological ways introduced and innovative types of products [10, 11].

The development of the economy involves the intensification of the industrial enterprises innovative activity to form and maintain competitive advantages and ensure sustainable development. One of the areas of state regulation of innovation activity activation in Ukraine should be the definition of this concept in the legislation and the development of indicators that would allow to analyze innovation activity and identify the most effective directions of innovation development. The most effective will be the application of a complex combination of statistical, resource-cost and effective approach to the analysis of the state of innovation activity [15].

The current state of innovation activity of Ukrainian enterprises can be characterized first by the indicators such as the share of enterprises engaged in innovations and implemented them and the share of realized innovation products in the total volume of industrial products (Fig. 2). The relatively low level of the share of enterprises engaged in innovations, as well as the share of industrial enterprises in the total number of industrial enterprises that introduced innovations, indicates negative trends in the innovation sector.

Taking into account the peculiarities of domestic statistical accounting, in which it is necessary to have only a minimal level of novelty, to include any changes to innovations, essentially two thirds of innovations are products that are new only for the enterprise where it was developed. At the same time, it can exist in the world market for many years. The national domestic practice considers organizations to be innovative only in the case if its had the costs of innovation in the reporting period, despite its size, the stage of innovation process and the level of its completeness [14, 15, 16].

The analysis of the structure of expenditures on innovative activity by enterprises of Ukraine by sources of financing in 2000-2016 showed that the main source of Ukrainian enterprises innovation financing were their own financial resources (see Fig. 2).

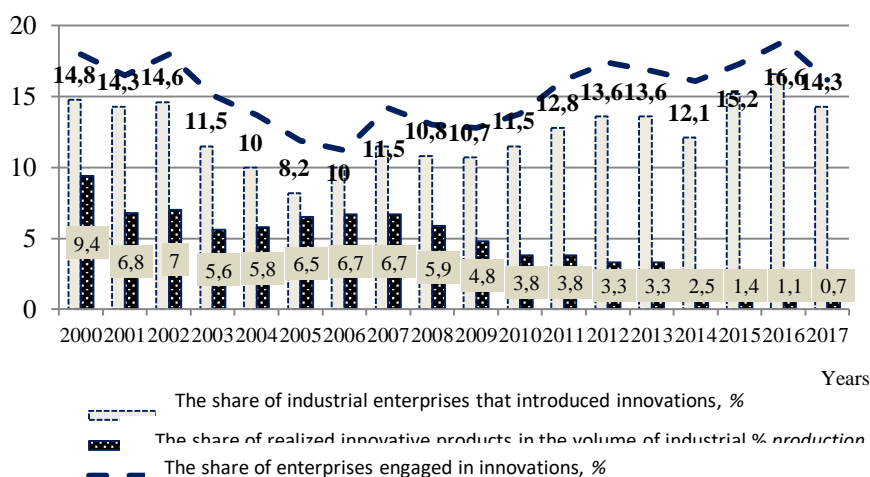


Fig. 1. Dynamics of enterprises innovative activity indicators of Ukraine in 2000-2017. Source: Built by authors using [11]

The amount of funding from public funds and foreign investment is very low. The dominance of the Ukrainian enterprises innovation activities financing at the expense of its own funds, especially in recent years (2014-2016), reflects an extremely negative tendency towards indifferent attitude of the state towards financing innovative activity and reluctance of foreign investors due to high risks of loss of their funds.

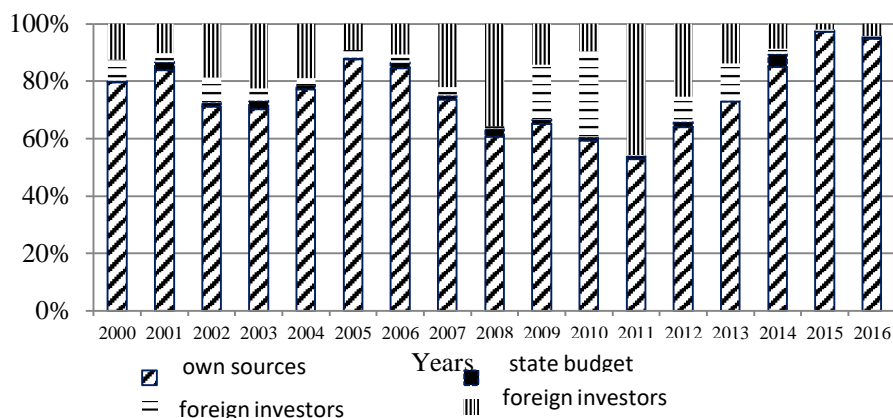


Fig. 2. Structure of expenses for innovative activity by industrial enterprises of Ukraine by sources of financing in 2000-2016. Source: Built by authors using [11]

Statistical analysis of the dynamics of innovation activity of Ukrainian enterprises by the average growth or decline (Table 1) showed that during 2000-2017 indicators were characterized by uneven rates of development.

Table 1. Average rates of growth / decline of enterprises innovative activity indicators of Ukraine for 2000-2017 years. Source: Built by authors using [11]

Indicator	Annual growth rate
The share of enterprises engaged in innovations, %	1,003
Total cost, mln. UAH	1,175
<i>including directions</i>	
research and development	1,149
acquisition of other external knowledge	0,992
the purchase of machinery equipment and software	1,200
other expenses	1,103
Share of enterprises that introduced innovations, %	1,007
Introduced new technological processes, <i>processes</i>	1,059
incl. low-waste, resource-saving	1,035
Introduced production of innovative types of products, <i>points</i>	0,921
including new types of technology	1,046
The share of realized innovative products in the volume of industrial, %	0,973

The average annual growth was: the share of enterprises engaged in innovations — by 0.3%, the total amount of expenses — by 17.5%, including in directions — for research and development — by 14.9%, for the purchase of machinery equipment and software — by 20%, other expenses — by 10.3%; expenses for innovation activity at the expense of own sources — by 18.8%, at the expense of the state budget — by 21.7%, other sources — by 10%. The share of enterprises that introduced innovations grew annually on average by 0.7%, introduction of new technological processes — by 5.9%, including low-waste, resource-saving — by 3.5%. The decline in the indicators of innovation activity was only observed for such indicators as: the cost of acquiring other external knowledge — by 0.8%, financing by foreign investors — by 10.3%, the number of implemented innovations — 7.9%, specific the weight of the realized innovative production in the volume of industrial — by 2.7%.

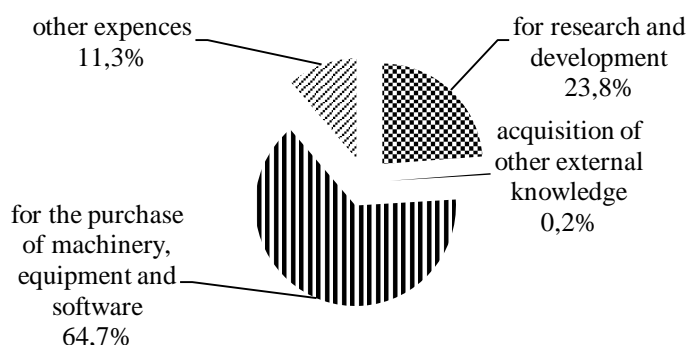


Fig. 3. Structure of Ukrainian enterprises expenses innovation activity in 2017, in directions. Source: Built by authors for [11]

The analysis of Ukrainian enterprises by types of innovations allowed to establish that during 2010-2012 the share of enterprises engaged in marketing and organizational innovations amounted to 10.4%, for the period 2012-2014 and 2014-2016 — 5.1% (Table 2).

Table 2. Distribution of enterprises and organizations of Ukraine by types of innovations, (% of the total number of enterprises. [11])

Types of innovation	Years		
	2010-2012	2012-2014	2014-2016
Total number of enterprises and organizations	100,0	100,0	100,0
Innovatively active	20,4	14,6	18,4
Were engaged only in product innovations	1,5	1,6	1,6
Were engaged only in process innovations	3,2	3,6	5,8
Were engaged in product and process innovations	4,2	3,6	4,5
Engaged only in marketing and organizational innovation	10,4	5,1	5,1
Did not do any of the innovations	79,6	85,4	81,6

In tabl. 3 we shows the distribution of enterprises that consider that the mentioned factors significantly influenced their decision to develop innovative projects or constrained the implementation of innovation activities during 2012-2014. The list of these reasons illustrates the lack of interest of domestic enterprises in enhancing innovation activity, as well as the impossibility of innovation development through financial status.

Table 3. Distribution of non-innovative enterprises for reasons which hampered the implementation of innovations during 2012-2014, %.[11]

There are no compelling reasons to innovate	82,2
including	
Low demand for innovations in the market	6,0
Because of previous innovations	3,9
Because of the very low competition of enterprises in the market	3,0
Lack of good ideas or opportunities for innovation	7,4
Possible introduction of innovations is hampered by weighty factors	17,8
including	
Lack of funds within the enterprise	11,4
Lack of loans or direct investments	6,1
Lack of skilled workers within the enterprise	1,7
Difficulties in obtaining state aid or subsidies for innovation	5,8
Lack of cooperation partners	1,9
Uncertain demand for innovative ideas	2,1
Too much competition on the market	4,3

Innovative businesses face a number of challenges. First, in the conditions of dynamic development of manufacturing technologies, the question arises about the choice of the necessary technology.

Secondly, the question arises about the alternative: to buy technology in the market, or to implement their own developments.

Thirdly, since the technology itself can generate profits, enterprises must solve the following issue: supply their products to the market, or use them only for internal needs. Within the enterprise itself there are also a number of obstacles for the implementation of innovations: lack of funds, loans or direct investments in the enterprise; lack of skilled workers; difficulties in obtaining state aid or subsidies for innovation; lack of cooperation partners.

Low innovative activity is due to the following: lack of financial resources; lack of motivation of R&D staff; low level of stimulation; migration of researchers, including because of low wages; a long-term process of introducing innovations into production and a significant payback period, low competition of enterprises in the market and lack of motivation for the introduction of innovations.

As a result of the research, a number of factors hindering innovation activity were identified, among which the main are: positive dynamics of the number of enterprises that introduced innovations, which are confirmed by statistical data; enterprises of the Ukrainian industry are focused on the introduction of technological innovations, and the share of marketing and organizational innovations is insignificant; insufficient amount of innovative activity financing hamper innovative development of enterprises; The main source of financing for the development and implementation of innovations at domestic enterprises was and remains its own resources, and the amount of financing from public funds and foreign investments is extremely low [17].

Solving problems of innovative development of domestic industrial enterprises requires: development and implementation of effective programs of support and stimulation of innovation development at the state level; provision of state guarantees for projects that involve the introduction of modern technological processes, including low-waste, resource-saving and non-waste; creation of a favorable investment climate for the introduction of innovations of different types.

6 Modeling factors of industrial enterprises innovation activity

In order to provide a more detail and reliable analysis of the dynamics of innovation activity of Ukrainian enterprises, we conducted an econometric analysis based on linear, power and parabolic trend models that were built according to statistical data for 2001-2017. Adequate trend models can be used for forecasting only in relation to enterprises, which were engaged in innovations and enterprises that introduced innovations. Data of these models are presented in the table 4, and the value of their influence on the effectiveness of economic development in the form of GDP is presented in Fig. 4.

Table 4. Econometric analysis based on linear, power and parabolic trend models.

The share of realized innovative products in the volume of industrial, %							
Type of model	Trend equation <i>t</i> - Student's criterion	R^2	<i>F</i> - Fisher criterion	<i>DW</i> - criterion Darbin-Watson	Forecast for year		
					2018	2019	2020
linear:	$\hat{y} = 8,09 - 0,31t$ 12,63* -5,03*	0,628	25,3*	1,50*	2,42	2,11	1,79
power:	$\hat{y} = 10,88t^{0,4137}$ 10,40* -3,81*	0,492	14,5**	1,05	3,29	3,22	3,15
parabolic:	$\hat{y} = 8,86 - 0,56t + 0,01t^2$ 8,49* -2,09** 0,94	0,650	13,0**	1,50*	3,19	3,13	3,10
Costs for the purchase of machines, equipment and software, million of UAH							
linear:	$\hat{y} = 533,24 + 630,61t$ 0,31 3,80*	0,490	14,4*	2,21*	11884,30	12514,92	13145,53
power:	$\hat{y} = 1048,04t^{0,785}$ 28,47* 6,8*	0,755	46,2*	2,09*	10128,09	10567,10	11001,16
parabolic:	$\hat{y} = 379,88 + 679,04t - 2,690,01t^2$ 0,13 0,93 -0,07	0,490	6,7**	2,21*	11730,94	12310,44	12884,55
Costs for research and development, million of UAH							
linear:	$\hat{y} = -35,81 + 129,56t$ -0,33 12,19*	0,908	148,6*	1,11*	2296,33	2425,90	2555,46
power:	$\hat{y} = 141,46t^{0,938}$ 39,03* 15,65*	0,942	245,1*	0,97	2130,67	2241,55	2352,08
parabolic:	$\hat{y} = 172,0 + 63,94t + 3,65t^2$ 1,02 1,48 1,57	0,922	82,7*	1,32*	2504,15	2702,98	2909,11

Source: calculated by authors using [11]

Note: * – statistical probability with probability

$p=0,99$; ** - with probability $p=0,95$ (tabular values $F(1;15; 0,99)=8,68$; $F(1;15; 0,95)=4,54$; $t(15; 0,99)=2,602$; $t(15; 0,95)=1,753$; $d_1(0,05)=1,08$; $d_2(0,05)=1,36$; $d_1(0,01)=0,81$; $d_2(0,01)=1,07$).

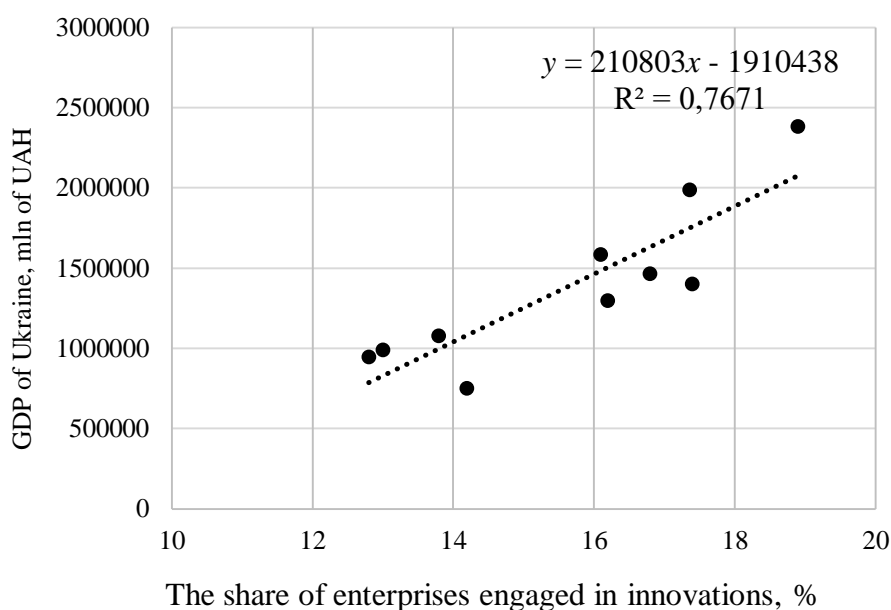


Fig. 4. Dependence of GDP of Ukraine on the share of enterprises engaged in innovations. Source: Built by authors using [11]

According to the equation of the pair linear regression $= 210803x - 1910438$ it can be argued that for an increase in the share of Ukrainian enterprises engaged in innovations, by 1%, one can expect an increase in GDP on average by 210803 million of UAH. The value of the determination coefficient $R^2 = 0,767$ indicates that the increase of the share of Ukrainian enterprises engaged in innovations by 76.7% leads to an increase in GDP.

Regression analysis of the influence of the parameters of innovation activity on the macro parameters of economic development is reflected in Table. 5.

Table 5. Regression analysis of the influence of indicators of innovation activity on macroeconomic indicators of Ukraine.

№	Indicator	Equation	Coefficient t R	R^2
1	The share of enterprises engaged in innovations, %	$\hat{y} = 210803x - 1910438$	0,876	0,767
2	Total cost	$\hat{y} = 76,689x + 477867$	0,708	0,502
3	Research and development	$\hat{y} = 893,82x + 117133$	0,942	0,888
4	Domestic R&D	$\hat{y} = 999,05x + 247579$	0,942	0,886
5	External R&D	$\hat{y} = 2161,6x + 783445$	0,478	0,229
6	Acquiring other external knowledge	$\hat{y} = -2164,5x + 1910438$	-0,596	0,355
7	Purchase of equipment and software machines	$\hat{y} = 83,029x + 681617$	0,753	0,566
8	Other expenses	$\hat{y} = -490,31x + 1910438$	-0,737	0,544
9	Introduced new technological processes, <i>processes</i>	$\hat{y} = 373,48x + 653216$	0,487	0,237
10	The share of soled innovative products in the volume of industrial, %	$\hat{y} = -100208 + 2000000$	-0,338	0,114

Source: calculated by authors using [11]

Within analyzing the factors of industrial enterprises innovation activity formation of Ukraine, it was revealed that the highest level of dependence of its level on sources of financing showed the model of own funds (Table 6), which can be recommended for forecasting.

Creating an attractive investment climate and the introduction of mechanisms and incentives that will increase the interest of enterprises in innovations implementing include:

- 1) improvement of tax legislation of innovation activity promoting;
- 2) the system of state subsidization of scientific developments according to the determined priority directions;
- 3) raising the level of financial support of innovation activity and foreign investors attraction;
- 4) development of infrastructure for financial, informational, consulting, marketing and other types of innovation support;
- 5) the formation of a training system for the innovative processes and projects implementation [18,13].

Table 6. Econometric analysis based on linear, power and parabolic trend models.

Costs of own sources, mln of UAH							
Type of model	Trend equation t - Student's criterion	R^2	F - Fisher criterion	DW - criterion Darbin-Watson	Forecast for year		
					2018	2019	2020
linear:	$\hat{y} = -518,32 + 777,71t$ -0,32 4,93*	0,618	24,3**	0,82	13480,5	14258,2	15035,9
power:	$\hat{y} = 1005,51t^{0,8234}$ 32,13* 8,10*	0,814	65,6**	0,73	10864,1	11358,7	11848,7
parabolic:	$\hat{y} = 2976,6 - 325,96t + 61,31t^2$ 1,22 -0,52 1,82	0,691	15,7*	0,88	16975,4	18918,1	20983,4

Source: calculated by authors using [11]

7 Research results

The study solves an important scientific and practical task to further identify key trends and factors of influence on the industrial enterprises innovative development. The main results of the study are as follows.

Realization of innovative development of the country's economy depends on a considerable number of interests and factors, determined first of all by the use of appropriate macrofinancial indicators, which are necessary to provide an adequate comprehensive assessment of the conditions for making managerial decisions, conducting a preliminary analysis of their consequences, and choosing the best scenarios for achieving the set strategic goals. The choice of appropriate indicators ensures the efficiency of state regulation, management of potential risks of macroeconomic development. One of the main prerequisites for the implementation of the economic and fiscal policy of innovation development is clearly defined intermediate and strategic policy objectives, measured by means of separate indicators or their systems, limited by time frame, realistic and justified.

The need for indicators arises at the moment of assessing the current state and identifying economic trends. Since management is a continuous cyclical process, in fact, during one cycle, indicators are used twice: in the process of assessing the situation for the formulation of a plan of measures, forecasting and evaluating the results of the implementation of these measures.

Analyzing the results of studies [2, 19, 17], one can conclude that the effectiveness of innovation development is achieved provided that the prediction depth forecasting and planning increasing for each option are mandatory.

This led to the choice as an analytical tool for this study of trend models and regression analysis. Trend models of selected growth parameters show the dynamics of their growth, and models of regression analysis - the level of their influence on macroeconomic parameters.

The statistical analysis of the dynamics of innovative entrepreneurship indicators in Ukraine and their structure is made possible to distinguish the main directions of innovation activity in Ukraine. The results obtained on the basis of econometric analysis of the dynamics of these indicators reflected growth trends. An adequate level of statistical probability of the obtained trend equations for individual indicators allows us to recommend them for practical application of determining the directions of development of enterprises innovation activity.

Thus, the described analytical tools are the basis of the method of entrepreneurship innovation development strategic monitoring, which involves the implementation of the following stages: the choice of innovation activity indicators to determine their level of influence on macroeconomic indicators; selection of trend models and determination of innovation activity predictive data.

8 Conclusions

As a result of the study, a number of factors hindering the implementation of innovation policy in industrial enterprises were identified, among them the main ones are: lack of state support, outdated material and technical base, lack of financial resources, lack of information provision and lack of incentives for innovation. The indicators of innovation activity having the highest growth dynamics were determined and models of the trend of these indicators were constructed for prediction of the direction of change.

The proposed analytical tools for making strategic decisions based on statistical and econometric analysis allows us to determine the main trends.

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