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DETERMINANTS OF INCREASING THE INNOVATION CAPACITY OF UKRAINE

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Abstract. Modelling the development of innovative power is an integral tool for finding ways to ensure the country's competitiveness and post-war recovery to accelerate European integration processes using its technological uniqueness. The innovative vector of economic development is a priority mechanism for the formation of competitive positions at all levels of the world economic system. The main *purpose* of this paper is to use modelling to identify the key determinants of the development and increase of Ukraine's innovative power, which should be crucial for the post-war recovery of the domestic economy. *Methodology*. The econometric model describes the efficiency of the use of Ukraine's innovative capacity and highlights its weaknesses. It is necessary to pay special attention to them in the period of post-war reconstruction. Both a correlation matrix of these factors and a regression model of their interdependencies were developed based on the assessment of a number of determinants affecting the formation and growth of innovative power. *Results*. The econometric modelling made it possible to obtain statistically significant two-factor linear models in which the share of R&D costs and the number of innovative products implemented were the independent variables. The commercialisation of R&D, in particular patenting, which reflects the effectiveness of scientific activity, appears to be very important. Business shows the highest rates of technology implementation. It creates a platform for further stimulation and development of relevant innovations. *Practical implications.* In the context of European integration processes, it is important to highlight those factors that would become advantages for strengthening the innovative power of Ukraine and to use them as a priority in the formation of the state policy of post-war reconstruction. The intensity of research and development and the introduction of advanced innovations, the innovative activity of the society and its functionality depend on the effective innovation policy of the state, the current state of the economy, the availability of a systematised base of institutes and institutions ensuring scientific and technical activity, modernised infrastructure, specialised information and consulting centres, etc. *Value/originality.* It has been proved that the priority of the innovative component of the domestic state policy is an undeniable condition for the effectiveness of the development of the economic system at the present stage of turbulence in the conditions of the Russian-Ukrainian war. At the same time, the obvious advantages of innovativeness are cancelled out by the presence of high costs for the development of innovations, a decrease in the activity of commercialisation of inventions, and the imperfection of the intersectoral distribution of funds for research and development.

Key words: innovation capacity, competitiveness, costs, commercialisation, technology, development.

JEL Classification: C19, F02, O33

1. Introduction

The intensification of competition at all levels of the world economic system, the emergence of an increasing number of market players, the formation of qualitatively new market segments, require each state to choose an innovative vector of economic development, moving towards the knowledge economy, effectively using it for its development and strengthening its innovative power. The importance of modelling the development of Ukraine's innovative

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capacity is due to the need to find and choose ways to ensure such development, which would allow not only to strengthen its competitiveness, which is based on advancing to higher technological systems, changing the structure and basic characteristics of the functioning of socio-economic systems, but also to distinguish Ukraine among other European regions for its technological uniqueness.

Despite the obvious advantages of the introduction of innovations in some areas, Ukraine suffers certain losses due to the incorrect distribution of funds between sectors, uncertainty of priorities for the implementation of domestic research developments, their lack of popularity in the business community, a decrease in the activity of commercialisation of inventions, etc. One of the methods of partial compensation of such losses is qualitative modelling of innovation activity, which is the key to the formation of an effective innovation policy of the state. The basis of this modelling is the development of a system of private forecasts of the main directions of innovative development. It will help to determine the factors that should become decisive for the growth of Ukraine's innovative power.

In order to study on a scientific level the effectiveness of using the innovative potential of Ukraine, it's necessary to obtain additional information about the object of research with the help of economic and mathematical models reflecting the objective reality. As a rule, the goal of any research is to determine the parameters of the studied socio-economic object that meet certain requirements and criteria. In the process of research, it is necessary to change the value of the object's parameters and thus change the value of the indicator that meets the criteria. The research process ends when a set of values of the object's parameters is found, satisfying the given criteria with the given accuracy and reliability.

2. Econometric Modelling of the Efficiency of Ukraine's Innovation Capacity

The process of building an econometric model involves the following steps: determining the empirical form of the model and selecting the influencing factors; checking the set of independent variables for multicollinearity; providing their availability, transforming the relevant variables or removing them from the list and replacing them with others; identifying the appropriate algorithm for analysing the model parameters; examining the obtained model (to determine the density of the connection, the adequacy of the model, to analyse the residuals); in accordance with the result obtained during the execution of the item, estimating the parameters of the model using other methods; making forecasts, economic and mathematical analysis of the model.

A set of determinants to ensure stable growth of industrial production and sales of high-quality competitive products, creation of new import-substituting and export-oriented, knowledge-intensive and high-tech products, which will help to increase employment, social protection, budget revenues, and more: an increase in the specific weight of enterprises and organisations using an innovative product in all types of economic activity; annual growth in the volume of innovative products sold as a proportion of the total volume of products sold; a significant reduction in the time between scientific developments and their introduction into production; an annual increase in the ratio of the number of licences sold for intellectual property objects to the number of licences purchased; an increase in the production and use of innovative products in organisations and enterprises in the region, particularly by type of economic activity; technology transfer (Eurostat, 2021).

In order to obtain an econometric model describing the efficiency of the use of Ukraine's innovative capacity, the following algorithm was used: Step 1 – establishing a cause-effect relationship between the identified and studied economic indicators – dependent variables; Step 2 – selecting significant independent factors and their characteristics and conducting correlation analysis to check the correlation dependence between variables; Step 3 – finding the parameters of the communication function; Step 4 – finding, if possible, the regular relations between the indicator Y and all the considered factors and parameters and creating a mathematical description (model) of the economic phenomenon or process; Step 5 – assessing the reliability of the obtained results and their analysis; studying the found model and finding the density of the connection; adequacy of the model according to the result; estimating the model parameters using other methods; Step 6 – making a forecast using the model and its economic and mathematical analysis.

The main task of mathematical modelling is to determine how accurately the constructed mathematical model reflects the relationship between the determinants considered, the parameters and the indicator that evaluates the properties of the real object.

The next step was a correlation analysis. A distinction is made between paired and partial correlations. Paired characteristics are calculated on the basis of the results of the measurements of only the pair of characteristics under consideration. Therefore, they do not take into account the indirect or joint effect of other characteristics. Partial characteristics are purified from the influence of other factors, but for their calculation it is necessary to have initial information not only about the investigated characteristics, but also about all the others whose influence needs to

Table 1
Modelling data on the development of Ukraine's innovation capacity

	Expenditures on research and development, state budget, (USD), Y_1	R&D expenditure, private sector, (USD), Y_2	Number of organisations engaged in R&D, X_1	Share of sales costs, GDP, X_2	Number of innovatively active companies, X_3	Patents for inventions, thsd., X_4	Volume of innovative products (goods and services) sold, USD, X_5	Dynamics of the number of technologies acquired by industrial enterprises (technology transfer), X_6
2010	414416436,7	751593224,7	1610	0,70	1541	29,4	2716311166, 92	694
2011	462178168,1	758725313,4	1506	0,72	1578	28,6	2939598997,59	724
2012	590112155,4	777264956,2	1303	0,75	1462	30,4	2823904881,10	739
2013	538854067,6	771910137,7	1255	0,65	1679	30,7	3112265331,76	651
2014	247833819,8	369066011,4	1208	0,67	1758	29,7	1634968152,92	543
2015	172712131,2	310393196,7	1143	0,70	1715	26,1	944672131,18	1131
2016	135067737,2	271629131,8	999	0,60	1609	31	1090801526,74	1034
2017	172365781,9	282709292,2	978	0,55	824	29,7	1227927272,76	1209
2018	215031642,9	350277000	972	0,48	834	29,3	1397178571,44	1109
2019	278643713,1	296862869,2	963	0,45	759	30,6	2049071729,97	1198
2020	253479820,2	318956834,5	950	0,47	777	30,3	2140611510,79	1265
2021	272092185,2	342905660,4	950	0,50	782	31,2	2151486988,87	1145

Source: compared by the authors

be eliminated. For quantitative characteristics, the Pearson correlation coefficient is most often used, which is calculated by the formula:

$$r = \frac{\frac{1}{n}\sum_{k=1}^{n}(x_k - \bar{x})(y_k - \bar{y})}{\sqrt{\frac{1}{n}\sum_{j=1}^{n}(x_j - \bar{x})^2} \cdot \sqrt{\frac{1}{n}\sum_{m=1}^{n}(y_m - \bar{y})^2}} \quad (1)$$

In formula (1), x_i, y_i – are the values of n variables X and, respectively, while $\bar{x}$, $\bar{y}$ are their arithmetic means. The Pearson correlation coefficient can be used to test the hypothesis of the significance of the relationship. The t-statistic is calculated for the sample correlation coefficient r, which has a Student's distribution with n-2 degrees of freedom and is calculated by the formula:

$$t = r \cdot \frac{\sqrt{n-2}}{\sqrt{1-r^2}} \quad (2)$$

There is a test to determine the significance of the correlation coefficient (how confidently it can be stated that it is different from zero). The null hypothesis H_0 is tested that the true value of the correlation coefficient is zero: $r = 0$. An alternative hypothesis H_1 is the hypothesis that $r \neq 0$. By comparing the value of the t-statistic calculated from the sample using formula (2) with the critical points determined from the Student's distribution tables, the null hypothesis can be accepted or rejected. For a two-sided critical region of a given significance level a, the critical point t_{kp} is found from the table as $t_{kp} = t_a/2,m$ for the number of degrees of freedom $m = n - 2$. If $|t| \leq t_{kp}$, the hypothesis H_0 is accepted, if $|t| > t_{kp}$ – the hypothesis H_0 is rejected.

The level of significance $a = 1 - p$ is the probability of committing a type 1 error, that is, of rejecting the null hypothesis when it is correct. In this case, it is the probability that the correlation will be considered non-zero when it is equal to zero.

Software using the R programming language was used to build regression models. Statistical data were processed using the statistical package R version 3.6.3 (The R Project, 2021). A convenient visual representation of the numerical values of the correlation coefficients is provided by the correlation diagram for the variables: x_{01} – number of organisations involved in R&D; x_{03} – expenditure on R&D, state budget (USD); x_{05} – expenditure on R&D, private sector (USD); x_{06} – share of implementation costs in GDP; x_{07} – number of innovatively active enterprises; x_{08} – patents for inventions (in thousands); x_{10} – volume of innovative products (goods, services) sold, USD; x_{11} – number of technologies purchased by industrial enterprises (transfer of technologies). The results are presented in Figure 1.

As a result of the analysis, the following indicators (dependent variables) were selected: Y_1 – R&D expenditures, state budget (USD) and Y_2 – R&D expenditures, private sector (USD). Also, the next factors (independent variables) were selected: X_1 – number of research and development organisations; X_2 – share of R&D expenditure in GDP; X_3 – number of innovatively active enterprises; X_4 – patents for inventions (in thousands); X_5 – volume of innovative products (goods, services) sold, USD; X_6 – dynamics of the number of technologies acquired by industrial enterprises (technology transfer). The significance results are presented in Table 2.

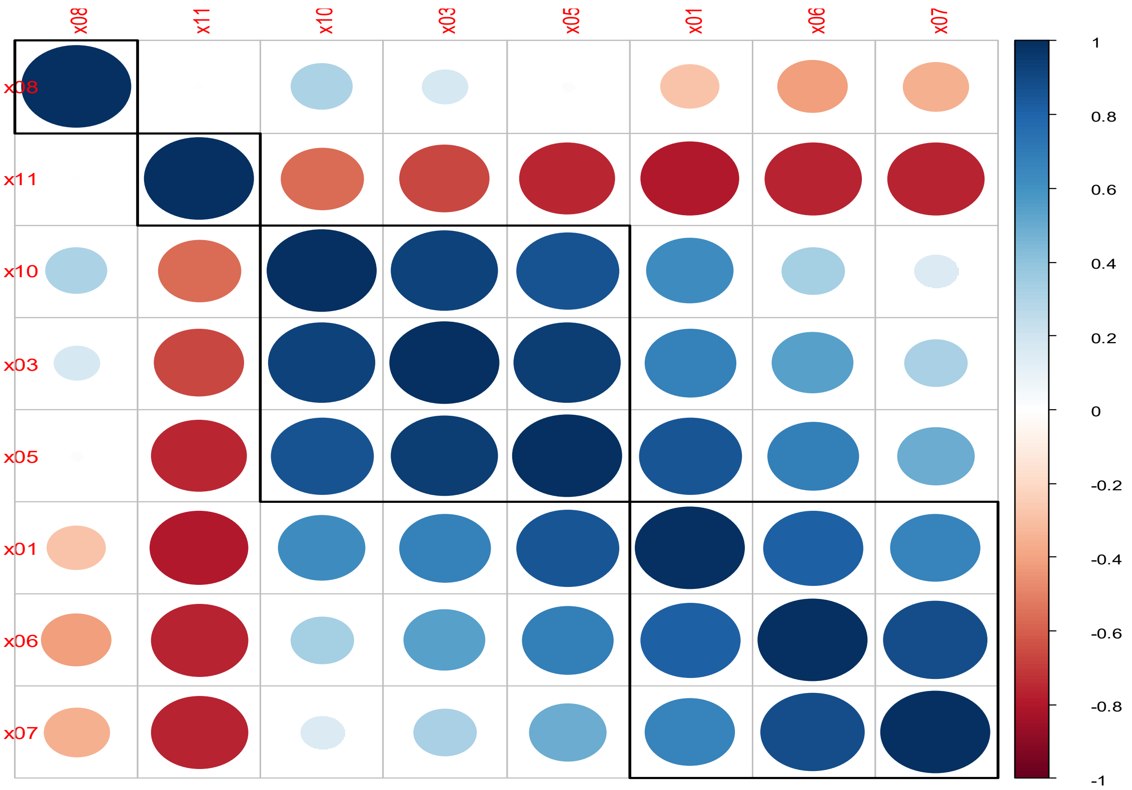

Figure 1. Presentation of numerical values of correlation coefficients

Source: compiled by the authors

Table 2
Matrix of correlation coefficients

		Y1	*Y2*	*X1*	*X2*	*X3*	*X4*	*X5*	*X6*
		X_{03}	X_{05}	X_{01}	X_{06}	X_{07}	X_{08}	X_{10}	X_{11}
X_{03}	Pearson correlation Stat. error t-value p-value hypothesis	1							
X_{05}	Pearson correlation Stat. error t-value p-value hypothesis	0.94 0.11 8.80 <0.001 alternative	1						
X_{01}	Pearson correlation Stat. error t-value p-value hypothesis	0.68 0.23 2.92 0.015 alternative	0.86 0.16 5.24 <0.001 alternative	1					
X_{06}	Pearson correlation Stat. error t-value p-value hypothesis	0.54 0.27 2.04 0.069 basic	0.69 0.23 3.01 0.013 alternative	0.82 0.18 4.50 0.001 alternative	1				
X_{07}	Pearson correlation Stat. error t-value p-value hypothesis	0.33 0.30 1.10 0.296 basic	0.49 0.27 1.80 0.103 basic	0.67 0.24 2.84 0.018 alternative	0.88 0.15 5.86 <0.001 alternative	1			

(End of Table 2)

		$Y1$	$Y2$	$X1$	$X2$	$X3$	$X4$	$X5$	$X6$
		X_{03}	X_{05}	X_{01}	X_{06}	X_{07}	X_{08}	X_{10}	X_{11}
X_{08}	Pearson correlation Stat. error t-value p-value hypothesis	0.18 0.31 0.57 0.579 basic	0.01 0.32 0.04 0.968 basic	-0.29 0.30 0.96 0.36 basic	-0.41 0.29 -1.44 0.18 basic	-0.36 0.30 -1.22 0.25 basic	1		
X_{10}	Pearson correlation Stat. error t-value p-value hypothesis	0.93 0.12 7.92 <0.001 alternative	0.87 0.16 5.56 <0.001 alternative	0.63 0.25 2.55 0.029 alternative	0.33 0.30 1.11 0.294 basic	0.16 0.31 0.51 0.62 basic	0.31 0.30 1.05 0.319 basic	1	
X_{11}	Pearson correlation Stat. error t-value p-value hypothesis	-0.66 0.24 -2.79 0.019 alternative	-0.75 0.21 -3.63 0.0046 alternative	-0.79 0.19 -4.14 0.002 alternative	-0.77 0.20 -3.78 0.004 alternative	-0.77 0.20 -3.81 0.003 alternative	-0.01 0.32 -0.02 0.985 basic	-0.56 0.26 -2.16 0.056 alternative	1

Source: compiled by the authors

The regression model for the indicator "research and development expenditures, state budget" is obtained:

$$Y_1 = 1{,}9\cdot10^8 - 2{,}9\cdot10^5 * X_1 + 9{,}1\cdot10^8 * X_2 - 9{,}6\cdot10^4 * X_3 - 8{,}4\cdot10^6 * X_4 + 0{,}19 * X_5 - 1{,}0\cdot10^5 * X_6 \quad (3)$$

Assessing the value of the coefficient of determination R^2 = 0,958, it can be concluded that in the regression model, the coefficient X_5 (p=0.00277) is "significant", and X_2 (p=0.054) is "almost significant". The results of the assessments are presented in the Table 3.

Table 3
Results of the quantile regression parameter for the dependent variable Y_1

Correlation	Value of assessment	Statistic error	t-value	p-value
Variables	$1{,}9\times10^8$	$7{,}1\times10^8$	0,268	0,79938
X_1	$-2{,}9\times10^5$	$1{,}7\times10^5$	-1,742	0,14198
X_2	$9{,}1\times10^8$	$3{,}6\times10^8$	2,506	0,05409
X_3	$-9{,}6\times10^4$	$8{,}6\times10^4$	-1,106	0,31894
X_4	$-8{,}4\times10^6$	$1{,}6\times10^7$	-0,515	0,62857
X_5	$1{,}9\times10^{-1}$	$3{,}5\times10^{-2}$	5,475	0,00277
X_6	$-1{,}0\times10^5$	$1{,}4\times10^5$	-0,772	0,47496

Source: compiled by the authors

For the most significant variables X_2 and X_5 in the six-factor model, a two-factor model was constructed, which can be represented by the equation:

$$Y_1 = -2{,}5\cdot10^8 + 3{,}65\cdot10^8 * X_2 + 0{,}17 * X_5 \quad (4)$$

In the model represented by equation (4), both independent variables are statistically significant, since for X_2 p-value is 0.02436, for X_5 p-value is 0.00001. The coefficient of determination (R^2) of the two-factor model decreased slightly compared to the previous version and is 0.924. More detailed characteristics of the model are given in Table 4.

Table 4
Results of two-factor regression parameters for the dependent variable Y_1

Correlation	Value of assessment	Statistic error	t-value	p-value
Variables	$-2{,}5\cdot10^8$	$7{,}9\cdot10^7$	-3,099	0,01274
X_2	$3{,}65\cdot10^8$	$1{,}4\cdot10^8$	2,701	0,02436
X_5	$1{,}7\cdot10^{-1}$	$1{,}9\cdot10^{-2}$	8,647	0,00001

Source: compiled by the authors

The regression model for the indicator "research and development expenditures, private sector" is obtained:

$$Y_2 = -5{,}0\cdot10^8 - 1{,}8\cdot10^5 * X_1 + 8{,}3\cdot10^8 * X_2 - 5{,}6\cdot10^4 * X_3 - 6{,}8\cdot10^4 * X_4 + 0{,}18 * X_5 - 2{,}7\cdot10^4 * X_6 \quad (5)$$

Assessing the value of the coefficient of determination R^2=0,945, it can be concluded that in the regression model, significance is observed only for the coefficient X_5 (p=0.0268). The results of the assessments are presented in Table 5.

Table 5
Results of the quantile regression parameter for the dependent variable Y_2

Correlation	Value of assessment	Statistic error	t-value	p-value
Variables	$-5{,}0\times10^8$	$1{,}2\times10^9$	-0,421	0,6910
X_1	$1{,}8\times10^5$	$2{,}8\times10^5$	0,632	0,5550
X_2	$8{,}3\times10^8$	$6{,}1\times10^8$	1,350	0,2348
X_3	$-5{,}6\times10^4$	$1{,}5\times10^5$	-0,386	0,7154
X_4	$-6{,}8\times10^4$	$2{,}8\times10^7$	-0,002	0,9981
X_5	$1{,}8\times10^{-1}$	$5{,}8\times10^{-2}$	3,101	0,0268
X_6	$-2{,}7\times10^4$	$2{,}3\times10^5$	-0,120	0,9089

Source: compiled by the authors

According to the results of building a six-factor model for the dependent variable Y_2, only one independent variable X_5 was significant. Despite this, an attempt was made to build a two-factor model with independent variables X_2 and X_5. As a result, the following equation was obtained:

$$Y_2 = -5,1 \cdot 10^8 + 9,19 \cdot 10^8 * X_2 + 0,21 * X_5 \quad (6)$$

Both independent variables X_2 and X_5 in this model are significant, as the p-value in both cases is less than 0.001. The coefficient of determination (R^2) of this model decreased by less than one percent and is 0.936. Other characteristics of the model are given in Table 6.

Table 6
Results of two-factor regression parameters for the dependent variable Y_2

Correlation	Value of assessment	Statistic error	t-value	p-value
Variables	$-5,1 \cdot 10^8$	$1,1 \cdot 10^8$	-4,815	0,00095
X_2	$9,19 \cdot 10^8$	$1,8 \cdot 10^8$	5,063	0,00068
X_5	$2,1 \cdot 10^{-1}$	$2,6 \cdot 10^{-2}$	8,085	0,00002

Source: compiled by the authors

The correlation analysis showed that the density of the relationship between the dependent variable Y_1 (R&D expenditures, state budget) and Y_2 (business sector R&D expenditures) is the highest with the independent variables X_5, X_1, X_2. The pairwise correlation with the variable X_6 is also strong, although inverse in nature. Econometric modelling resulted in statistically significant two-factor linear models with X_2 and X_5 as independent variables. In the context of European integration processes, it is important to highlight those factors that would become advantages for strengthening Ukraine's innovative power. The commercialisation of research and development, in particular patenting, which reflects the effectiveness of scientific activity, is of great importance. Business has the highest rates of technology implementation, which creates a platform for further stimulation and development of relevant innovations. The number of technologies purchased by industrial enterprises determines the dynamics of development in this sphere, which also strengthens the position on international markets and creates a perspective for further cooperation between the industrial and scientific sectors. Unfortunately, for both the public and private sectors, the low level of realised products in relation to costs is a negative factor that can become an obstacle to the formation of international competitiveness at the European level. Similarly, the public sector's R&D expenditure as a percentage of GDP shows little dynamism, while European countries maintain these indicators at a level of 2.3-3.5%.

3. Practical Recommendations Based on the Results of Econometric Modelling

To improve Ukraine's innovation capacity, it is important to take the following measures:
– increasing the share of research and development expenditures in GDP;
– promoting and encouraging the private sector to use and implement domestic scientific developments;
– transforming public procurement into a mechanism for supporting innovation and creating demand for it;
– unification of standards for high-tech products and industry-specific regulations in the relevant areas;
– expanding motivational tools for commercialisation of research and development carried out at the expense of the state budget and creating conditions for successful interaction between science, the private sector and industry;
– ensuring the development of high-tech priority industries, taking into account the specifics of value creation along the entire innovation chain (Heyman, Norbäck, Persson, 2021);
– ensuring effective institutional and financial support for the innovation activities of all business entities at any level;
– promotion of domestic technologies by organising joint events between the business and scientific sectors;
– strengthening of investment attractiveness, which allows determining the maximum level of investment, as well as the parameters of investment efficiency in various industries and areas of activity based on business planning (Szopik-Depczyńska & etc., 2020);
– guaranteeing an appropriate level of remuneration for highly qualified personnel for the performance of work and providing them with appropriate equipment for research and development;
– improvement of the innovation monitoring and information system in order to provide relevant information to the relevant entities for making effective management decisions.

Undoubtedly, the system of formation of state budget expenditures for the development of the innovative sphere in Ukraine needs significant transformation. As mentioned above, the amount of financial resources allocated to the development of innovative industries in Ukraine today is insufficient both in absolute and relative terms in comparison with the EU member states. It should be noted that the financing mechanism itself deserves special attention, which will be based on the results of a technical-technological and methodological audit of priority topics with a strategic orientation. From this point of view, the question of establishing a scientific advisory centre as a state institution, which would be authorised to carry out relevant examinations of grants, scientific works and projects, as well as to check scientific research and educational institutions according to their scientific topics, seems important. This method involves a selective approach to the distribution of state funds and the selection of necessary and competitive research and development in the general system of scientific research.

The issue of programme-initiative support of various innovation spheres, in which individual scientific directions are financed, remains relevant, for example: the National Nanotechnology Initiative, the Biotechnology Initiative of the USA and Ukraine Foundation, Euratom, the pan-European network of business incubators, and so forth (Kučera, Fiľa, 2022). Within the framework of the listed programmes, the following deserve special attention: raising the technical and technological level of national scientific equipment, re-equipment of specialised centres for collective use of equipment, ensuring publication activity in the relevant fields, consulting support.

Thus, on the basis of the simulation, it can be concluded that in Ukraine the share of private sector financing of innovative activity is higher in absolute terms than that of the state, although the specification of the respective injections is observed, since domestic business invests selectively in research and development, while the state provides for technology transfer, patenting and general development of scientific and innovative organisations. Equally important is the fact that the dynamics of business investment is negative because, on the one hand, interest in domestic research and development is being lost and companies are starting to buy foreign research and development and, on the other hand, as already mentioned, there is specialisation, i.e. companies do not cover all scientific fields. The private sector ensures a higher number of patents, the volume of implemented innovative products (goods, services) and the number of technologies purchased by industrial enterprises. The anti-crisis complex of economic development, which should be implemented in Ukraine in the coming years, requires the formation of a balanced innovation strategy. It is necessary to understand that the intensity of research and development and the introduction of advanced innovations, the innovative activity of the society and its functionality depend on the effective innovation policy of the state, the current state of the economy, the presence of a systematized base of institutes and institutions ensuring scientific and technical activity, modernized infrastructure, specialized information and consulting centers, etc.

4. Conclusions

At present, the commercialisation of research and development, especially patenting, is very important as it reflects the effectiveness of scientific activity. This sector has the highest rates of technology implementation, which creates a platform for further stimulation and development of relevant innovations. The number of technologies purchased by industrial enterprises determines the dynamics of development of this sphere, which also strengthens the position on international markets and creates a perspective for further cooperation between the industrial and scientific sectors. Unfortunately, for both the public and private sectors, the low level of realised products in relation to costs is a negative factor that can become an obstacle to the formation of international competitiveness at the European level. Similarly, the public sector's R&D expenditure as a percentage of GDP shows little dynamism, while European countries maintain these indicators at a level of 2.3-3.5%.

Despite the high potential of innovative activity, there is a considerable list of problems that prevent the full integration of Ukraine into the European innovation space. It is the innovative force that determines not only the current international competitiveness of high-tech products, highly qualified personnel, the effectiveness of the national innovation system and infrastructure, but also reveals and predicts the future, taking into account the challenges facing society. The responsiveness of state mechanisms and the private sector to the relevant time requirements characterises the readiness of the state for transformation and its integration into the international innovation system. Innovative power is not only based on existing developments, but also creates advantages for a breakthrough in priority strategic industries, which will be able to maintain the state's competitiveness at an appropriate level.

Having a significant natural and acquired potential for the development of innovations, today in Ukraine there is a limited positive success of innovative activity, which is concentrated mainly in the field of IT technologies. Given the fact that one of the most important programmes for the EU today is the European Green Course, the main priority for Ukraine should be the development of green technologies, of which there are already successful examples, but this process needs significant scaling up. Before the large-scale invasion by Russia, the main obstacle to the ability of businesses to innovate and compete in international markets was the institutional imperfection of the Ukrainian state. Today, the key factors that will influence the development of the high-tech sphere in Ukraine in the short and medium term are the destructive impact of the ongoing military conflict (both from the point of view of the destruction of physical capital and the potential non-return of human capital that left the country as a result of the war) and the attainment of candidate status for EU membership, which opens up full access to the European research and development sphere and significant EU funding for scientific projects.

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