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EUROPEAN INTEGRATION DEVELOPMENT PLATFORM OF INNOVATIVE ENTREPRENEURSHIP OF UKRAINE

ABSTRACT

The fundamental processes of innovation of the global economic system and the dynamic development of industry 4.0 put forward among the strategic priorities of economic development of Ukraine the development of domestic innovative entrepreneurship as one of the main tools for the inclusion of Ukrainian companies in the global value chains. Systemic development of innovative entrepreneurship implies both maximum mobilization of the national scientific and technical resource and its deep integration into European innovation networks. Study of the system of factors related to the development of innovative entrepreneurship on the GDP of Ukraine, and justification of the key directions of its development based on the implementation of tools and mechanisms provided by the Association Agreement between Ukraine and the European Union. An integrated methodological approach based on the use of general scientific and special methods of scientific research, primarily economic and mathematical modelling and extrapolation, as well as statistical and graphical methods in the processing and synthesis of statistical data and their reflection. The conducted econometric analysis showed that the most significant impact on GDP is exerted by such factors of development of innovative entrepreneurship as total expenditures in the areas of innovation, research and development, purchase of machines and equipment and software, introduction of innovative products, investment in fixed capital. Full-scale implementation of the tools for the development of innovative entrepreneurship, laid down in the Association Agreement between Ukraine and the European Union, will ensure the dynamic spread in the Ukrainian economy of new forms of research and development (R & d), large-scale implementation of their results in economic practice, as well as the intensification of international technological transfer of domestic economic entities.

Keywords: innovative entrepreneurship, Industry 4.0, EU – Ukraine Association Agreement, cross-border industrial parks, international technical assistance, equity crowd funding, European technology platforms, European innovation networks, Horizon 2020

JEL Classification: F02, F15, M13, M21, O14, O31, O32, O33

INTRODUCTION

Economic globalization, as the main trend of world economic development in the first quarter of the XXI century, acquires its multidimensional manifestation in the deepening of the processes of transnationalization of business activities, the dynamic development of industry 4.0, the strengthening of digital integration of production processes, their networking and fragmentation, as well as the active development of global value chains. It is the globalization processes that have significantly dynamized the internationalization of research and development, led to the systematic modernization of the technological and innovative basis of world production and the active involvement of not only the leading States of scientific, technological and innovative progress, but also developing countries. Confirmation of the stability and irreversibility of this trend is, in particular, the fact that now from 70% to 85% of GDP of developed countries form new knowledge embodied in goods, technologies, education and organization of production [1, p. 214]. Under such conditions, the main driving force of the system of innovation of the global economic system is innovative entrepreneurship as a special innovative activity of small

and medium-sized businesses, aimed at the creation and use for commercial purposes of scientific, technical and technological innovations, which is accompanied by the formation of new forms of labour organization and production management.

LITERATURE REVIEW AND PROBLEM STATEMENT

Pioneering the scientific research of the problem of innovative entrepreneurship include the work of G. Kassel, A. Klein-knecht, N. Kondratiev, S. Kuznets, E. Mansfield, D. Sakhal, G. Haberler, I. Schumpeter and many others. Their research is devoted to a comprehensive analysis of the objective prerequisites, driving forces and factors of economic development of countries and their mastery of innovative models of economic growth.

A significant contribution to the theory and practice of innovative entrepreneurship was made by representatives of the institutional direction of economic theory, which studies historically established customs, rules, norms and methods of economic behaviour of subjects in their connection with other spheres of social life. Its representatives are A. Alchian, J. M. Buchanan [2], G. Becker [3], O. Williamson [4], T. Eggertsson [5], J. Campbell [6], R. Coase [7], R. North [8], R. Posner [9], etc. In their research, we find a detailed development of innovative entrepreneurship through the prism of determining the set of institutions that ensure the activation of the process of formation of knowledge and technology.

Significant scientific weight and theoretical and practical significance for the study of innovative entrepreneurship are characterized by the research of K. Freeman [10, 11] and B.-A. Lundval [12]. These scientists not only laid the paradigmatic foundations of the modern theory of national innovation systems, but also came close to the Foundation of the theory of the network society and innovation economy. This laid a solid Foundation for comprehensive research into the development of global innovation entrepreneurship.

However, until now, the domestic and foreign scientific literature has not sufficiently disclosed the issues of enhancing the development of innovative entrepreneurship in Ukraine on the European integration platform using the tools and mechanisms laid down in the Association Agreement with the European Union.

RESULTS

Innovative entrepreneurship in the period of technological changes of the fourth industrial revolution is turning into one of the key tools of the country's macroeconomic growth dynamization. According to the world practice, its effective functioning provides up to 20% increase in labour productivity in certain industries and sectors of the economy, while reducing the investment cycle of the project by 15% and the total cycle of the project – by 10%. Thus, the analysis of financial activity of 399 business structures conducted by experts of PwC consulting company revealed significant differences in profitability indicators between the most and the least innovative companies. The total return on equity of the first shareholders was significantly higher than the industry average, with more than 75% of their turnover accounted for goods and services introduced into mass production over the past five years. In addition, 44.7% of innovation-active companies demonstrated a high level of influence of innovation on the expansion of the range of goods and services; a 35.5% – to improve the quality of products and services [13, p. 19, 28].

Such indicators are quite natural, because big business does not respond so quickly to the needs of the market in new technologies as small and medium. It does not want to take risks, especially given the fact that up to 70% of all innovations «die» already at the stage of development of a scientific idea; 80% of new products entering the market do not have commercial success and are removed from production; and 60% of innovative developments are never transformed into commercial products. Data from international surveys of 50 USA companies confirm that about half of their total research and development costs are accounted for by commercially unsuccessful innovations, and 30% of market-successful innovations after a short period of time cease to make a profit [14, p. 156]. Therefore, the production of a significant proportion of innovative developments are now concentrated in small and medium business, which is conducted either by independent development or the development of custom-made corporations' big business, engaging with them in various kinds of organizational forms of innovative partnerships. In general, in the leading countries of world economic development, small and medium-sized businesses produce up to 60% of GDP (in the UK – 50%, Germany – 50-53, France – 55-62, USA – 50-52%), while providing new jobs and the formation of an innovative economy [1, p. 214].

Analysing the current scale of development of innovative entrepreneurship in Ukraine, we present the following data (*Fig. 1*).

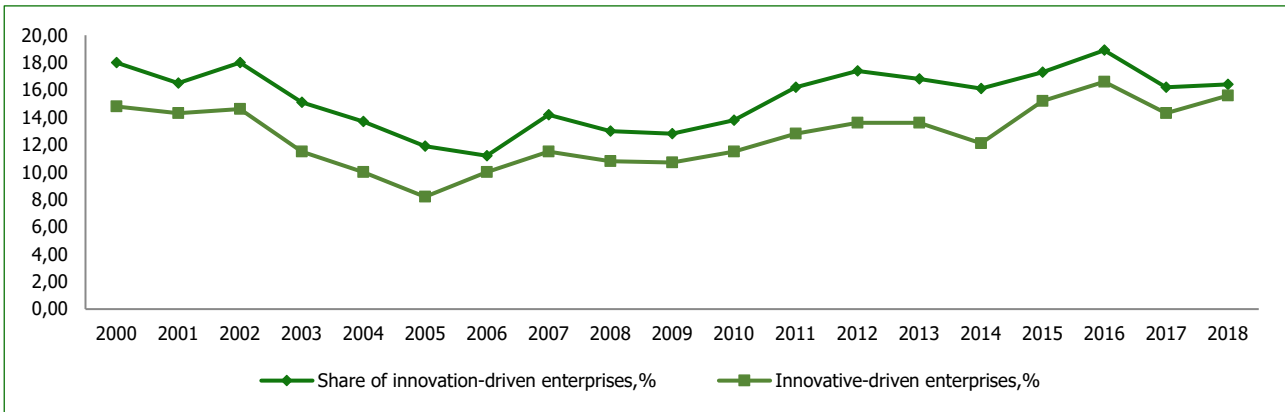


Fig. 1. Dynamics of development of innovative entrepreneurship of Ukraine. (Source: built on the basis of [15])

As shown in *Fig. 1* the share of enterprises engaged in and implemented innovations is quite low and ranges from 8-18%. It should be noted that the curve of enterprises for innovation during the study period lies under the curve of enterprises that were engaged in innovation. This suggests that some of the entrepreneurial opportunities are not used, that is, innovative developments are not commercialized, for a number of reasons, including financial ones. In particular, the sources of financing of innovative activities of industrial enterprises are focused on four main groups. As shown in *Fig. 2*, the main burden of financing innovation lies on own capabilities, namely in the study period, the share of own sources almost always exceeds 60%, and in 10 cases out of 18 and 80%. In fact, enterprises fully assume the burden of innovation implementation and financing, and only in some cases, foreign investors are more actively involved in their development (20-30%).

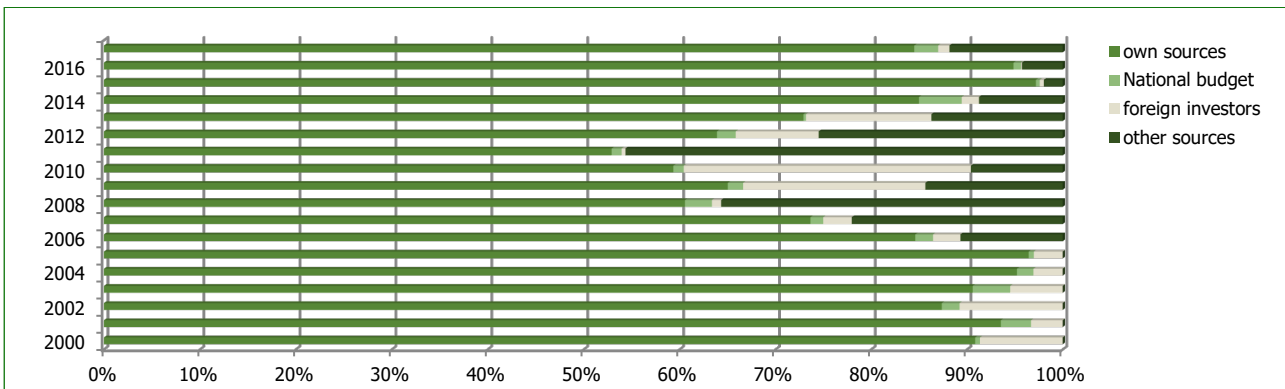


Fig. 2. Sources of financing of innovative activity of industrial enterprises. (Source: built on the basis of [15])

Among the key costs in the areas of innovation (*Fig. 3*), only two structural elements are essential, namely research and development and acquisition of machinery, equipment and software, which is why we use these indicators as factors in building relationships and their impact on the country's GDP in the context of the development of innovative entrepreneurship in Ukraine.

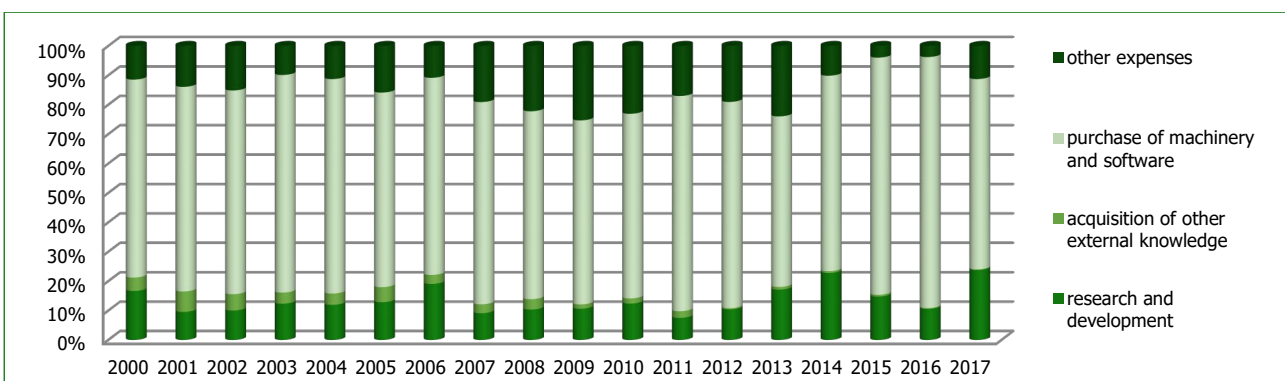


Fig. 3. The structure of expenses on directions innovative activity.

Therefore, in order to determine the key factors and the strength of their impact on the country's GDP, it is necessary to build a multivariate equation and determine the impact of each variable in the two-factor model.

The results of the use of the software product «data Analysis» Microsoft Excel based on the construction of regression are reflected in the equation and the basic model validation coefficients, characterized by the following values: $R^2 = 0.988725$, $R = 0.9936$, Fisher's calculated criterion = 77.43 (Table 1).

Table 1. Empirical data for the construction of economic and mathematical model of GDP dependence on certain factors. (Source: based on [15])

Year	GDP, million UAH	Share of enterprises engaged in innovation, %	Total amount of costs in the areas of innovation, mln	including research and development, million UAH	including research acquisition of machines of the equipment and the software,	The share of firms that have introduced innovations, %	New technological processes are introduced	Production of innovative types of production, names is mastered	Financing of innovative activity of industrial enterprises, million UAH	Investments in fixed capital, million UAH
	y	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9
2000	211 200	16.50	1 979.40	171.40	1 249.40	14.30	1 421	19 484	1 971.40	32 573
2001	234 100	18	3 018.30	270.10	1 865.60	14.60	1 142	22 847	3 013.80	37 178
2002	277 400	15.10	3 059.80	312.90	1 873.70	11.50	1 482	7 416	3 059.80	51 011
2003	357 500	13.70	4 534.60	445.30	2 717.50	10	1 727	3 978	4 534.60	75 714
2004	457 300	11.90	5 751.60	612.30	3 149.60	8.20	1 808	3 152	5 751.60	93 096
2005	565 000	11.20	6 160	992.90	3 489.20	10	1 145	2 408	6 160	125 254
2006	751 100	14.20	10 821	986.40	7 441.30	11.50	1 419	2 526	10 821	188 486
2007	990 800	13	11 994.20	1 243.60	7 664.80	10.80	1 647	2 446	11 994	233 081
2008	947 000	12.80	7 949.90	846.70	4 974.70	10.70	1 893	2 685	7 649.90	151 777
2009	1 120 600	13.80	8 045.50	996.40	5 051.70	11.50	2 043	2 408	8 045.50	180 576
2010	1 349 200	16.20	14 333.90	1 079.90	10 489.10	12.80	2 510	3 238	14 333.90	241 286
2011	1 459 100	17.40	11 480.60	1 196.30	8 051.80	13.60	2 188	3 403	11 480.60	273 256
2012	1 522 700	16.80	9 562.60	1 638.50	5 546.30	13.60	1 576	3 138	9 562.60	249 873
2013	1 586 900	16.10	7 695.90	1 754.60	5 115.30	12.10	1 743	3 661	7 695.90	219 420
2014	1 988 500	17.30	13 813.70	2 039.50	11 141.30	15.20	1 217	3 136	13 813.70	273 116
2015	2 383 200	18.90	23 229.50	2 457.80	19 829	16.60	3 489	4 139	23 229.50	326 164
2016	2 983 882	16.20	9 117.50	2 169.80	5 898.80	14.30	1 831	2 387	9 117.50	328 716.68
2017	3 558 706	16.40	12 180.10	3 208.80	8 291.30	15.60	2 002	3 843	11 569.80	347 100.29
2018	211 200	16.50	1 979.40	171.40	1 249.40	14.30	1 421	19 484	1 971.40	32 573

Accordingly, the equation of multifactor regression will have the form:

$$Y = -53\,777.49911X_1 + 258.9331953X_2 + 478.5182534X_3 + 234.5262983X_4 + 39\,203.90057X_5 + 261.4869802X_6 + 10.70377169X_7 - 553.0063867X_8 + 8.746322667X_9 - 16\,908.05024.$$

Commenting on the coefficients of the main variables, it should be noted that the greatest positive impact on GDP is the share of enterprises that have introduced innovations, while the share of enterprises engaged in innovations is characterized by the greatest negative indicator in the equation.

Financing of innovative activities of industrial enterprises is also characterized by a negative impact on GDP, which is associated with high costs of the enterprises themselves, which do not always pay off, and therefore their growth will reduce the expected growth of the economy.

Extending the analysis, we will evaluate the impact of certain factors on GDP in the two-factor model, respectively, the equations that most fully reflect the impact reflected in Fig. 4.

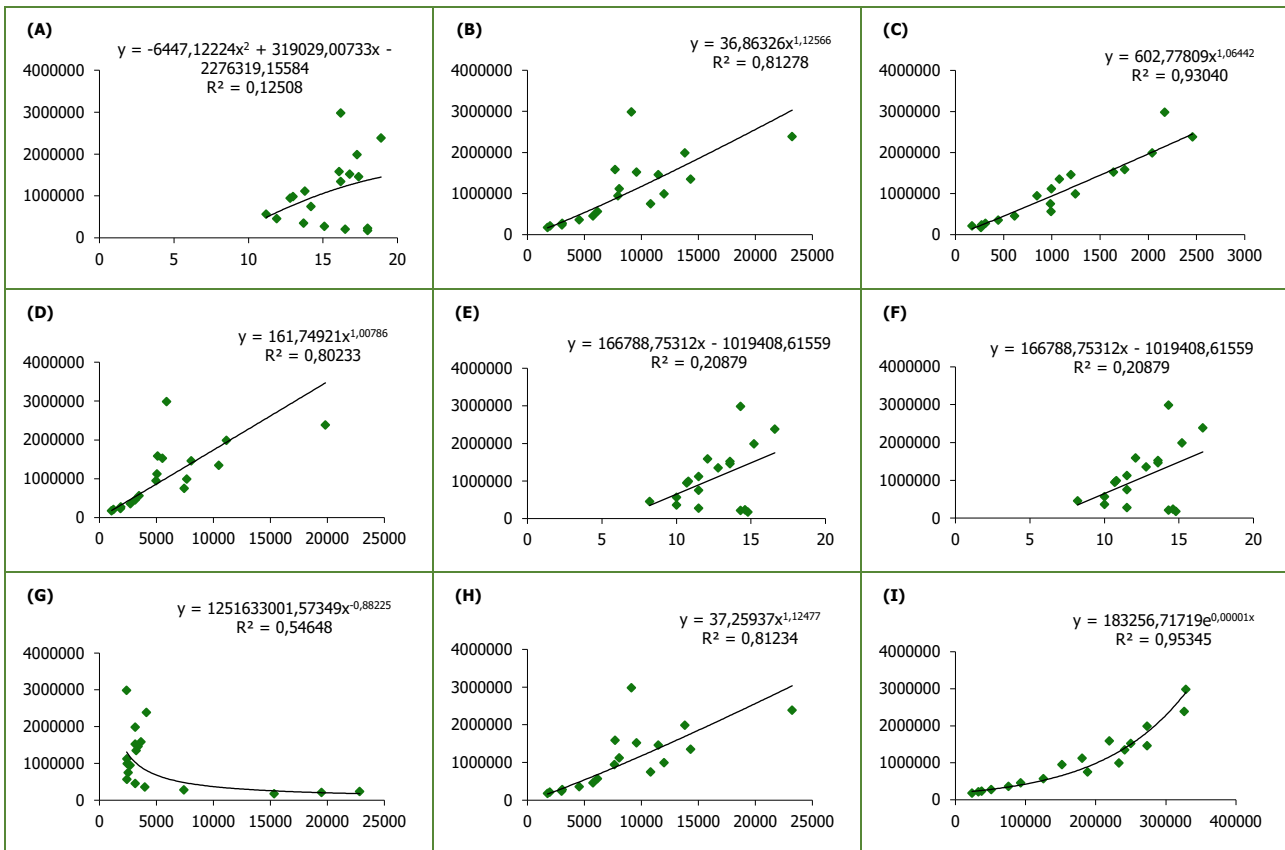


Figure 4. Trend lines. Note: (A) – the trend line of the impact of innovation enterprises (X_1) on GDP; (B) – The trend line of the impact of total expenditure on innovation activities (X_2) on GDP; (C) – The trend line of the impact of total R&D (X_3) on GDP; (D) – The trend line of the impact of the purchase of equipment and software (X_4) on GDP; (E) – The trend line of the impact of innovation (X_5) enterprises on GDP; (F) – The trend line of the impact of the introduction of new technological processes (X_6) on GDP; (G) – The trend line of impact of the introduction of production of innovative products (X_7) on GDP; (H) – The trend line of influence of financing of innovative activity of industrial enterprises (X_8) on GDP; (I) – The trend line of the impact of fixed capital investment (X_9) on GDP.

In the two-factor analysis, these indicators have a low coefficient R^2 , which confirms the absence of a direct impact on GDP, so we exclude these factors from the model and re-use the software product «data analysis». The corrected equation of the interdependence of GDP from the important factors would be:

$$Y = 596.6189964X_2 + 398.5570134X_3 + 273.7716395X_4 + 4.077645183X_7 - 901.7834975X_8 + 8.855718122X_9 + 73922.60816.$$

As a result, part important factors retained their positive coefficients, has changed it meaning a free member equation $R^2 = 0.9782$, $F_{\text{pos}} = 82.55$ ($F_{\text{табл}} = 3,01$), which confirms the adequacy of the model.

Consequently, innovative activity of enterprises significantly affects the country's GDP. The lack of solid financial state support requires them to find foreign partners and investors to realize the innovative potential, especially from the EU countries in the context of the implementation of the European integration course of Ukraine. That is, to increase the resource of innovative entrepreneurship in Ukraine, it is important to rely on the European integration platform, that is, those tools and mechanisms provided for in the Association Agreement between Ukraine and the EU, and are able to provide a «technological connection» of domestic business with the European. The start of scientific and technical cooperation of Ukraine with the EU was put immediately after the acquisition of sovereignty by our country, and today the national Academy of Sciences of Ukraine has more than a hundred bilateral agreements on scientific, technical and innovative cooperation with more than 50 countries, most of which are European. The most complete implementation by Ukraine of the integration mechanism for the development of innovative entrepreneurship is associated with the expansion of the participation of domestic innovative companies and research institutions in the projects of the EU framework program «Horizon 2020».

Priority activities in this area should state support for the integration of domestic innovative enterprises to European innovation networks. One such network is the enterprise Europe Network (EEN), established in 2007, which includes more

than 250 associations and about 600 specialized innovation support organizations in 60 countries. Combining in its ranks 4 thousand employees and 3 thousand experts [16, p. 4], this network has formed more than 600 institutional platforms to support scientific and technical cooperation of innovative entrepreneurs of European countries.

It should be noted that the diagnosis and ranking of the EU countries in terms of innovation development is carried out on the innovative scoreboard, which includes a set of indicators of scientific, technical and innovation activities, which are the basis for the calculation of the composite index of innovation. Unfortunately, the composite innovation index calculated for Ukraine has a value of 0.206 (for comparison, the average for the EU countries is 0.5) [17].

Given the unsuccessful in previous years' experience of integration of Ukrainian companies and research institutions in European innovation networks, the easiest way out of this situation is seen in the cooperation of domestic innovators with European networks in the status of recipients of innovation requests. They will enable Ukrainian innovators to find European partners for their commercialization without disclosing detailed details of their scientific and technical developments to the public.

The second direction of the implementation of the European integration platform for the activation of domestic innovative entrepreneurship is to stimulate the inclusion of domestic small and medium-sized companies in the information and communication sphere in the European technology platforms. It is well known that today in the European Union there are 40 technological platforms, United in six sectorial and one horizontal group [18, p. 37].

Therefore, the inclusion of domestic innovative small and medium-sized business in the European technology platform as a compulsory mechanism to provide for the complete legalization of the Ukrainian ICT sector. To this end, measures should be taken to transfer large companies from private to public corporate models and to limit the share of oligarchic capital in the ownership of the relevant property. The implementation of international standards of its products and services in our country on the basis of modernization of the domestic tax system (in particular in terms of recognition of the place of sale of information-intensive goods and services as the place of registration of the buyer, not the seller); the widespread introduction of mechanisms of joint-stock crowd funding, as well as primary or secondary public offering of shares of individual domestic ICT enterprises on European stock exchanges is also relevant today.

The third direction of the implementation of European integration mechanisms for the development of Ukrainian innovative entrepreneurship is the initiation by the top leadership of Ukraine of negotiations with the EU on the expansion of financing of international technical assistance to Ukraine in the field of industrial and innovative entrepreneurship. Thus, in 2018, with the support of the EU, Ukraine implemented about 90 technical and financial assistance projects totaling about a quarter of a billion euros, agreed with the priorities of the Government of Ukraine in the framework of the so-called «special events». The main priorities of the technical assistance projects of the European Union, in particular, the implementation of the Strategy of reforming the system of state management for the period 2016–2020 (totaling 104 million euros); the project of decentralization of the system of providing administrative services (97 million); support the implementation of the Association Agreement (29.8 million); and the fight against corruption and support the newly established national anti-corruption agencies (16.3 million) [19]. Therefore, today the issue of system monitoring of the domestic business sector is significantly updated in order to assess its actual and potential opportunities for participation in European cooperation programs in the field of innovation.

Significant economic effect is also laid in such areas of technical and financial assistance of the European Union to Ukraine as:

- implementation of the European system of public procurement of innovative products of domestic small and medium-sized companies;
- attraction of European grants for the development of innovative products by domestic small and medium-sized companies;
- implementation of projects financing of innovative developments of domestic innovative companies of small and medium business on the basis of attraction to co-financing of resources of the international donors, etc.

Transparency plays a very important role in this process, which greatly simplifies the process of finding partners for innovative cooperation and reduces time. Therefore, it actualizes the development of sustainable production relations between Ukrainian and European manufacturers of innovative products, including through the dissemination in the business community of the EU information about the production capabilities of Ukraine and prospects for cooperation with Ukrainian business networks. Formation of information retrieval systems and information databases on innovative products and technological developments developed by domestic innovators; creation of detailed sectoral catalogues of Ukrainian

innovative products; as well as comprehensive institutional and financial support for the participation of domestic companies in international specialized exhibitions is also relevant today. In turn, a detailed study of the methods and tools of organization and management of high-tech business structures of the EU countries by the domestic specialized institutions will form significant prerequisites for the implementation in the domestic economic practice of the best European experience in the field of innovative entrepreneurship.

Another area of implementation of the European integration platform for the development of innovative entrepreneurship in Ukraine is the activation of the process of signing interstate agreements with the EU countries on the creation of cross-border industrial parks. This requires, on the one hand, the introduction in our country of a special simplified customs regime for the movement across the state border of goods, equipment and components used in the economic, scientific, technical and innovative activities of the subjects of industrial parks. On the other hand, their investors should be exempted from share participation in the development of infrastructure of settlements in the case of construction of production facilities on the territory of parks. In addition, it is important today and the intensification of state support for industrial parks in the form of providing them with interest-free credit resources for the purpose; exemption from taxes on value added, profits and real estate, the introduction of tax incentives for social insurance, the introduction of a five-year restriction on the alienation of property.

World experience shows that cross-border industrial parks not only stimulate the social and economic development of the border areas of the countries, but also play an important institutional role in deepening interstate economic and innovative cooperation. The significant impact of cross-border industrial parks on the modernization of local infrastructure, the intensification of investment capital flows and the solution of employment problems should not be discounted. On this basis, the process of decentralization of public administration in Ukraine, in particular, in terms of granting preferences to the founders of industrial parks for the use of land, rental of production sites and the like, is now becoming a priority. This should take into account that the Association Agreement between Ukraine and the EU opens up the possibility of engaging on a project basis, of financial resources from international donor and credit institutions, which could become a powerful engine of development of infrastructure of industrial parks and the modernization are concentrated here the production and innovative capacity.

The full-scale implementation of the potential of innovative entrepreneurship development laid down in the Association Agreement assumes as a mandatory component such direction as bringing into line with the European practice of the current system of deregulation and support of small and medium-sized businesses in Ukraine. First of all, we are talking about the improvement and optimization of the current simplified tax system on the basis of a significant reduction in the types of economic activities to which it applies, including those related to passive income and super-profits.

Another disadvantage of the current simplified tax system in Ukraine is its active use by domestic business entities to minimize tax liabilities, illegal receipt of cash, their laundering and so on. The only way out of this situation is to reduce the established maximum amount of annual income of the enterprise, which gives grounds to apply a simplified tax system against it, from the current 20 million UAH (for companies of the third group) to the European level — 100 thousand dollars. US annual volume of its implementation [20]. The full implementation of the provisions of the Association Agreement regarding the adaptation of the national reporting system to European standards and the formation of a national register of companies operating on a simplified tax system is also relevant today. It will allow not only to unify their tax, customs and statistical reporting, but also to provide system informatization of financial and economic activity of small enterprises, bringing it out of the «shadow» and expanding the tax base of the Ukrainian economy.

In addition, programs and projects related to the introduction and use of alternative energy sources have a high level of innovation [21, p. 152]. The volume of investment in this segment in the EU is quite high, and countries where the share of renewable sources is more than 30% is constantly growing. Unfortunately, in Ukraine, this figure is 5% and this is another strategic direction for the development of innovative entrepreneurship in the context of the European integration course of our state.

Thus, the implementation of the above has not only purely economic, but also social goals and objectives, as it creates a solid economic basis for the formation of the middle class in Ukraine.

CONCLUSIONS

Thus, a powerful driver of the development of innovative entrepreneurship is its European integration platform. It is based on the instruments and mechanisms of the Association Agreement between Ukraine and the EU, providing for the activation of partnership between Ukrainian and European economic entities in the field of innovation and the participation of our

state in the development of the European innovation space. Modern innovative cooperation between Ukraine and the European Union is implemented based on bilateral agreements on innovative cooperation and supranational mechanisms of cooperation within the framework of existing framework programs. At the same time, the main competitive advantages of our state in terms of the activation of innovative entrepreneurship stemming from its participation in the thematic platforms of internal projects of the program «Horizon — 2020», state support for the integration of domestic innovative enterprises to European innovation networks, promotion of the inclusion of domestic small and medium-sized ICT companies in European technology platforms, activation of the process of signing with the EU countries of interstate agreements on the creation of cross-border industrial parks, bringing into line with European practice the current system of deregulation and support of small and medium-sized businesses in Ukraine.

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ЄВРОІНТЕГРАЦІЙНА ПЛАТФОРМА РОЗВИТКУ ІННОВАЦІЙНОГО ПІДПРИЄМНИЦТВА УКРАЇНИ

Фундаментальні процеси інноватизації глобальної економічної системи та динамічний розвиток Індустрії 4.0 висувають у число стратегічних пріоритетів економічного розвитку України розбудову вітчизняного інноваційного підприємництва як одного з головних інструментів включення українських компаній до глобальних вартісних ланцюгів. Системна розбудова інноваційного підприємництва України передбачає як максимальну мобілізацію національного науково-технічного ресурсу, так і його глибоку інтеграцію у європейські інноваційні мережі. Відповідно метою дослідження стало визначення системи факторів, пов'язаних із розвитком інноваційного підприємництва, на ВВП України, та обґрунтування ключових напрямів його розбудови на основі імплементації інструментів і механізмів, передбачених Угодою про асоціацію між Україною і Європейським Союзом. Використано комплексний методологічний підхід, що базується на застосуванні загальнонаукових і спеціальних методів наукового дослідження, насамперед економіко-математичного моделювання та екстраполяції, а також статистичного і графічного методів під час обробки та узагальнення статистичних даних та їх відображення. Проведений економетричний аналіз засвідчив, що найбільш суттєвий вплив на ВВП мають такі фактори розвитку інноваційного підприємництва як загальний обсяг витрат за напрямками інноваційної діяльності, дослідження і розробки, придбання машин, обладнання та програмного забезпечення, упровадження у виробництво інноваційних видів продукції, інвестиції в основний капітал.

Повномасштабна реалізація інструментів розвитку інноваційного підприємництва, закладених в Угоді про асоціацію між Україною і Європейським Союзом, забезпечить динамічне поширення в українській економіці новітніх форм організації досліджень і розробок (ДіР), масштабне впровадження їхніх результатів у господарську практику, а також активізацію міжнародного технологічного трансферу вітчизняних суб'єктів господарювання.

Ключові слова: інноваційне підприємництво, Індустрія 4.0, Угода про асоціацію між Україною і ЄС, транскордонні індустріальні парки, міжнародна технічна допомога, акціонерний краудфандинг, європейські технологічні платформи, європейські інноваційні мережі, Горизонт – 2020

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