

## FINANCIAL SUPPORT FOR THE DEVELOPMENT OF INNOVATION ACTIVITIES

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**Abstract:** *The ability to innovate determines the competitive level of enterprises in modern economic conditions. It essentially depends on the level of innovation activity, which is impossible without adequate financial support. The question of financial security is relevant if we consider the shortage of our own financial resources and the complexity of attracting investments.*

*The purpose of the work is to study the innovation activity of Ukrainian enterprises by sources of their financing and the development of practical recommendations for choosing the optimal model of influence on innovation efficiency of innovation support.*

*Results of the research - a rating assessment of the development of innovation activity in Ukraine was carried out and a correlation-regression analysis was conducted to assess the impact of innovation support on innovation efficiency.*

*The practical significance of the results obtained is the application of correlation-regression analysis, which makes it possible to assess the impact of innovation support on innovation efficiency and to implement the forecast of enterprise innovation development.*

**Keywords:** *innovation, financial support, rating assessment, innovation efficiency.*

### Introduction

Modern world trends show that structural transformations in entrepreneurial activity, especially in the field of innovative entrepreneurship, are the driving force behind economic development. These transformations increase the competitiveness of the country in the scientific and technological space. The primary challenges faced by enterprises are the expansion of the use of advanced technologies. This will facilitate the transition to an intensive economic development, mainly on an innovative basis. Modern business conditions in Ukraine require conditions that can guarantee economic security for enterprises and provide innovative development of the domestic economy.

Innovation activities play a significant role in the socio-economic development of the country and enterprises. However, implementation requires adequate financial support.

First of all, it is necessary to provide an integrated system of financial support for effective innovation. This includes the level of the individual enterprise and the state as a whole. This system should be based on the optimal combination of own and borrowed financial resources and control over their effective use. This will provide the necessary conditions for accumulation and maneuvering of financial resources and the possibility of their concentration on key areas of innovation policy.

Theoretical and methodological aspects of the financial support of innovation activity for many years are considered in the works of foreign and domestic authors, including M. Diba [2], I. Fedulov [4], T. Golovchenko [5], S. Ilyashenko [6], O. Kolodizek [8], N. Krasnokutskaya [10], M. Krupka [11] and others. At the same time, despite significant scientific progress, the problem of funding innovation and some other issues are not sufficiently highlighted and require additional research.

### **Results and discussion**

The success of innovation activity is largely determined by the forms of its organization and methods of financial support.

Developed countries have diverse opportunities to support and develop innovation as new scientific developments and technologies become the fundamental components of national security of states. The variety of innovative activities financing and the range of indirect support measures for innovation are extended. It should be noted that in the country insufficient attention is paid to the protection of intellectual property rights.

Attention is drawn to the approach adopted in many countries: the state should insure the risks of new innovative companies, but should not claim the income from their business. The state receives its income at the expense of taxes from innovative firms. The tax burden on innovative enterprises increases according to their income in Ukraine. This is negative because it complicates innovation activity.

Innovation is a key factor in socio-economic development in developed countries. According to recent research found that 50 to 95% of GDP obtained through innovation in these countries. Only 25% of the able-bodied population are engaged in innovative business. In Ukraine, the growth of GDP based on the introduction of innovation activity is at a level less than 1% [13, p. 21].

The financing of innovation activities determines the success or failure of innovative projects and programs. The ability of an enterprise to accumulate enough funds to implement innovative designs influences its commercial success. However, not every entrepreneurial structure has enough own funds for this, which leads to the search for other sources of income. Investments from different sources have a different price. The

organizational form of financing and the duration of the investment period affect the value. Choosing effective forms of funding for innovative programs and projects ensuring high economic returns [1,3,7].

The statistical analysis of Ukraine's domestic business activity for 2011-2017 points to the revival of innovation activity. However, the innovative activity of Ukrainian enterprises is rather low compared to the leading countries of the world. In Ukraine, the share of enterprises engaged in innovations is 17.1% of the total. The share of enterprises that introduced innovations - 14% of the total. For example, the share of innovative enterprises is 70-80% in Germany, France, the USA and Japan. This is characterized by insufficient level of perception of domestic technological innovations by the business. Consequently, ineffective use of innovative potential occurs. Another indicator confirming this conclusion is the share of the realized innovative products in the volume of industry, which did not exceed 3.8% during 2011-2015, however, which increased to 6.1% in 2017.

The experience of foreign countries shows that national products lose their competitiveness if the share of innovation products in GDP is less than 20%. The average European average is 25-35%. It reaches 40% in China [14, p. 163].

Despite this, the development of innovation activity in Ukraine in recent years has been observed (Table 1). In 2016, the share of enterprises engaged in innovation increased by 2.1% compared with 2013. The total amount of expenses has grown by almost 2.5 times (+13 667 million UAH) compared to 2013. However, there was a sharp decline in the share of enterprises engaged in innovation in 2017.

Own funds of enterprises remain the main source of financing of innovative expenses - UAH 7704.1 million (84.5% of total expenditures on innovations). Only 8 enterprises received funds from the state budget and 17 enterprises - from local budgets. Total amount of funds amounted to 322,9 million UAH (3,5%). 5 enterprises received funds from domestic investors, 3 enterprises - from foreign investors. The total volume amounted to 380,9 million UAH (4,2%). 21 enterprises used loans amounting to 594.5 million UAH (6.5%). Notably, the majority of businesses own funds accounted for venture capital investments. This figure was about 95% in 2017.

*Table 1*

### **Innovative activity of Ukrainian enterprises and sources**

**of its financing for 2013-2017**

| Year | Share of enterprises engaged in innovations, % | Total cost, mln. UAH | At the expense of funds |                  |                   |               |
|------|--|----------------------|-------------------------|------------------|-------------------|---------------|
|      |  |                      | own                     | the state budget | foreign investors | other sources |
| 2013 | 16,8   | 9562,6               | 6973,4                  | 24,7             | 1253,2            | 1311,3        |
| 2014 | 16,1   | 7695,9               | 6540,3                  | 344,1            | 138,7             | 672,8         |
| 2015 | 17,4   | 13813,7              | 13427,0                 | 55,1             | 58,6              | 273,0         |
| 2016 | 18,9   | 23229,5              | 22036,0                 | 179,0            | 23,4              | -             |
| 2017 | 16,2   | 9100,0               | 7704,1                  | 322,9            | 380,9             | 594,5         |

*Source: calculated according to the State Statistics Committee of Ukraine [12]*

On the one hand, the use of own funds to finance innovation is characterized by stability, simplicity and speed of their involvement. They also enable flexible and prompt investment decisions. High mobility of cash flows is provided and the risk of insolvency and bankruptcy is avoided, through minimizing project costs by the amount of interest on loans. However, constant insufficiency of own funds and a high level of risk does not always guarantee the domestic enterprises a high rate of development by self-financing innovative activities.

The analyzed statistical data show that a wide range of sources of funding for innovation activities are absent in Ukraine and its regions. Innovative enterprise is an investor who finances an innovative project at the expense of own, borrowed funds or receipts from the state budget in the form of subsidies. Budget funds are used to reduce the cost of loans borrowed in national and foreign currencies, including loans from foreign financial institutions, for realization of innovative and investment projects in the real sector of the economy. They are also directed to provide state support for the implementation of investment projects on a co-financing basis [11]. The budget deficit at the expense of budget funds constrains financing of innovation development. In addition, the economic crisis limits the possibility of financing innovation at the expense of its own funds. The financial resources of venture funds and regional development funds are not sufficiently used in financing innovative development [9].

We believe that the methodology of rating assessment for the integral indicator should be used to study the territorial differentiation of the development of innovation activities of Ukrainian enterprises.

A number of macroeconomic indicators were allocated to calculate the integral indicator of innovation development. In particular, the number of industrial enterprises engaged in innovation activities; the share of enterprises that introduced innovations; the share of enterprises that implemented innovative products, as a

percentage of the total volume of industrial products sold; amount of financing to GDP,%; the number of new technological processes introduced by one enterprise that introduced innovations.

We propose to use a formula for the valuation of all values within (0; 1)

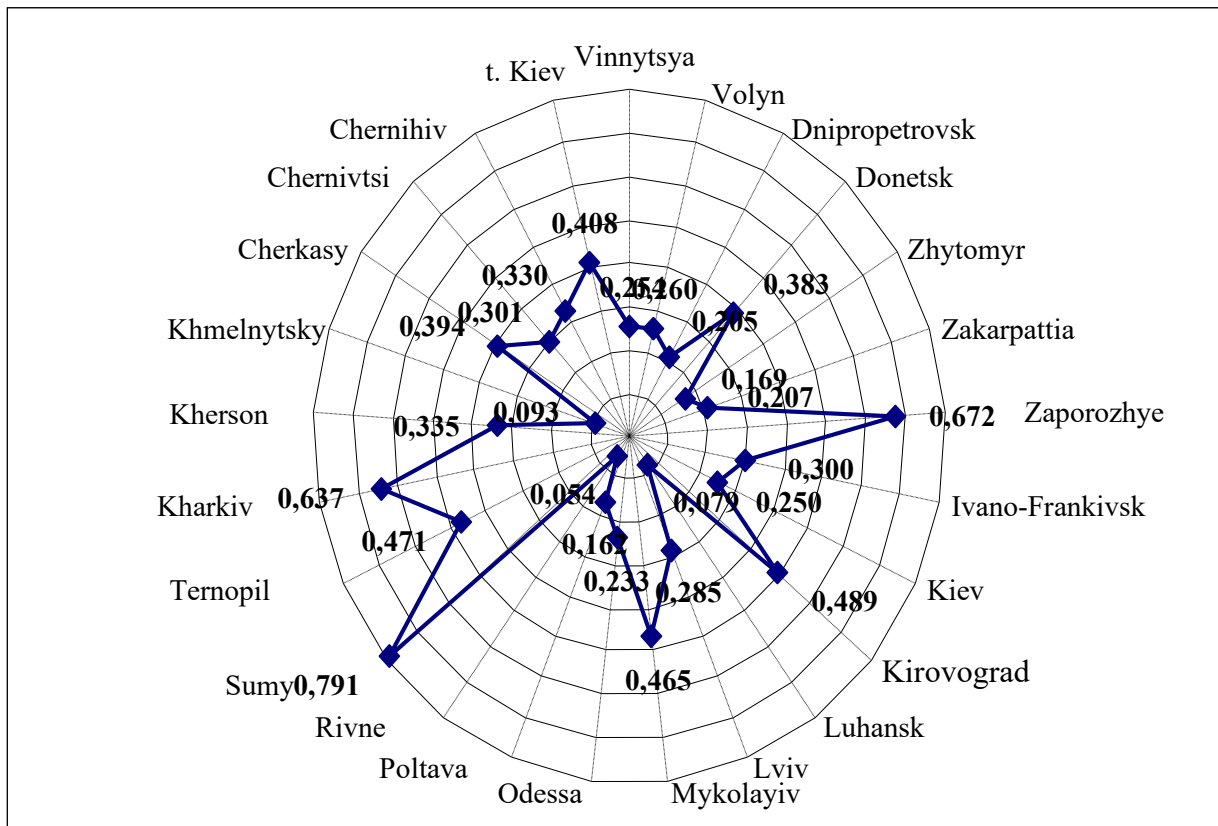
$$Z = \begin{cases} \frac{X_i}{X_{max}}, & \text{if } X_i - \text{integrator}, i \in N, X_{max} \neq 0; \\ \frac{X_i}{X_{max}}, & \text{if } X_i - \text{disintegrator}, i \in N, X_i \neq 0. \end{cases}$$

where z - normalized statistical values of indicators  $x_i$ ,  $X_{min}$  Ta  $X_{max}$  - respectively least and most of their value.

Find the mean geometric value of the corresponding normalized indicators for determining the integral index using the formula:

$$Z_i^k = \sqrt[k]{\prod_i z_i} \quad i = 1, 2, 3, 4, 5, 6, \quad k = 1, 2, \dots, 24.$$

Fig. 1



Rating assessment of innovation development in Ukraine in 2017 (Source: Built by the author)

The rating assessment of the development of innovation activity shows that enterprises of Sumy, Zaporozhye and Kharkiv region have a high integral index. They are the absolute leaders in the development of innovation in the region. Khmelnytsky, Luhansk and Rivne regions showed poor state of innovation support (Fig. 1). Classification of regions of Ukraine by the level of development of innovation activity of enterprises, allows us to get the division of areas by the level of potential innovation activities of enterprises (Table 2).

We will conduct a correlation-regression analysis of the dependence of the impact of innovation on innovation efficiency for a more detailed assessment of the impact of innovation support on the effectiveness of innovation

Table 2

**Classification of Ukrainian regions by the level of potential of innovative business activity in 2017**

| Characteristic | High potential                  | Low potential  | Average potential   |
|----------------|---------------------------------|--|---|
| Regions        | Zaporozhye,<br>Sumy,<br>Kharkiv | Kirovograd,<br>Ternopil, Mykolayiv,<br>t. Kyiv, Cherkasy,<br>Donetsk, Kherson,<br>Chernihiv, Chernivtsi<br>and Ivano-Frankivsk | Lviv, Volyn,<br>Vinnytsya, Kyiv,<br>Odessa, Zakarpattia,<br>Dnipropetrovsk,<br>Zhytomyr, Poltava,<br>Khmelnytsky, Luhansk,<br>Rivne |

Source: Built by the author

The value of the approximation error (R2) can be used to determine the validity of the impact. If the value (R2) is closer to one, then the more precisely chosen model reflects the tendency of development.

Table 3

**The choice of the optimal model of the impact of innovation support on the effectiveness of innovation**

| Model                              | The average error of approximation |
|------------------------------------|------------------------------------|
| Logarithmic $1.9574\ln(x) + 5.167$ | 0,55                               |
| Powerful $6,1883x^{0,8512}$        | 0,50                               |
| Linear $y = 7,5065x + 0,182$       | 0,65                               |

Source: Built by the author

The determination coefficient and the average error of approximation draw attention to the choice of the optimal model (Table 3).

The determination coefficient determines the degree of influence of the change of one factor to another. The average error of approximation indicates a deviation from the actual value from the predicted. These indicators provide an understanding of the relationship of factors. They also show the effects on each other and the model's compliance with the actual values. So, we have a direct relationship between the level of innovation and the effectiveness of their use. The linear model is the most optimal for describing this dependence. Since, the approximation error value is higher, the selected model is accurate. In addition, it is characterized by a high determination index.

Accepted recommendations are mostly not implemented. Financial, credit, tax, customs and other ups which ensure the development of innovation activities do not work. Although there are a number of concepts and programs for the development of science and innovation. There is also a periodic discussion of issues of innovation and scientific and technical activities at the parliamentary level. This is the main reason for the inhibition of the process of transferring the results of research from research institutions to enterprises of the real sector of the economy. In Ukraine, there are practically no mechanisms to support the transfer of research results that are common in developed countries

### **Conclusion**

The analysis of the current innovation and development status of the Ukrainian economy proved the existence of an imbalance between the objective laws of social development and the conditions for the introduction of innovations. This conclusion is confirmed by a number of factors directly related to the process of innovation: insufficient level of economic conditions, not optimal structures of innovations and their financing; Unmatched separate components of financial support for innovation development of the economy; lack of regulatory framework for the implementation of financial support.

The acceleration of innovation and the proper financial support of innovation processes require the improvement of domestic tax legislation in part: introduction of tax privileges for profit tax for economic entities that co-finance and implement innovation and investment projects. It is also necessary to introduce a mechanism for the refund of the tax amount of benefits.

Financial support for the development of innovation activity should become a priority task of innovation policy. It is based on a system of strategic priorities of innovation development with a reduction in their number. On the other hand, it is necessary to preserve those in which Ukraine has significant scientific achievements and

prospects.. It is necessary to develop and implement a comprehensive system of financial support for innovation activities. In particular, the system of mechanisms for cheapening loans and encouraging banks to lend to innovative projects. Such measures will stimulate the increase of investments in scientific institutions, technological parks and other scientific-oriented industries from other non-state sources.

## REFERENCES

1. Davis E. Institutional Investors / E. Davis, B. Steil. MIT Press. 2001. P. 30.
2. Diba M. Finansovye zapepechennya Innovatsiynogo razvitku Ukraine: monographs. K.: KNEU, 2013.425 p.
3. Dominique G., Van Pottelsberghe B. The Impact of Public R&D Expenditure on Business R&D. June 2014, Paris, OECD Directorate for Science, Technology and Industry. STI Working Papers 2014/4, P. 7-9.
4. Fedulova L. Innovative development of industrial affairs of Ukraine: tendencies and laws. Actual problems economics. 2017. №3. Pp. 82-97.
5. Golovchenko T. Innovative development, as the main reason for competitiveness of the company. Ekonomichny prostr 2015. № 7. p. 60-66.
6. Ilyashenko S. Management of innovative development. K. : Vidavnychy house "Princess Olga", 2015. p. 118.
7. Klaus Schwab The Global Competitiveness Report 2012-2013. World Economic Forum. Geneva / Switzerland [Електронний ресурс]. - Режим доступу: [http://www.weforum.org/docs/WEF\\_GlobalCompetitivenessReport\\_2012-13.pdf](http://www.weforum.org/docs/WEF_GlobalCompetitivenessReport_2012-13.pdf)
8. Kolodizek O. Financial Bank of the Innovative Development of National Economy: [dis. Dr. Conde Sciences: spec. 08. 00. 08 "Groschi, Finance and Credit"] The state of the great mortgage mortgage "Ukrainian Academy of National Bank of Ukraine". Sumi, 2011. 508 p.
9. Komelina O. Science – Methodological Basis of the Formulation of Innovative – Investment Mechanism of Social and Economic Development of Regions of Ukraine: Author. dis. ... d – ra econom. Sciences: spec. 08.00.05 "The development of productive forces and regional economics" Poltava, 2010. 40 p.
10. Krasnokutska N. Innovation Management. K. : KNEU, 2013. P. 387.
11. Krupka M. Financial-credit mechanism of innovation development of the economy of Ukraine. Lviv: Vidavnychy center of Lviv National University of Ivan Franko, 2014. 608 p.
12. Naukova and naukovo-technical diyalnist for Dani State Committee on Statistics of Ukraine. - [Electronic resource]. - Access mode: <http://www.ukrstat.gov.ua/>
13. Tarasyuk M., Malyarchuk V. The current camp of the implementation of the innovation policy of Ukraine and the financial policy of Ukraine. Ekonomika that power. - 2017. - № 1. - p. 19-24.
14. Yurynets Z. Formuvaniya Innovatsiynkh strategiy: theory, methodology, practice: monograph. Lviv: SPOLOM, 2016. - 412 p.