

Zianko V., Nikiforova L., Dong X.

### MODEL OF FINANCIAL SUPPORT FOR INNOVATIVE ACTIVITIES OF SMALL ENTERPRISES

*In the article the authors proposed a multi-factor model of financial support for innovative activities of small enterprises, in which, unlike the existing similar models, the factors that have a clear financial dimension are taken into account. This model can be used at small enterprises, especially at the initial stage of their operation, to increase the efficiency of innovative activities.*

**Key words:** sources of financing, innovative activities, innovation, small enterprise, model, financial support.

**The formulation of the problem.** Innovative development is today the mainstream for the economy of both developed countries and countries with lower levels of scientific and technological development. Thus, in the State Program of the Strategy of Innovation Development of the People's Republic of China it is planned that by 2020 China will be included in the list of innovative countries, by 2030 it will enter the first ranks of innovative states, and by 2050 it will become the world leading state of scientific and technological innovations [1]. The program envisages that innovation should become the main driving force of development. At the same time, scientific and technological innovations should be supported by innovations in the field of public institutions, culture, models of management and trade, which will allow moving to a higher level of economic development with a more rational structure of innovation costs. The document sets 8 strategic tasks, including, in particular, promoting innovations in the industrial technology system, enhancing primary innovations, optimizing regional innovation placement, implementing important science and technology projects, and training highly skilled personnel [1].

As for Ukraine [2], its main strategic priorities are aimed at creating an innovative market economy, but their implementation requires an economically strong and efficient state of law and government administration focused on innovative development and the availability of free financial resources in the business sector. Unfortunately, most Ukrainian enterprises now suffer from a significant deficit in

their own funds, and the investment attraction is problematic due to the significant risk posed by both socio-economic and political instability and the limited availability of public resources for financing and the possibility of attracting bank loans. In particular, domestic commercial banks, if they issue loans, are mainly for projects with a low degree of uncertainty, to which innovations do not belong [3]. Getting financial resources for promising innovative development is possible only at very high interest rates, which immediately makes them unprofitable.

Thus, the issue of financial support for Ukrainian enterprises' innovative activities for the current financial and economic situation is very relevant. Especially for small firms that, as one of the most important system-forming elements of the financial system of the country, make a significant contribution to improving macroeconomic indicators and at the same time serve as a convenient form of business organization [4].

Highly developed countries pay special attention to the mechanism of financial support of small enterprises, since they provide the fastest return on costs and wide freedom of market choice, demonstrate high innovative activity, form a competitive environment, which helps to reduce prices and improve the quality of goods. Thus, in the EU countries innovations are used by 52.3% of medium-sized companies with a number of employees from 50 to 249 people and by 33.4% of small firms, that is, those employing less than 50 people [5]. Unfortunately, in Ukraine during 2012–2014, the share of innovative actively small enterprises with the number of employees from 50 to 249 people was only 19.7%, and in firms with a number of employed less than 50 people – 11.3% [6], which makes the issue of creating new small innovative enterprises extremely important, and the problem of finding sources of financial support for innovation activities of such enterprises rather relevant.

**The analysis of recent researches and publications.** The problems of financial support for innovative activities have been investigated in the

© **Zianko V.**, Dr. Sc. (Econ.), Professor, Head of the Chair of Finance and Innovation Management, Vinnytsia National Technical University

**Nikiforova L.O.**, Ph.D. (Econ.), Associate Professor, Associate Professor of Business Economics and Production Management, Vinnytsia National Technical University

**Dong Xinying**, Post-Graduate Student of the Chair of Finance and Innovation Management, Vinnytsia National Technical University

scientific works of such scholars as Z. S. Varnaliy [4, 7], L. M. Vasilyeva [8], YA. B. Dropa, KH.P. Danylkiv [9], V. V. Zianko [3, 10], V. V. Kostetskyi [11], M. Pyvovarov [12] and others, which reveal the issues of functioning of small enterprises, highlight the principles of management and stimulation of the development of innovation activities of small enterprises in Ukraine and in the world, consider the methods of their financial support and factors affecting such provision, analyze trends and perspectives of further financial support of innovation activities of small enterprises in Ukraine.

In the previous papers of the authors [3, 10, 13, 14], certain steps have been taken in solving the problem, but a generalized system, on the basis of which a multi-factor model for the financial support of the functioning of a small innovative enterprise could be developed, has not been created.

**The formulation of the goals of the article.** The purpose of the article is to develop a model of financial support for innovative activities of small enterprises.

**The main results of the research.** The formation of the required amount of financial support for innovative activities, envisages [10]:

- definition of the general need for financial resources;
- definition of the volume of internal (own) financial resources for the financing of innovative activity;
- determination of the volume and value of the necessary external financial resources for the financing of innovative activity;
- definition of forms and methods of financing.

In determining the general need for financial resources for the creation of an innovative project on

an existing enterprise, the factors such as available technical capacity, existing human capital, and profit from other activities of the enterprise are taken into account, which reduces the general need for financial resources. For the newly created company, the definition of the general need for financial resources to create an innovative start-up occurs at the stage of writing a business plan for the establishment of an enterprise and should take into account relatively large one-off costs, which will be used in future for subsequent projects.

In determining the amount of internal and external financial resources to finance innovative activities, some specific moments for newly created and existing enterprises should also be taken into account. In the first case, the share of external financial resources, as a rule, is lower than in the case of a newly created enterprise. In the case of material-intensive production, the ratio of own and attracted capital is recommended within 50% [15], if this is the service sector, and then the share of attracted capital is higher. As modern small innovative enterprises tend to focus on IT technology or FinTech projects [16], in particular, to create a start-up in these areas, then the share of attracted capital can reach almost 100%, depending on specific project.

Having analyzed the existing ways of financial support for innovative activities of small enterprises [3, 9], which in our opinion are the most widespread today, we will reflect the most important factors for developing a model of financial support for innovative activity of small enterprises, which at the same time are sources of financial support of innovative activity of a small enterprise, as it is graphically shown in Fig. 1.

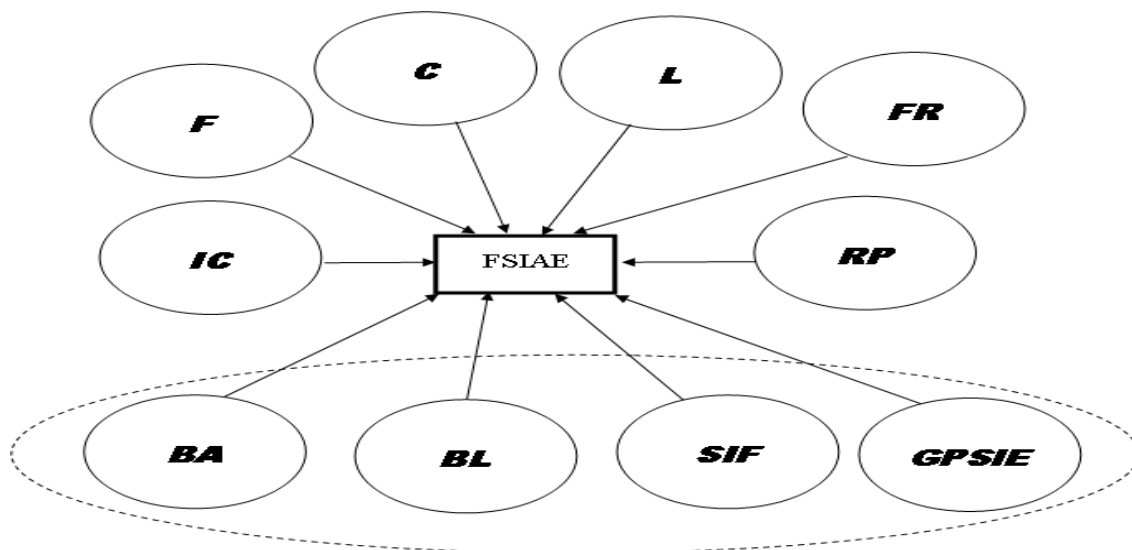


Figure 1. Simplified model of financial support for innovative activities of small enterprises

In Fig. 1 a dotted line depicts the functional area within which the factors of external attracted financial resources operate. Since the model is generalized, then Fig. 1 does not reflect the functional relationships between factors of the first order, since they are sufficiently complex and require a separate research.

For example, an increase in the tax exemption for small innovative enterprises in the form of a reduction in the income tax provided for by the state program of support of small business will affect not only the factor of attracted capital, but it also will produce an indirect influence with varying degrees of importance on all other factors of the first order, especially on the factor of reinvestment of own profit.

The factors that affect the financial support for innovatively active enterprises (*FSIAE*) are:

- *C* – Crowdfunding. There are crowdfunding platforms for the development of projects, where anyone can invest any amount in development. The mechanism is simple: you publish on the site the main regulations and goals of the start-up and declare the required amount for the project realization [17]. This is the same mechanism “many a little makes a mickle”, which creates great things and helps to raise money at the start. The most popular crowdfunding platforms in Europe are as follows [18]:

- Crowdfunding International, the Netherlands: in more than 160 countries, more than 35,000 people today have the opportunity to receive grants for their business projects;

- Ulule, France: since its foundation in 2010, Ulule has helped raise funds for more than 4,900 creative, innovative or public projects;

- Wemakeit, Switzerland: the largest platform in Switzerland for the creative industry. In addition, Wemakeit also supports non-profit organizations, financing their projects and helping to develop their community. Over the past two years, Wemakeit has helped launch 550 projects worth a total of CHF 4 million;

- Bigggidea, Ukraine: aims to develop a strong and open society, to implement the desired systemic changes. The Bigggidea platform collects funds for education, health, literature, music, journalism and research projects;

- Na-Starte.com, Ukraine: the main objective of the platform is the development of cultural initiatives and innovations in Ukraine. The largest sum for the project in Ukraine – 3.7 million hryvnias was collected on this platform.

- *L* – implementation of licenses for an innovative product;

- *FR* – fundraising. Fundraising, as a term, is not widespread in Ukraine yet. In most cases, this

concept is associated with philanthropy and social projects, but it is important to understand that, in addition to attracting resources for commercial projects, the search for a financial patron or donor is also fundraising [18].

- *RP* – reinvesting the share of profit received from the sale of the product. It should be noted that this factor will be zero for newly created enterprises at the beginning of their life cycle, and only with further profitable activity of the enterprise it will become positive;

- *GPSIE* – government programs to support innovative entrepreneurship (from obtaining grants for individual innovative projects at the micro level and for preferential fiscal policies at the level of the whole state in general);

- *SIF* - support of various innovation funds, both domestic and foreign, including non-state grants, venture funds and business incubators;

- *BL* – bank loans;

- *BA* – partnership with business angels. Today, around 500,000 business angels work in the world [19]. Business angel is a private investor who invests his own funds in unusual and promising projects at the stage of company creation in exchange for a share in its capital. Angels tend to invest their own funds, unlike venture investors who manage a pool of other people's money in a professional fund [18, 20]. The business angel's funds fill the gap in financing start-ups between the funds of “friends and family” [21], which provide basic funding, and formal venture capital, which is often not interested in small investments. Therefore, for example, in the United States, business angel investments are the usual second-round start-up financing for high-growth and they have almost the same size as venture funding, but distributed 60 times more (\$ 20.1 billion versus \$ 23.26 billion, in 61,900 companies versus 1,024 companies) [18].

For a business angel there is no “definite” size of investment, it can range from a few thousand to several million dollars. Harvard's report by W.R. Kerr, J. Lerner and A. Shawar provides evidence that start-up with angelic funding “fails” less often than companies with other sources of initial funding [22]. Among the start-ups raised by the angels there are milliard-worth airlines, biotech, financial, computer, energy companies, etc. Many of them are well known: Xerox, Amazon.com, Ryanair, Apple, Xynergy, Compaq, America Online, Google, E-bay, Innovative Robotics and many others [19].

- *IC* – own initial capital;

- *F* – franchising which in this model will be expressed in two main variants. When using the first option (*F1*), the transfer of technology and the name of the company to the third party concerned is subject to one-time remuneration. In the second

variant (F2) there is the technology transfer and the name of the company to the third party on the terms of receipt of remuneration in the form of a specified percentage of future revenue or profit from the sale of the transferred innovative product or technology.

We will show both options for franchising in the form of general formulas:

$$F = \sum_{i=1}^n \alpha_i F_i, \quad (1)$$

$$\alpha_i = 0, 1, \quad (2)$$

$$F \in F_1, F_2, \quad (3)$$

where  $F$  – total financial resources received from franchising;  $n$  – number of firms that have purchased franchising;  $a$  – choice of franchising option;  $F_i$  – financial resources received from each franchise option.

$$FSIAE = f(C; L; FR; RP; DC; IC; F), \quad (5)$$

where  $DC$  – debt capital.

Since formula (5) uses the complex component of the debt capital, then, in percentage terms given in the equation of variables, one can immediately observe the effect of the change of each of the factors included in  $DC$  on the indicator of financial independence of the enterprise, and therefore on its financial position. This is very important, since the stability of the financial state of the company is one of the most important indicators for the granting of loans by commercial and public institutions [15]. In this model, we refer to the debt capital only those financial resources that need to be repaid with

$$DC = f(BA; SIF; BL; GPSIE) \quad (6)$$

Taking into account the expression (6), the dependence (5) acquires the following final form:

$$FSIAE = f(C; L; FR; RP; BA; SIF; BL; GPSIE; IC; F) \quad (7)$$

Since the factors in equation (7) are equivalent to the possibility of their involvement and this model does not take into account the multiplicative and synergistic effects, as well as ignores the time factor as a discount factor, then the model will be considered static rather than dynamic.

$$FSIAE = C + L + FR + RP + BA + SIF + BL + GPSIE + IC + F \quad (8)$$

Thus, the developed model of financial support for innovative activities of small enterprises is formed taking into account the ten factors that are included in the ratio (7). For practical application, you can also use evaluation (8), which has a limited range of applications, but is easier to calculate.

**Conclusions.** One of the main reasons for the low level of innovative activity of Ukrainian small enterprises is the insufficient level of financial support for innovative activities in general and the extremely low level of its state financing. The main source of financing for innovation in Ukraine

We combine formulas (1), (2) and (3) into a single, generalized model of obtaining financial resources for all possible franchising options:

$$F = \sum_{i=1}^n F_1^i + \sum_{j=1}^m F_2^j, \quad (4)$$

where  $\sum_{i=1}^n F_1^i$  – the financial resources received from the first version of the franchise from all the  $n$ -number of  $i$ -firms;  $\sum_{j=1}^m F_2^j$  – financial resources received from the second version of franchising from the entire  $m$ -number of  $j$ -firms.

Let us illustrate the simplified model of financial support of the innovative activity of a small enterprise mathematically in the form of functions:

interest, without them (only the body of the loan or credit), or in the form of a percentage of profit, through a fixed period of time, and do not include crowdfunding and fundraising, since the former operates on the basis of gratuitousness, and fundraising is proposed to be used only for attracting a financial sponsor or donor, which also operate on the basis of gratuitousness.

Since the indicator of “debt capital” is a multifactorial component of the financial support for the innovative activities of a small enterprise, it can be represented as such dependence:

To simplify the practical application, taking into account the foregoing, as an example, let us consider the variant of linear dependence for the developed multifactorial model:

remains the own funds of enterprises that account for more than half of all expenditures aimed at innovative activities. Taking into consideration that most domestic enterprises today operate at a loss, and those who make a profit are in no hurry to take risks, because innovations are characterized by a high level of risk, it becomes clear the reason for the low activity of innovation activity of domestic enterprises.

The multi-factor model proposed in the article, which, unlike the existing ones, takes into account the main factors that have a clear financial

dimension, allows it to be used to increase the efficiency of innovative activity of small enterprises, especially at the initial stage of their functioning.

**Prospects for further research.** The results of the article can be used to develop effective organizational measures and methodological approaches to calculating optimal financial support for innovative development of small enterprises, identification of the most promising innovative projects and increase the efficiency of their financing from endogenous and exogenous sources.

Also, further research in the direction determined by the article will allow the development of

powerful quantitative methods for the development of financial support for innovation in the field of small business. In particular, a promising direction is the development of mathematical models, methods and algorithms to support of making decisions on optimal financial support for the introduction of innovations in the field of small business. This, in turn, will lead to an increase in the number of innovative Ukrainian enterprises and, as a consequence, to an increase of the Ukrainian economy.

## REFERENCES

1. Ukrinform, multimedijna platforma inomovlennja Ukrajini [Ukrinform, multimedia platform for the Ukrainian and foreign languages]. (07.07.2016). [ukrinform.ua](http://www.ukrinform.ua/rubric-technology/2021364-kitaj-zaplanuvav-do-2050-roku-stati-providnou-naukovotehnicnoi-derzavou.html). Retrieved from: <http://www.ukrinform.ua/rubric-technology/2021364-kitaj-zaplanuvav-do-2050-roku-stati-providnou-naukovotehnicnoi-derzavou.html>. [in Ukrainian].
2. Drogomiretska, Yu. V. & Semchuk, O. V. (2009). Aktualnist derzhavnogo reguljuvannja innovatsijnoi diyalnosti v konteksti suchasnih umov gospodarjuvannja [The urgency of state regulation of innovation activity in the context of modern economic conditions]. Retrieved from: [http://www.rusnauka.com/17\\_APSN\\_2009/Economics/48233.doc.htm](http://www.rusnauka.com/17_APSN_2009/Economics/48233.doc.htm). [in Ukrainian].
3. Zyanko, V. V. & Stasyuk, N. L. & Dong Xinying (2015). Sutnist ta dzherela finansovogo zabezpechennja innovatsijnoi diyalnosti malih pidpriemstv [Essence and sources of financial support of innovation activity of small enterprises]. *Visnik Vinnitskogo politehnicnogo institutu – Bulletin of the Vinnytsia Polytechnic Institute*, 4, 57-62 – 2015. [in Ukrainian].
4. Varnaliy, Z. S. & Garmashova, O. P. (2013). Konkurentospromozhnist natsionalnoi ekonomiki: problemi ta prioriteti innovatsijnogo zabezpechennja [The Competitiveness of the National Economy: Problems and Priorities of Innovative Support]. – K. : Znannya Ukrajini. [in Ukrainian].
5. Innovatsiji v Ukrajini: Evropejskij dosvid ta rekomendatsiji dlya Ukrajini. Innovatsiji v Ukrajini: propozitsiji do politichnih zahodiv. Ostatochnij variant (proekt vid 19.10.2011). [Innovation in Ukraine: European Experience and Recommendations for Ukraine. Innovation in Ukraine: Proposals for policy measures. The final version (project from 19.10.2011)]. – K. : Feniks. [in Ukrainian].
6. Derzhavna sluzhba statistiki Ukrajini [The State Statistics Service of Ukraine]. [ukrstat.gov.ua](http://www.ukrstat.gov.ua). Retrieved from: <http://www.ukrstat.gov.ua>. [in Ukrainian].
7. Varnaliy, Z. S. (2008). Instituti finansovoi pidtrimki malogo pidpriemnitstva Ukrajini: sutnist, geneza, perspektivi [Institutes of financial support of small business in Ukraine: essence, genesis, perspectives]. *Visnik Kijivskogo natsionalnogo torgovelno-ekonomichnogo universitetu – Bulletin of the Kiev National Trade and Economic University*, 5, 14-24 – 2008. [in Ukrainian].
8. Vasileva, L. M. (2009). Rozvitok malogo pidpriemnitstva v zarubizhnih krayinah [Development of Small Business in Foreign Countries]. *Derzhava ta regioni. Seriya: Ekonomika ta pidpriemnitstvo. – State and Regions. Series: Economics and Business*, 7, 56-60 – 2009. [in Ukrainian].
9. Dropa, Ya. B. & Danilkiv, H. P. (2011). Osnovni dzherela finansovo-kreditnogo rozvitku malogo pidpriemnitstva [The main sources of financial-credit development of small business]. *Ekonomichnij prostir. – Economic Space*, 52/2, 161-173 – 2011. [in Ukrainian].
10. Zyanko, V. V. & Epifanova, I. Yu., & jn. Zyanko, V. V. (2015). Innovatsijna diyalnist pidpriemstv ta yiji finansove zabezpechennja v umovah transformatsijnih zmin ekonomiki Ukrajini [Innovative activity of enterprises and its financial support in the conditions of trans-cational changes of the Ukrainian economy]. *Vinnitsya: UNIVERSUM, VNTU*. [in Ukrainian].
11. Kostetskij, V. V. & Butov, A. M. (2011). Kontseptualni zasadi finansovogo zabezpechennja innovatsijnoi diyalnosti promislovih pidpriemstv [Conceptual Fundamentals of Financial Provision of Innovative Activities of Industrial Enterprises]. *Nauka y ekonomika – Science and Economics*, 4, 20-26 – 2011. [in Ukrainian].
12. Pivovarov, M. (2013). Rozvitok institutu infrastrukturi malogo pidpriemnitstva: problemi ta shlyahi yogo pokrashchennja [Development of the institute of small business infrastructure: problems and ways it to improve]. *Sotsialno-ekonomichni problemi i derzhava – Socio-economic problems and the state*, 1(8), 6-18 – 2013. [in Ukrainian].
13. Nikiforova, L. O. & Jockusch, T. O. & Liu Lijiang (2016). Model mehanizmu adaptatsiji migrjujuchogo lyudskogo kapitalu dlya innovatsijno-investitsijnih privablivih krayin [Model of the mechanism of adaptation of migrating human capital for innovation-investment of attractive countries]. *Naukoviy visnik Uzhgorodskogo natsionalnogo universitetu. Seriya: Mizhnarodni ekonomichni vidnosini ta svitove gospodarstvo – Scientific Bulletin of*

Uzhgorod National University. Series: International Economic Relations and World Economy, 10, 39-44. – 2016. [in Ukrainian].

14. Shiyan, A. A. & Nikiforova, L. O. & Ostriy, I. F. (2011). Mehanizmi vzaemodiyi finansovih institutiv rozvinenih ta perehidnih ekonomik [Mechanisms of the interaction of financial institutions of developed and transition economies]. Aktualni problemi ekonomiki – Current problems of the economy, №2(116), 18-25. – 2011. [in Ukrainian].

15. Luchko, M. R. & Zhukevich, S. M. & Farion, A. I. (2016). Finansoviy analiz. [Financial analysis]. – Ternopil : TNEU. [in Ukrainian].

16. Rozvitok fintehu v Ukrayini [Development of finike in Ukraine]. moneyveo.ua. Retrieved from: <https://moneyveo.ua/ru/news/fintech-v-ukraine>. [in Ukrainian].

17. Dorohina, A. Biznes-inkubatori, biznes-angeli, kraudfanding: yak znayti groshi na rozvitok biznesu z nulya? [Business incubators, business angels, kraudfanding: how to find money for business development from scratch?]. news.finance.ua. Retrieved from: <http://news.finance.ua/ua/news/-/376065/biznes-inkubatory-biznes-angely-kraudfanding-yak-znajty-groshi-na-rozvytok-biznesu-z-nulya>.

18. Vikipediya – vilna entsiklopediya. [Wikipedia – is the free encyclopedia]. uk.wikipedia.org. Retrieved from: <https://uk.wikipedia.org>. [in Ukrainian].

19. Aleksandrova, L. Biznes-angeli investitsiy nih proektiv [Business angels of investment projects]. ufin.com.ua. Retrieved from: [http://www.ufin.com.ua/analit\\_mat/sdu/108.htm](http://www.ufin.com.ua/analit_mat/sdu/108.htm). [in Ukrainian].

20. Hadzima, J. All Financing Sources Are Not Equal / Boston Business Journal. Retrieved from: <http://web.mit.edu/e-club/hadzima/all-financing-sources-are-not-equal.html>.

21. Loewen, J. B. Money Magnet: How to Attract Investors to Your Business (2011). John Wiley & Sons.

22. William, R. Kerr & Lerner, Josh & Schoar, Antoinette. The Consequences of Entrepreneurial Finance: A Regression Discontinuity Analysis – HBS Working Knowledge. Retrieved from: <http://hbswk.hbs.edu/item/the-consequences-of-entrepreneurial-finance-a-regression-discontinuity-analysis>.

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