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Financing of intellectual potential of innovative development

Abstract. The prospects of innovative development depend on intellectual potential, which has gained increasing attention concerning both research and more practically oriented applications. Further development of intellectual potential is closely connected with possibilities of financial support. In this paper, the advisability of financing of intellectual potential of innovative development is introduced. Intellectual potential is a further development of intellectual capital, which is based on the skills and knowledge of employees. This study therefore tries to investigate the efficiency of intellectual potential usage and its financing. We try to show that value can be generated by intangibles, which are not always reflected in financial statements. The results were based on the data taken from indicators of innovative and intellectual level and financing possibilities of national economy. It was found the connection between the efficiency of financing of intellectual potential and innovative development in Ukraine.

Key words: intellectual potential, innovative development, intellectual capital, finance.

1. Introduction

Nowadays, it is no doubt that successful national economy should be innovative. Particularly, the innovative possibilities of company have to be relying on new technologies and emphasize on skills and knowledge of their employees rather than assets such as plants or machinery. More precisely, in the same way as the

machine substituted human and animal work force a few centuries ago, knowledge has substituted manual work (in the factory as well as in the office) as a base for industrial production. Economic growth can no longer come either from putting more people to work - that is, from more resource input, as much of it has in the past - or from increase in consumers' demands. It can come only from a very sharp and continuing increase in the productivity of the one resource in which the developed countries still have a competitive edge (and which they are likely to maintain for a few more decades): knowledge work and knowledge workers (Drucker, 1997) ¹.

In order to explain the measuring methods and practical aspects of financing of intellectual potential of innovative development in Ukraine to be presented in this article it seems to be essential to point out some fundamental theoretical starting points.

There are many significant contributions to the study of importance of innovative development. In economics, the contributions start with the work of Frank Ramsey (Ramsey 1928) ², who, in particular, studied the long trajectories of economic development, which is closely connected with its innovative, intellectual and financing possibilities and perspectives.

Becker, Gary S. and Robert J. Barro (1985) ³ were focusing on various aspects of economic development and growth, using technology and progress. At the same time they were abstracting from demography and other regressive factors. Romer ⁴ and Lukas (1986, 1988) ⁵ have created the modern theory of growth, which is actual by now. The main topic of their works shows, that the modern aspects of innovative activity and development are created on the base of the internal factors of the enterprise. Particularly, the development of intellectual potential and the want to use the creative power are among the main factors of innovative development of the

¹ Drucker P.: The Future That Has Already Happened, HBR, 9-10/1997, s. 20

² Ramsey F. (1929) A Mathematical Theory of Savings // Economic Journal. Desember. Vol. 38. P. 543-559.

³ Becker, Gary S. and Robert J. Barro, 1985, A reformulation of the economic theory of fertility, Unpublished working paper (University of Chicago, Chicago, IL).

⁴ Romer P. (1986) Increasing Returns and Long Run Growth. "Journal of Political Economy". Vol. 94. – P. 1002–1037

⁵ Lucas R.E. (1988) On the Mechanics of Economic Development. "Journal of Monetary Economics". Vol. 22. P. 3–42.

separate enterprise. Otherwise, mainly such internal factors aren't independent. They are created because of stimulation (specially financing) of enterprise and government. Nowadays it is important to combine both the internal and external factors for creation and continue of further innovative development.

Schumpeter (2008) ⁶ made in his "Theory of economic development" a conclusion about the main role of entrepreneur and his innovative and intellectual possibilities in the innovative development. The entrepreneur is able to change the productivity, create new goods, services and products, to grow the technical possibilities of the enterprise. The stimulation of innovative activity of the entrepreneur stimulates the innovative development of the enterprise and the society in general. But according to Schumpeter's point of view the innovative development is completely impossible without the financing. The credit is one of the main conditions for realization of innovation. It helps to find the important amount of the capital.

The great contribution to the theoretical aspects of innovative development made Kondratieff (2002) ⁷, paid attention to the dependence of cycles of economic growth from the technological waves. It is possible to remark, that technological growth is the consequence of the stimulation and development of the intellectual potential.

On the other hand, Bernal (1935) ⁸ have made the conclusion, that the property of the science and intellectual potential is the next step of innovative development and technical progress. Because of the last, we are able to make a decision about the circles of innovative development, intellectual potential and their stimulation (specially financing). The innovative development and intellectual potential are both dependent from each other.

⁶ Schumpeter, J.A., [1911] (2008), *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest and the Business Cycle*, translated from the German by Redvers Opie, New Brunswick (U.S.A) and London (U.K.): Transaction Publishers.

⁷ Kondratieff N. D. 2002 [1926]. *The Major Cycles of the Conjunction and the Theory of Forecast*. Moscow: Economika.

⁸ Bernal J. D. *Science and Industry*. in: Hall, Sir D et al., 1935. *The frustration of Science* (London: Allen and Unwin), p.p. 45-48.

Upon the previous points of views, Kuznets (1958) ⁹ have made a conclusion about the new source of innovative growth, which means the development of science and intellectual possibilities of the nation.

Nowadays Giarratana, Torrisi and Pagano (2005) ¹⁰ have point of view, that for example in Ireland the quick innovative development of possible because of the creation of big innovative corporations. Such types of enterprises are able to finance their innovative wants. Besides this factor the scientists pay the attention to the great amount of the intellectual capital and its right management and stimulating.

Upon to the points of views above mentioned we confirm, that instead of differences, all of them conclude, that innovative development is impossible without the right usage of intellectual potential. The intellectual potential is developed under the conditions of sufficient financing.

Therefore this study is trying to investigate the efficiencies of intellectual potential and its financing. In addition, the study also attempts to analyze the connections between intellectual capital and innovative development.

2. Methods of analysis

Nowadays there are different separated theoretical methods to study innovative development, measure the efficiencies of intellectual potential and its financing (Pulic, 1998; Riahi-Belkaoui, 2003; Usoff, Thibodeau and Burnaby, 2002; Mattson, Barrett, Mellichamp, 1994; S de Mel, McKenzie, Woodruff, 2009) ¹¹, ¹², ¹³, ¹⁴, ¹⁵. In

⁹ Kuznets S. 1958. Long Swings in the Growth of Population and in Related Economic Variables. Proceeding of the American Philosophical Society 102(1): 25–52.

¹⁰ Giarratana M., Torrisi S., and Alessandro Pagano. (2005) The Role of MNCs in the Evolution of the Software Industry in India, Ireland and Israel". In A. Aurora and A. Gambardella, eds., From Underdogs to Tigers: The Rise and Growth of the Software Industry in Some Emerging Economies. Oxford, UK: Oxford University Press.

¹¹ Pulic, A. (1998). "Measuring the performance of intellectual potential in the knowledge economy" available at: www.measuring-ip.at.

¹² Riahi-Belkaoui, A. (2003). Intellectual capital and firm performance of US multinational firms. A study of the resource-based and stakeholder views. Journal of Intellectual Capital, 4, 215- 226.

¹³ Usoff C.A., Thibodeau J.C., and Burnaby, P. (2002). The importance of intellectual capital and its effect on performance measurement systems. Managerial Auditing Journal, 17, 9-15.

¹⁴ Mattson J., Barrett B., Mellichamp J. Software Development Costs Estimation Using Function Points // IEEE. Transactions on Software Engineering. – 1994. - # 4.– P. 275 – 287.

this article we try to combine the intellectual potential, possibilities of financing and innovative development. Moreover, it is important to study such theoretical methods which will be suitable for the practical usage.

It is almost impossible to measure the level of intellectual potential only with the help of financial measurements. It is the reason for development of several approaches which all, more or less, try to synthesize financial and non-financial measurements into one management tool. To obtain an overview Sveiby categorizes the different methods according to their ambition to assign a dollar value and their level of detail (Sveiby, 2001) ¹⁶. The validity of these approaches varies considerably and among the most recognized are the intangible assets monitor (Sveiby, 1997), the Skandia navigator (Edvinsson and Malone, 1997) ¹⁷.

One of the best known analytical methods is the Skandia Navigator. Skandia AFS was the first company in which an attempt to calculate intellectual capital was taken. It was associated with the shareholders' interest why the stock value of the company's shares may exceed the accounting value. At the beginning of the 1990s, L. Edvinsson along with specialists from Skandia began research, the result of which would have allowed to answer the above question. In Skandia, working on that answer resulted in creation of a report on intellectual capital (Identification of intellectual capital), which was presented in May 1995 ¹⁸.

The model prepared by Skandia, named Skandia Navigator, is a process model supported by the computer system Dolphin. It contains 164 measurement metrics, which were divided into intellectual (91) and traditional (73). These metrics cover five business areas of the company: financial, client, process, human and

¹⁵ S de Mel, D McKenzie, C. Woodruff. Innovative Firms or Innovative Owners. Determinants of Innovation in Micro, Small, and Medium Enterprises. – Policy Research Working Paper: The World Bank Development Research Group. Finance and Private Sector Team, May 2009

¹⁶ Sveiby, K.E. (2001), "Methods for measuring intangible assets", www.sveiby.com/articles/IntangibleMethods.htm

¹⁷ Sveiby, K.E. (1997), *The New Organizational Wealth: Managing and Measuring Knowledge Based Assets*, Berett Koehler Publisher, San Francisco, CA

¹⁸ Edvinsson, L. and Malone, M.S. (1997), *Intellectual Capital – The Proven way to Establish your Company's Real Value by Measuring its Hidden Brainpower*, HarperBusiness, New York, NY.

development. Within each area, a specific set of indices describing a given intangible resource is suggested ¹⁹.

There are some thought, that the most interesting are the scorecard methods. The most prominent of these deserves a more thorough explanation. For example, the intangible assets monitor was developed by Sveiby (1997) and he uses a conceptual framework based on three groups of intangible assets: external structure (brands, customer and supplier relations); internal structure (the organization, management, manual systems, attitudes, R&D, software) and individual competence (education, experience) ²⁰.

Based on the previous mentioned points of views we suppose that the analytical method has to be used for measurement of intellectual potential in Ukraine. Moreover, both financial and non-financial measurements have to be used.

3. Results and Findings

Based on the data collected from annual reports listed in States Statistics Service of Ukraine and The National Bank of Ukraine frequency analysis was done on the financing of intellectual potential of innovative development.

Based on the analytical methods the attention is paid to the financial and nonfinancial measurements. The expenditures for performing scientific and technical work are considered as the financial measurements in the article (Table 1).

Table 1

¹⁹ Paździor A., Paździor M. (2012) Measurement of intellectual capital in a company. Management, Knowledge and Learning. International Conference. Slovenia

²⁰ Sveiby, K.E. (1997), The New Organizational Wealth: Managing and Measuring Knowledge Based Assets, Berett Koehler Publisher, San Francisco, CA

Financial measurements of financing of intellectual potential of innovative development*

	Expenditures for performing scientific and technical work, million UAH		
	All Expenditures	Account of state budget	Other Expenditures
2009	7822,2	3398,6	4423,6
2010	8995,9	3704,3	5291,6
2011	9591,3	3859,7	5731,6
2012	10558,5	4709,1	5849,4
2013	11161,1	4762,1	6399
2014 (nine month)	6992,7	2878,4	4114,3

Source: compiled by the author on the basis of Statistical information. States Statistics Service of Ukraine. Electronic resource. Available at: <http://www.ukrstat.gov.ua/>; The National Bank of Ukraine. Electronic resource. Available at: <http://www.bank.gov.ua/control/en/index>

Based on the data of Table 1 we conclude that there was a slow growth of financial measurements of financing of intellectual potential of innovative development before 2014 year. Therefore the account of state budget was not enough (Figure 1).

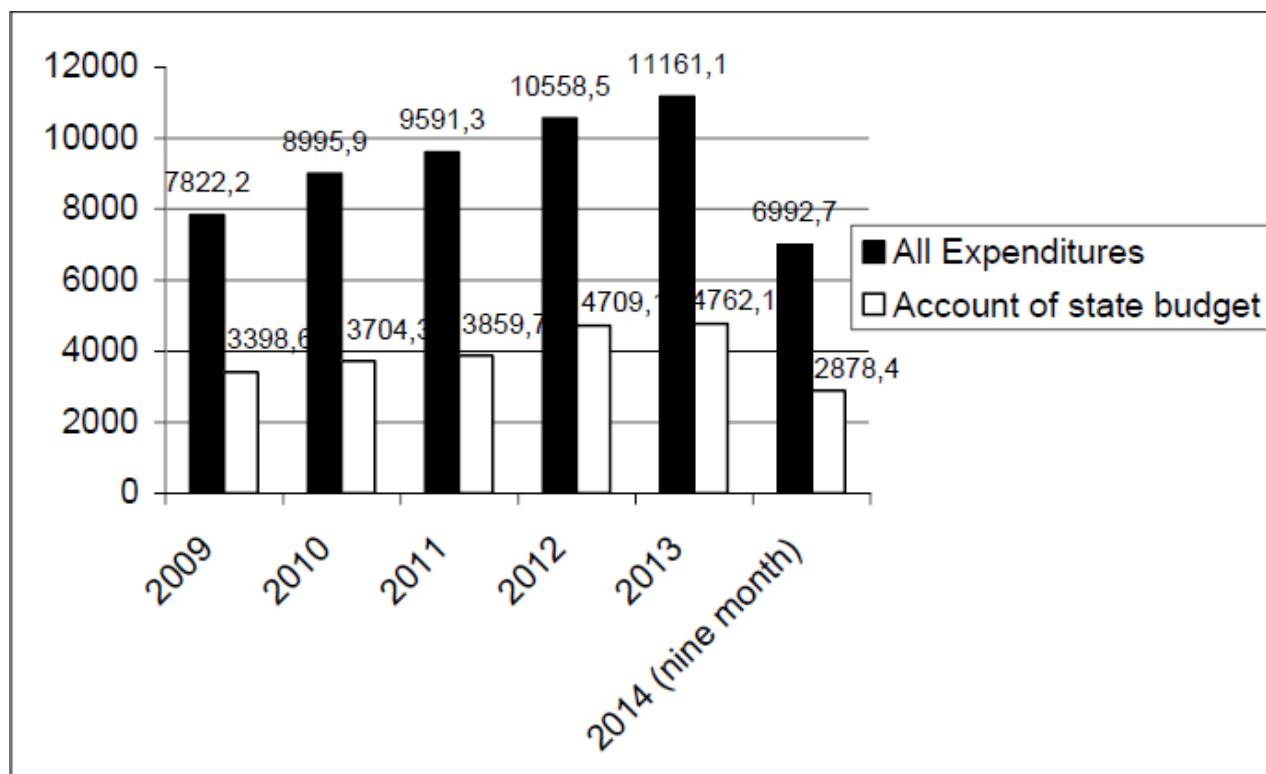


Figure 1 – Expenditures for performing scientific and technical work*

Source: compiled by the author on the basis of Statistical information. States Statistics Service of Ukraine. Electronic resource. Available at: <http://www.ukrstat.gov.ua/>; The National Bank of Ukraine. Electronic resource. Available at: <http://www.bank.gov.ua/control/en/index>

Moreover, we observe the small part of credit resources, which were involved for the development of intellectual potential and further innovative development of national economy (Table 2)

Table 2

The trends of changes of credit resources' volumes for intellectual and innovative development*

	Indicator, billion UAH				
	2009	2010	2011	2012	2013
In general	436,77	453,68	500,54	570,74	606,95
professional scientific and technical activity	X	X	X	X	45,76
education	0,21	0,17	0,11	0,11	0,23

Source: compiled by the author on the basis of Statistical information. States Statistics Service of Ukraine. Electronic resource. Available at: <http://www.ukrstat.gov.ua/>; The National Bank of Ukraine. Electronic resource. Available at: <http://www.bank.gov.ua/control/en/index>

Based on the data, which shown in the Table 2, we are able to suppose, that specially credit could have the potential for further stabilization and growth of financing, of intellectual and innovative development. It is possible under the condition of further activation of crediting of professional scientific and technical activity (Figure 2)

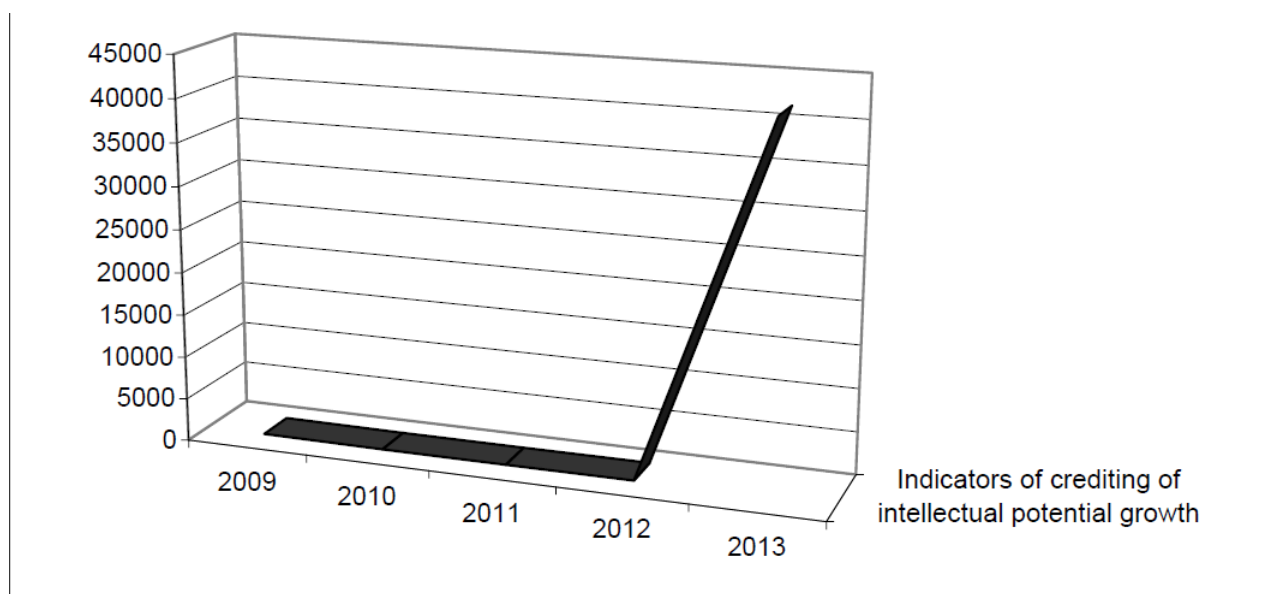


Figure 2 – Indicators of crediting of intellectual potential growth*

Source: compiled by the author on the basis of Statistical information. States Statistics Service of Ukraine. Electronic resource. Available at: <http://www.ukrstat.gov.ua/>; The National Bank of Ukraine. Electronic resource. Available at: <http://www.bank.gov.ua/control/en/index>

Altogether, the financial measurements show a rather low level of intellectual potential financing (spatially states financing) in Ukraine. Further innovative development needs the stabilisation and perfection of financing possibilities. But on the other hand it is impossible without non-financial measurements. Upon our point of view, the number of the organizations which carry out scientific researches and development and scientific manpower are supposed to be the non-financial indicators of intellectual potential of innovative development (Table 3)

Table 3

The growth of non-financial indicators of intellectual potential of innovative development*

	Number of the organizations which carry out scientific researches and development	Scientific manpower, persons
2009	97,24	98,16
2010	97,24	96,93
2011	96,32	94,87
2012	96,25	96,54
2013	94,62	94,91

Source: complied by the author on the basis of Statistical information. States Statistics Service of Ukraine. Electronic resource. Available at: <http://www.ukrstat.gov.ua/>; The National Bank of Ukraine. Electronic resource. Available at: <http://www.bank.gov.ua/control/en/index>

The both non-financial indicators, that mentioned above, show a relative stability (Figure 3).

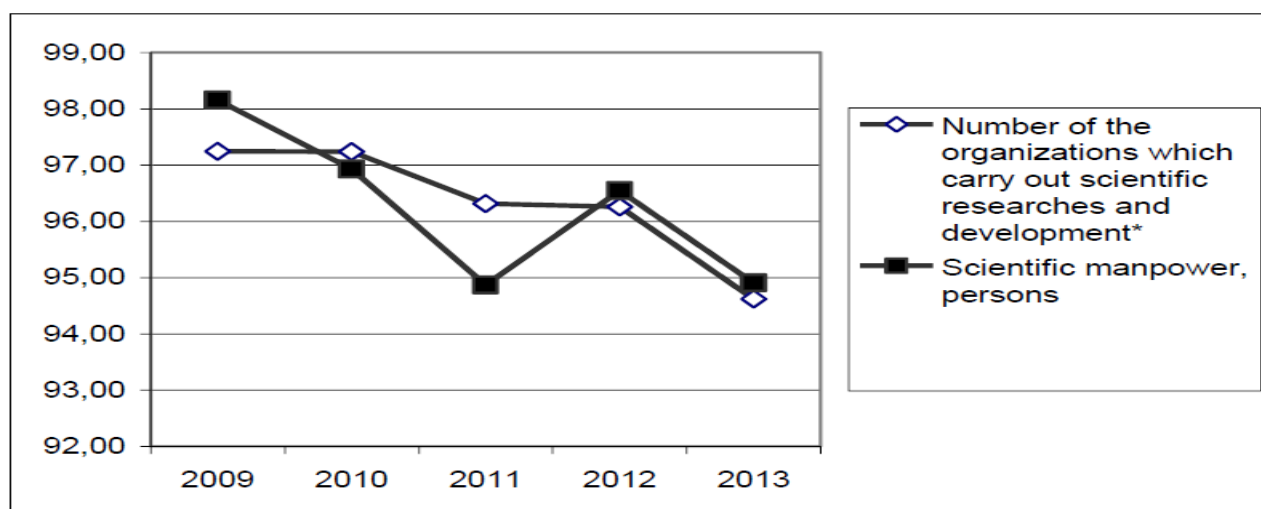


Figure 3 – Non- financial indicators of intellectual potential growth*

Source: complied by the author on the basis of Statistical information. States Statistics Service of Ukraine. Electronic resource. Available at: <http://www.ukrstat.gov.ua/>; The National Bank of Ukraine. Electronic resource. Available at: <http://www.bank.gov.ua/control/en/index>

Nowadays for the national economy is important to save the stabilisation of non-financial indicators and control the financial indicators for further development of possible innovative resources.

3. Discussions and conclusions

In order to build the worldwide competitive economy, its innovative development has to be presented. Moreover, there is need for the growth of intellectual potential for such a goal. For the above mentioned purpose is important to satisfied financing needs of the separate entrepreneurs and the national economy as a whole. The results of the current study found that, the importance of innovative development isn't the creation of our modern scientists. The significant role of innovative development, its intellectual potential and their financing were the subjects of studies of famous representatives of the classical political economy. For example, these points of views were developed in the works of Drucker, Ramsey, Schumpeter and Kondratieff. It is possible to conclude, that spatially the possibilities of financing of intellectual potential of innovative development are the base for combining the theoretical points of views and the practical prospects for further economic development (Figure 4).

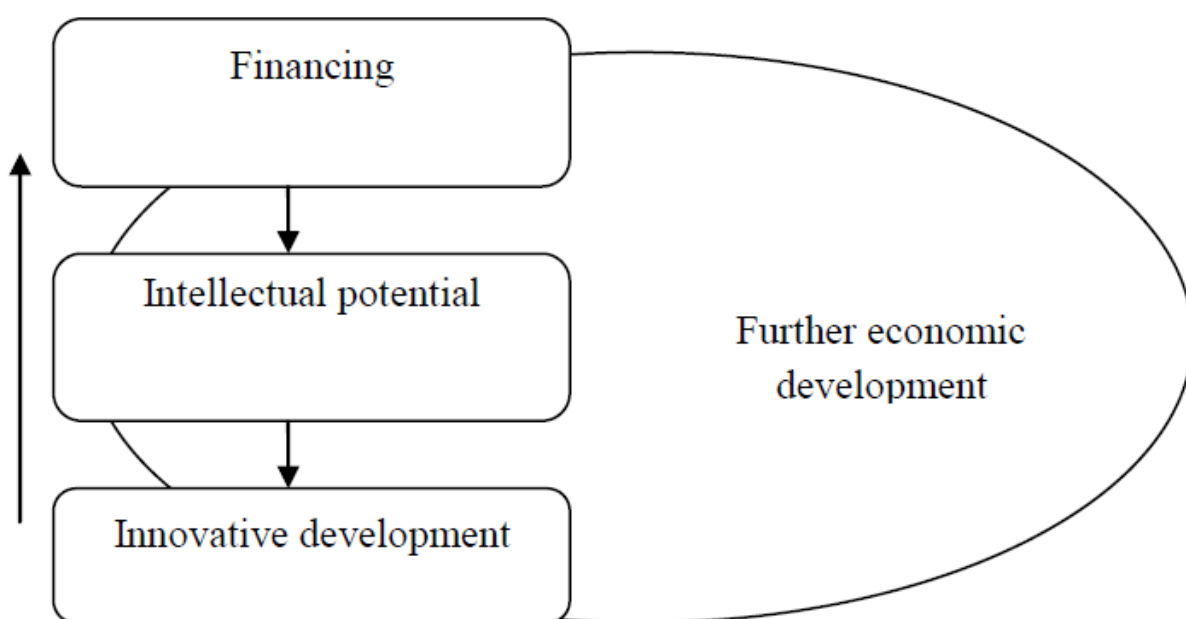


Figure 4 – Practical usage of financing of intellectual potential of innovative development

The study was conducted using analytical method. The analytical method of analysis used was the one developed by Sveiby, Edvinsson and Malone. The main conclusions from this particular study are: both financial and non-financial measurements have to be used for measurement of intellectual potential, its influence on the innovative development and the effectiveness of their financing. Based on the data collected from annual reports listed in States Statistics Service of Ukraine are made some calculations and analytical conclusions, that perform a rather low level of intellectual potential financing (spatially states financing) in Ukraine. On the other hand we have prospects for further development of intellectual potential of the nation. It is possible to use more financing resources in the form of credit for such a purpose.

The current study has its limitation in terms of its samples (which is only analytical method). Future research can also compare other methods of measurement of financing of intellectual potential of innovative development.