Innovation capital in the appraisal system of intrinsic industrial enterprise value

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Abstract. The paper studies innovation capital value of in formation of intrinsic industrial enterprise value. The authors specify a structure of intrinsic industrial enterprise value, establish an innovation capital position therein and describe interrelation between all cost components. Concept and essence of enterprise innovation capital are defined on the basis of a scholarly opinion with concentration on its difference from innovation potential. The scheme of innovation capital formation with involved cost components is described during clarification of nature of innovation capital and its importance in intrinsic industrial enterprise value management. In the paper there is indicated an estimation procedure, in which description differential features of such components appraisal as value of innovation projects in the developmental stage and value of innovation projects in the implementation phase are emphasized based on the author's clarification of essence of innovation capital and identification of its place in a modified model of intrinsic industrial enterprise value. The proposed procedure of innovation capital estimation is approved by an example of two innovation projects, which are in the different stages, but have the same earning capacity and equal financing terms. The calculation data showed that enterprise innovation capital value, which innovation project is under development, is significantly lower than the same indicator of a company, which innovation project is underway. The recommendations on investment policy improvement, made by the authors, which are aimed at innovation capital compounding and intrinsic industrial enterprise value increase, form the result of the paper.

1 Introduction

In the current circumstances intrinsic enterprise value management is an exigency of insufficient investment attractiveness of the most of domestic industrial companies. One of the main company investment attractiveness indicators is overrun of its intrinsic value over the market one. This indicates that enterprise value is undervalued by the market at a particular time and that there is growth potential for it, which provides investment inflow. One of the significant intrinsic value elements for industrial enterprises is innovation capital.

Innovation capital compounding appears as one of the most effective ways to manage intrinsic value and investment attractiveness of industrial enterprises.

The basis of investment inflow in industrial enterprises innovation projects is to be set up that provides terms for their economic recovery and strategic prospects implementation.

2 Timeliness. Scholarly importance

Innovation capital essence and appraisal methodology for it should be considered when it is necessary to emphasize intrinsic industrial enterprise value management, provided by innovation capital compounding. A selected innovation capital appraisal method has influence on objectivity of intrinsic industrial enterprise value appraisal, its investment opportunity as well as its ability to stimulate economic growth. The approach, which should be set as a basis of a selection procedure of an innovation capital appraisal method, is heavily tied to this component positioning in the element system of enterprise intrinsic value.

Modern academic specialists generally give similar concepts of enterprise intrinsic value. M. A. Fedotova defines intrinsic value as appraisal of internal asset capacity based on a forecast of its market price in the future, made by an analyst [14]. In international appraisal and investment practice the terms "intrinsic value" and "fundamental value" are often considered as equal. These two concepts are identical. Lawrence J. Gitman and Michael D. Joehnk consider intrinsic value as hidden or essential stock value calculated in the course of a fundamental analysis [12].

However on paper there are also concepts which differ from the traditional term of intrinsic value. William F. Sharpe, Gordon J. Alexander and Jeffery V. Bailey investigate the terms "investment value" and "intrinsic value" as synonyms, when considering security as an investment project. In their opinion, investment value is the current security price, accounted by well-informed and capable analysts, considering prospect

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evaluation of its demand price level and income from it in the future. In this case it can be considered as fair value of a security [19]. The authors of this paper do not share this opinion. It seems more logical, when investment value is understood as difference between market and intrinsic value due to the fact that it shows growth potential of the first term over the long term and thus provides guidance to an investor on his opportunity to invest in this company. With this in mind, if market value is lower than intrinsic enterprise value, it means that there is investment potential. Otherwise, an enterprise is not investment-attractive.

When the conceptions of intrinsic enterprise value are close except for some of the above-mentioned points, the insight into intrinsic value structure varies significantly. While on subject of market capitalisation and its structure Leif Edvinsson [10] consider, however, basic elements: intellectual capital and financial one. He [10] highlights human and structural capital as a part of intellectual one and divides it into customer and organization one, where the last named consists of innovation, cultural and process capital. Properly speaking, Leif Edvinsson, whose point of view is contrary to the standards of market capitalisation appraisal, listed all major components of intrinsic enterprise value, in our opinion, with exception of such elements as resource capital and commercial goodwill. The key point is intellectual capital structure and innovation capital place therein. Interpretation of innovation capital essence and appraisal procedure for it depend on innovation capital positioning in this system. Therefore, the aim of this paper is to study essence of industrial enterprise innovation capital and to develop an appraisal methodology for it.

3 Thesis statement

The following objectives are set by authors in order to achieve the stated aim within the framework of this paper.

Firstly, it is necessary to clarify a structure of intrinsic industrial enterprise value and to identify the place of innovation capital therein. This problem solving is necessary for understanding decomposition of intrinsic industrial enterprise value and interrelation between its elements that allow us to draw the line of interpretation of elements essence in general and innovation capital in particular.

Secondly, in connection with modified decomposition of intrinsic industrial enterprise value it is necessary to introduce clarity into this concept on the basis of the first problem solving result and through investigation of modern approaches to the interpretation of innovation capital essence.

Thirdly, an appropriate appraisal methodology is to be elaborated by virtue of clarified essence of innovation industrial enterprise capital.

Fourthly, applicative calculations of industrial enterprise innovation capital appraisal are to be executed in order to confirm practical relevance of the author's technique.

4 Theoretical part

Improving the structure of intrinsic industrial enterprise value, we analyze the estimates of market capitalisation, according to Leif Edvinsson, as a basic model and presume that it measures intrinsic value better, although incompletely. As noted above, firstly, there are no such important components as commercial goodwill and resource capital in this model, and, secondly, innovation capital is not positioned entirely correct.

Figure 1 illustrates the author's view on the model of intrinsic industrial enterprise value, taking into account the foregoing points.

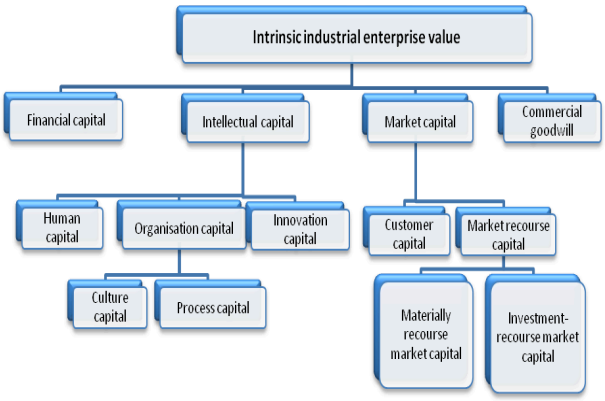

Fig. 1. Decomposition of intrinsic industrial enterprise value.

The signature features of our model of intrinsic industrial enterprise value from the model of market capitalisation, offered by Leif Edvinsson, are the following.

Firstly, in addition to financial and intellectual capital, we have added market one and goodwill in the first hierarchy level, assuming that these components also make their strong contribution to intrinsic industrial enterprise value.

Here we should make a reservation that there is market capital in the Leif Edvinsson's model, but it represents a part of structural capital, included in intellectual capital, and is called there "customer capital". According to the authors, there are some inaccuracies as follows:

1. Market capital is superior to customer one. Customer capital is formed owing to customer base (customers and clients). Then resource (logistic) capital, related with partnership with suppliers, contractors and investors, is equally important. We divide resource capital into the materially resource and investment resource and associate both these elements with market advantages of an industrial enterprise.
2. It is obvious that market capital should not be considered as a part of intellectual capital, taking into account the special nature of the last one. We interpret it as a separate component, which contributes tried and tested market opportunities of an enterprise to intrinsic industrial enterprise value.

Secondly, innovation capital is got by us as an equal component of human and organization capital to the second hierarchy level. According to the Leif Edvinsson's market value model, innovation capital is a component of organization one on a par with cultural and process capital. In the authors' opinion, such an approach does not seem logical, because of the fact that innovation capital should be considered as a component, mainly characterized by already developed innovation projects or those projects, which are under development, where an organizational point is important, but do not have the single role, and has independent significance in formation of intrinsic industrial enterprise value.

We will explain delimitation of innovation capital from human and organization one further during addressing the following issue of innovation capital essence clarification.

Interpretation of innovation capital essence in modern science has received attention of only few authors, while much more attention is paid to innovation potential essence.

So, for example, I. S. Vinnikova gives the following definition of innovation capital: "Innovation capital is a comprehensive system of investment sources formation and their transformation into improved means of production, new economically viable methods of production organization and personnel development in an enterprise for the purpose of profit maximisation" [9]. According to the authors, this definition requires clarification and specification on the following points.

Firstly, we hold that identification of capital with a system is an arguable point. The system is a broader term, which requires with regard to this matter a set of mechanisms of accumulation of different capital types and their transformation into new or improved means of production and technologies. In addition to investment capital industrial enterprise innovation system accumulates all the components, which were previously discussed and are shown in the Figure 1 of intrinsic enterprise value. Moreover, let us turn to the opinion expressed by M. A. Palienko, who deems that formation of innovation capital in industrial enterprises intends a special focus on innovation policy, that is kind of a program for establishing innovation priority in production, which is justified by preliminary calculations, depending on available resources and assigned tasks [15]. Summarizing this discourse, let us clarify the concept of innovation capital. Innovation capital of an enterprise is to be understood as value terms of those innovation projects, which are under development or already represent the intellectual property. At the same time, enterprise innovation capital amount, which, in our opinion, characterize its value, consists of various cost elements of other capital types, involved in the implementation of innovation projects. This includes financial, human, organization, market capital and goodwill which transfer their value to innovation capital in the process of enterprise innovation activity. Formulated differently, a company invests financial and human resources, organizational health and the like in innovation projects, reducing the financial capital value in the current period in exchange for its addition in the future while increasing innovation capital value. We should note that we do not mean decrease of human, organization, market capital and goodwill value at the same time, believing that these capital types are for our purposes inexhaustible and can be supplied faster, if such factors as staff turnover, commercial goodwill decline and others are not taken into account.

Now we should pay attention to difference between the concepts of innovation capital and innovation potential, where the last one is used more frequently.

The term "potential" derives from the Latinism "potentia" that means strength, power, opportunity and ability, which exist in the open form and can manifest under certain conditions [3]. The abstract term of "enterprise innovation potential" is defined as the whole complex of different resource types, including material, financial, intellectual, scientific, sci-tech and other resources required to innovation activity implementation [2,18]. Innovation potential is interpreted as enterprise readiness degree to gain a set innovation objective [1,3,4,5,8,11,13,16,17]. Hence it follows difference between innovation capital and innovation potential. Let us to emphasize the key point: innovation capital is the concept, qualifying the value of resources, invested in innovation projects, which are under development or already represent the intellectual property, taking into account expected profit from them. Innovation potential is enterprise readiness degree to carry out innovation projects, provided that this degree is characterized mainly by financial, human, material and production resources as well as by market opportunities.

Subsequently let us study delimitation of innovation capital from human and organization one and its connection with all components of intrinsic industrial enterprise value.

According to the most common point of view, human capital is characterized by knowledge, abilities and skills of force [6,7,20]. Human capital, involved together with the other forms of capital (organization, financial and market one as well as commercial goodwill) in innovation project implementation, creates innovation capital, which, according to the above given by us arguments, is positioned fairly in intrinsic industrial enterprise value and represents a strategic potential for development. Knowledge and skills of staff, involved in innovation enterprise project implementation are compensated by wage payment that leads to financial capital reduction without the changing human capital value or even with its increase due to new experience and professional training acquisition.

Organization capital, consisting in the value of corporate culture and existing corporate standards and regulations, is also involved in innovation project implementation, ensuring effective communication and creating a new component of intrinsic industrial enterprise value, which is called innovation capital.

Market capital, expressed in value of the long term cooperation with buyers, customers, suppliers, contractors and investors, is also included in the innovation projects implementation, providing easier access to markets of goods and resources and

contributing to a new component of intrinsic industrial enterprise value –innovation capital.

Commercial goodwill as a part of intrinsic enterprise value is also very important in the process of innovation capital formation. Goodwill ensures economic benefit from such industrial enterprise characteristics as creditworthiness, tax compliance, investment attractiveness and partner trust.

Thus, all the components, considered by us as a part of intrinsic industrial enterprise value, participate in innovation capital formation and furthermore innovation capital is a separate element requiring the appraisal.

Approaching innovation capital appraisal methodology, we emphasize the following points.

1. The innovation capital consists of two components:
1.1. Value of innovation projects that are under development;
1.2. Value of innovation projects carried out or prepared for implementation.
2. The discounting method is applied under evaluating present value of both innovation capital components. At the same time a discount rate for the first part of innovation capital is knowingly higher than a rate for the second one, as the innovation projects under development are characterized by higher risks.

In accordance with these ideas, innovation capital value can be appraised in terms of modification of a model of total mortgage-investment analysis with following formula:

$$CIC = \left[\sum_{k=1}^{p} \left[\sum_{n=x}^{m} \frac{(NOI - DS)\left(1 - s_{in}\right)}{(1+i)^n} + \sum_{n=1}^{m} I_n \frac{(1+j)^n}{(1+i)^n} \cdot \frac{PIC}{PIC + AIC} - BAL \right]_k \right] + \left[\sum_{k=1}^{p} \left[\sum_{n=1}^{m} I_n \frac{(1+j)^n}{(1+i)^n} \cdot \frac{AIC}{PIC + AIC} + ML \right]_k \right] \quad (1)$$

where CIC - enterprise innovation capital value, rub.;
NOI - annual net operating income from innovation project, rub.;
DS - annual debenture capital maintenance expenses, raised in an innovation project, rub.;
s_{in} - company take of an innovation project;
I - investments in an innovation project, rub.;
PIC - own investment assets, contributed in an innovation project, rub.;
AIC - sought investment capital, contributed in an innovation project, rub.;
BAL - closing unpaid balance, rub.;
ML - a total sum of debenture capital, contributed in an innovation project, rub.;
j - innovation capital value increment rate per annum;
i - an annual discount rate;
n - an innovation project year;
m - quantity of years for innovation project development and implementation, yr;
x - an expected payback year;
κ - an innovation project number;
p - quantity of enterprise innovation projects.

In the presented model the first part of the formula allows us to calculate innovation capital value, financed by own investments, the second part – innovation capital value, financed by attracted funds (investments of third-parties and credit recourses).

Summarizing the results of the conducted research, we draw special attention to those, which have scientific novelty.

1. The structure of intrinsic industrial enterprise value is clarified as well as the place of innovation capital therein is identified. The outstanding features of the author's model of intrinsic industrial enterprise value from the conventional model of market value of a company, offered by Leif Edvinsson, are as follows:
1.1. there are market capital and commercial goodwill in the first level of the hierarchy in addition to financial and intellectual capital;
1.2. innovation capital is on the second level of the hierarchy as an equal component of human and organization capital;
1.3. innovation capital is deemed to be a component, mainly characterized by already developed innovation projects or those projects, which are under development, where an organizational point is important, but do not have the single role. This component is also self-sufficient in the process of intrinsic industrial enterprise value formation.
2. The scope of the concepts of "innovation capital" and "innovation potential" is defined. Innovation capital is a term, qualifying cost of resources, invested in innovation projects, which are under development or already represent the intellectual property, with account of anticipated gain from them. Innovation potential is a measure of enterprise readiness to implement of innovation projects, provided that this readiness measure is mainly characterized by financial, human, material and production resources, as well as market opportunities.
3. The methodology of innovation capital appraisal is developed. Its distinctive features are the following:
3.1. Innovation capital consists of two components: cost of innovation projects under development and cost of innovation projects, implemented or prepared for implementation.
3.2. The discounting method is applied under appraisal of present value of the both components. At the same time the discount rate for the first part of innovation capital is apparently higher than the rate for the second one, in as much as innovation projects under development are characterized by higher risks.

5 Practical relevance

In order to justify practical relevance of the proposed methodology of appraisal of enterprise innovation capital value we will make practical calculations under two innovation projects, having the same annualized gain and the equal financing conditions (Table 1): 1) under innovation project in the

development stage; 2) under innovation project in the implementation stage.

Table 1. The innovation capital value appraisal.

Conditions	The first project	The second project
Annual net operating income from innovation project, mil. rub.	500	500
Annual debenture capital maintenance expenses, raised in an innovation project, mil. rub.	80	80
Company take of an innovation project	0,5	0,5
Investments in an innovation project, mil. rub.	4000	4000
Own investment assets, contributed in an innovation project, mil.rub.	2000	2000
Sought investment capital, contributed in an innovation project, mil. rub.	2000	2000
Closing unpaid balance, mil. rub.	400	400
A total sum of debenture capital, contributed in an innovation project, mil. rub.	800	800
Innovation capital value increment rate per annum	0,15	0,15
An annual discount rate	0,5	0,12
An innovation project year	1-5	1-5
Quantity of years for innovation project development and implementation, yr	5	5
An expected payback year	4	1
An innovation project number	1	1
Quantity of enterprise innovation projects	1	1
Enterprise innovation capital value, mil. rub.	4149	4837

The obtained results of the calculations show that in the context of the same annualized gain and equal financing terms innovation capital value of an enterprise, which innovation project is under development, is 688 mil. rub. lower than innovation capital value of an enterprise, which innovation project is set up. On the basis thereof intrinsic value of the first enterprise is the same amount lower than intrinsic value of the second one under otherwise equal conditions. In the introduced example this is due to different project riskiness level and diverse terms of project start up. Underrun of innovation capital and intrinsic industrial enterprise value can only be compensated through increasing the volume of attracted investment, which will accelerate innovation projects implementation, pull them to financial viability and ensure addition to enterprise financial capital. Employment of this approach requires application of smart investment policy, which implementation will be aimed at increase in investment flow, compounding of innovation capital and financial one as well as at addition of intrinsic value of an industrial enterprise. The presented facts emphasize the importance of innovation capital in the system of management of intrinsic industrial enterprise value and the role of investment in their compounding management.

6 Conclusions

The obtained results affirm possibility of increasing intrinsic industrial enterprise value by innovation capital compounding. Attracted investments, which accelerate innovation projects implementation and their pulling to financial viability that has impact on increase of financial capital and intrinsic industrial enterprise value, are the main regulator of innovation capital value. The following instrumentarium can be applied as the recommendations for capital compounding. It is advisable to reconsider the traditional conditions of outward investments attracting. As follows: venture investors do not really want to finance innovation projects in the stage of their development on the conditions of income acquisition in proportion to the investment in the total capital due to higher riskiness of such projects, as a consequence a planned fraction of the income earned by an investor is to be regulated upward in order to encourage inflow of investments in high-risk projects. When the made recommendation of investment policy improvement is practiced widely, then the efficiency of innovation management could be improved, the processes of innovation capital compounding as well as financial capital increment be accelerated that respectively asserts influence on increasing intrinsic value of an industrial enterprise and its investment attractiveness and creates conditions for a start of some benefits in social and economic development of an industrial enterprise.

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