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Tkachova A.V.,
PhD in Economics,
Makeevka Economics and Humanities Institute

RISK INNOVATION PROJECTS OF ENTERPRISE: SPECIFICITY, TYPES, METHODS OF MANAGEMENT

The article deals with the specific innovation company, it was proposed a comprehensive method of risk management innovation, taking into account risk factors macro and micro level, which allows to make rational management decisions for the project.

Keywords: innovation, innovative product, innovative project, risk, management, macro risk, mikro risk.

Statement of the problem. Every company should strive to develop their innovative capacity, providing production processes with new equipment, technology and the ability to produce new products in the current economic conditions. None of economic relations which is aimed at the successful long-term development does not exist without innovation projects. However, in making decisions on new product development or implementation of other innovative project to consider the risks that inevitably accompany any innovation at all stages of their development and implementation. High level of risk, which is the factor that slows the development of not only companies but also innovative economy and the world is typical for innovative projects. Therefore, the primary task of innovation active enterprises is risk management, the successful solution which adequately constructed within the risk management system depends on the results of innovative projects.

Companies that carry out targeted risk management innovation, not only ensure the successful implementation of projects, but also acquire the image of trusted partners, and as a result – long-term relationships with investors. Thus their resource potential grows and grows the chances in the competition.

Mentioned facts underline the relevance of the issue of risk management innovation of enterprise and determine the need for improved methods of risk management innovation – the process of adoption and implementation of management decisions aimed to reduce appearance of an unfavorable result and minimization of possible losses caused by its realization.

Analysis of recent research and publications. The problem of forecasting and risk management of innovation projects devoted the works of foreign and domestic scholars, such as: V.B. Artomenko [1] I.A. Baieva, N.P. Bashchuk [2] A. Damodaran, P. Drucker, I.T. Balabanov, S.M. Illiashenko [3] S.D. Ilienkova, V.I. Canova [4] P. Lutovinov, O.P. Mazur [5] A.I. Orlov, L.A. Orlova, V.L. Popov, O.M. Ryzhykova [6] O.A. Starodubtseva [2] and others.

Cover of earlier unresolved parts of the general problem. Although a large number of publications devoted to this problem, many aspects of this problem are still not well developed and unresolved. In particular, a number of authors [1; 2] propose the use of risk management of innovative projects the same tool that is used for investment projects, taking into account the specifics of first. It should be noted the lack of scientific elaboration of methods of forecasting tools and risk management innovation company.

The aim of the article is to develop methods of risk management innovation on the basis of an integrated approach, taking into account risk factors of macro and micro level.

The main material. Increased risk of innovative projects require careful and comprehensive estimates, which should not be limited to the identification of major risk factors. Specificity of innovation is the high degree of uncertainty of the environment, long-term implementation and, consequently, a large dependence

on macro factors. The latter property requires that the macro risks (including political, social, economic, technological) in the management of innovation projects of companies.

Methodical approach to enterprise risk management project should be comprehensive and include procedures for their assessment, forecasting and development activities decrease, so it is proposed to carry out in several stages: a preliminary assessment of the competitiveness of product innovation, identifying the most appropriate since its introduction to the market, forecasting internal and external risks innovation project, total project risk, development and implementation of measures to reduce overall risk. The term «innovative product» in this context includes along with the traditional products and services that are innovative in nature, even new or improved manufacturing processes used in the practice of business as well as new approaches to social services.

Previous valuation of the competitiveness of innovative product to avoid risk of rejection by the consumer rejection of those projects, the outcome of which is likely to not be perceived by the market. A similar assessment of the authors work [7] proposes to build a matrix based on «Innovation index– cost of implementing an innovative product ». In theory, the market success of product innovation in general will depend on the ratio of its innovation (in terms of upgrading or improving the ratio «price – quality») and the difference in cost compared to the product of previous generation (in the case of rise functionality).

The level of innovativeness (coordinate y) can be determined by degree of conformity of product innovation attributes (rational character for the consumer and innovation technologies and processes which are used) based on the calculation of innovation index that reflects the assessment of the functions and characteristics of a new product relative features and specifications of product with the previous generation terms of innovation component [8, p. 68]:

$$K_{inovat} = K_f \cdot \alpha_f + K_t \cdot \alpha_t , \qquad (1)$$

where K_{inovat} – rate of innovation;

K_f – rate of functionality of an innovative product;

K_t – rate of technological innovation technology and product manufacturing processes;

α_f, α_t – rate of importance (demand for the product) functional and technical components respectively.

It is assumed that the data base for the calculation of the rate of innovation is composed by peer review. In areas where the product can be quantified, can be quantitative assessment parameters and then transition to the points to be able to compare with other options.

For the second coordinate x should first consider that when comparing the prices of products from different generations can not be limited to the cost of purchasing the product, you must consider the cost of its operation and disposal (if these are present), and the so-called «switching costs». Causes of its appearance may have psychological, economic and mixed character. Psychological reasons can be connected with consumer reluctance to change the habit of using the previous product and the most typical for markets B2C. Economic causes of «switching costs» are typical of markets B2B and linked with the need to incur additional costs of readjustment technology, staff retraining and unavoidable expenses during the period development of new technology.

Thus, the costs of implementing product innovation form the costs of its acquisition and «switching costs» [8, p. 68]:

$$B_{implement} = B_{acq} + B_{switch} , \qquad (2)$$

where $B_{implement}$ – costs of implementing an innovative product, ths. UAH;

B_{acq} – price of the product in its purchase, costs of operation and disposal (in a case of presence), ths. UAH;

B_{switch} – value of «switching costs» ths. UAH.

After calculating the coefficients matrix is constructed «Innovation coefficient – Costs of implementing an innovative product» for innovative products businesses and competitors' products (in a case of possibility), followed by determining the most competitive products enterprise value criterion degree of innovation and the cost of implementing innovation.

Thus, previous estimate by the correlation «coefficient of innovation/implementation costs of the product» allows to select the most competitive and innovative products to reduce the risk of rejection of the product market.

The next step in risk management innovation of enterprise *is determination of the most appropriate period output of an innovative product to market.* This problem is caused by the existence of contradictions that is the necessity to release the product in terms of competition and as late as possible in terms of speed of sales and profitability of the project.

The same innovative product according to the value of «switching costs » can be a disaster at a time and very successful in another. New technologies implemented in various fields which prepare the introduction of products based on similar technology. Thus, the innovation will be introduced later, the ceteris paribus «switching costs» consumers will be less. On the other hand, if too late to market the product as it can be substitutes, which significantly reduce the capacity of the market and create conditions for innovation project failure. From this perspective, the moment of withdrawal of the product on the market can play a main role in its success.

It is generally accepted that function innovative product sales due to the described effect has S-shaped form. If the zero countdown take time planning, the function of sales of innovative product can be expressed by such way:

$$Q(t) = \Delta t + m \cdot \frac{t - \Delta t}{|t - \Delta t|} \cdot \sqrt[n]{|t - \Delta t|}, \qquad (3)$$

where $Q(t)$ – function volume of sales, thing;

t – time parameter, months;

Δt – period of time, needs for introduction of technology;

n – parameter that takes into account speed of growth volume of sales to achieve «peak» moment;

m – parameter that takes into account the speed of growth rate of sales in the «peak» moment.

Based on the graphical representation of functions (3) the approximate amount of product innovation project initiator can choose a time its launch, which will on the one hand, to introduce the product to the market, where the consumer is already familiar with the technology, but on the other hand, identify potential competitors.

Forecast of internal and external risk innovative project of company provides their preliminary identification and qualitative analysis of the risk factors of the project, and then formed a list of the most significant risks. Combination of internal and external risk innovative project from the viewpoint of regulation should be considered separately at the micro and macro level.

For the formation of macro risk innovative project is used well known PEST-analysis, was point out four types of macro risk on its base:

- political risk (one of the index BERI (Business Environment Risk Index) Political Risk Index (PRI), World Political Risk Forecast (WPRF), International Country Risk Guide (ICRG), POLICON, Oxford Analytical Data (Political));

- ecomonic risk (one of the index BERI Foreland, World Economical Risk Forecast (WERF), Institutional Investor's Country Credit Rating, Euromoney's Country Risk Index or fund indexes);

- social risk (as indicator – state budget costs per capita, Consumer Price Index – CPI);

- technological risk (fluctuations in the share of expenses on research and development work).

These risks (political, economic, social, technological) can be supplemented by legal, ecological risks and others if it is necessary.

Macro risk forecast is built on the project term lasting on a base of their dynamics, then by expert method determined the effect of each macro risks of innovation of the whole project and the calculation of aggregate macro project:

$$R_{macro} = \frac{\sum_{i=1}^{n} (R_i - K_i) \cdot W_i}{B_{\max}} \qquad (4)$$

where R_{macro} – aggregate macro risk innovation project, $0 < R_{macro} < 1$;

R_i – expert assessment of the probability of the i macro risk innovative project, score;

K_i – mart of the degree of preparedness realization of the i macro risk project, score;

W_i – index of importance of the i macro risk, part of unit;

i – number of macro risk, $i = \overline{1, n}$;

B_{max} – maximum score on a scale of peer review.Species classification of mikro rysks innovative project enterprise should present a management process at the stages of

research and development, patent, application to production and marketing of innovative products:

- risks of incorrect organization research process (receiving negative results of research, failure of planned technical parameters in the design and technological development);

- risks associated with the provision of property rights (risk of low volume of patent technical, graphic and marketing solutions, risk protesting patents protect fundamental decisions innovations)

- risks of incorrect choice of economic objectives of the project (unwarranted definition of priority of general economic and market strategy, wrong forecast conditions in capital markets procurement and supply);

- the risks of failure of innovation funding (risk of no provision source of financing of project, risk of nonoperation of chosen method of financing the project);

- risks of project term delays (risk of nonschedule cost, the risk of deviations from the planned schedule of income);

- market risk capital procurement and supply current (risk nonfinding suppliers of unique resources, due to the technical characteristics of the project, the risk nonfinding suppliers in procurement prices, projected);

- marketing sales risks (risk of incorrect choice of target market segment, the risk of an erroneous choice of innovative product sales strategy);

- risks of interaction with contractors and partners (risk of delays partners current liabilities, the risk of entering into a contractual relationship with the incapacitated or insolvent partners, contractors);

- risks and unforeseen expenses exceeded budget project (risk of future increase in interest rates on loans for the project, the risk of growth of market prices for resources to be purchased in the next stages of the project);

- unforeseen risks of competition (the risk of local young competing firms, the risk of entry into the sector of firms from other diversified industries).

The cumulative micro risk innovation project of enterprise is calculated by analogy with macro risks:

$$R_{micro} = \frac{\sum_{j=1}^{m} (r_j - k_j) \cdot w_j}{B_{\max}}, \quad (5)$$

where R_{micro} – cumulative micro risk of innovation project, $0 < R_{micro} < 1$;

r_j – expert assessment of the probability realization of the j mikro risk innovative project, score;

k_j – assess the degree preparedness of realization of the j mikro project risk, score;

w_j – index of importance of the j mikrorisk, part of unit;

j – number of micro risk, $j = \overline{1,m}$;

B_{max} – maximum score on a scale of peer review.

The cumulative risk innovative project as a whole is proposed to determine on the basis of the following formula:

$$R_I = 0{,}4 \cdot R_{macro} + 0{,}6 \cdot R_{micro}, \quad (6)$$

where R_i – cumulative risk innovative project of company;

R_{macro} – cumulative macro risk innovative project, $0 < R_{macro} < 1$;

R_{micro} – cumulative micro risk innovative project, $0 < R_{micro} < 1$.

Table 1

Matrix management decisions for individual making decision, which is moderate optimist

The cumulative micro risk of project	The cumulative macro risk of project			
	low (less 0,2)	moderate (from 0,2 to 0,4)	high (from 0,4 to 0,6)	critical (more 0,6)
low (less 0,2)	adoption of the project	adoption of the project	adoption of the project	refusal from the project
moderate (from 0,2 to 0,4)	adoption of the project	adoption of the project	adoption of the project	refusal from the project
high (from 0,4 to 0,6)	adoption of the project	adoption of the project	refusal from the project	refusal from the project
critical (more 0,6)	refusal from the project	refusal from the project	refusal from the project	refusal from the project

Table 2

Defining measures neutralization of risks of innovative projects on the stage of research and development work and patenting

Stage of project realization	Level of risk	Types of risks	The costs of overcoming risk by types of measuresloss in the case of risk realization, UAH.				
			avoiding	*lowering*	*insurance*	*hedging*	*Acception of the risk*
Research and development work	critical	risk 1	2500	-	2000	4500	12500
		risk 2	1000	1250	1750	1500	5000
	high	risk 3	1000	-	1750	750	1250
		risk 4	500	-	1000	1500	500
Patenting	critical	risk 5	5000	5000	4500	4000	16250
	high	risk 6	4000	3000	4250	2000	6250

Table 3

Effectiveness indexes of risk management of innovation project

Name of index	Calculation	Characteristics	Conventional signs
(EV, Earned Value) budget of risk management program	$EV = IMP_{\%} \cdot BAC$	Really made amount of work specified in the budget	*EV – earned value;* $IMP_{\%}$ *– percent of the project realization; BAC – planned budget of risk management; AC – factual budget of risk management program; CV – deviation in value budget; FCV – relative budget savings of risk management program; CPI – performance index value*
Фактичний бюджет (AC, Actual Cost) програми управління ризиками	-	The real value of the works of risk management program	
(CV, Cost Variance) budget risk management	$CV=EV–AC$	The difference between the earned value and the actual budget	
(FCV, Fractional Cost Variance) budget risk management program	$FCV=CV/EV$	The correlation of savings budget risk management (deviation in value) and the current earned value	
(CPI, Cost Performance Index)	$CPI=EV/AC$	The correlation of earned value and actual budget	

Indexes 0.4 and 0.6 characterize the importance of macro-and micro risk innovative project of enterprise accordingly. These meanings are determined according to the provisions micro risks directly affect the implementation of innovative projects at various stages, and the impact of macro risk is indirect, that is why are less significant.

In order to solve the problem of accepting or rejecting the innovation project risk assessment it is proposed to build a matrix management decisions (table 1). The basis of allocation of risk levels based on the analysis of previous projects of enterprises and peer review. Analysis of enterprise projects and expert assessment was put in base of risk levels.

In making decision to implement the innovation project should be considered as the total risk of the project R_1, which should not exceed the maximum level. In case the project to implement the next step should be *program development of preventive measures.* It is necessary to consider only significant for the innovation project risks in order to prevent undue increase in the program budget risk management and thus reduce the efficiency of the innovation project.

After identifying the most significant risk innovative project for each of them, depending on the level of risk determined by the least costly measures neutralizing or risk taking (into account the costs of overcoming the consequences of risk taking). In table 2 presents measures of risks neutralization of innovation projects under research and development work and patenting. Similar calculations are made for the implementation stages in the production

and marketing of innovative product and then formed a program of activities and budget for their implementation.

Evaluating the effectiveness of risk management enterprise innovation project should be performed on the basis of earned value techniques are well known in the theory of project management [9]. Indexes of effectiveness of this technique are given in table 3.

It is possible to judge the effectiveness of the existing program of risk management innovation project company on the base of indicators *CV*, F*CV* and *CPI*. Positive values of indicators *CV*, F*CV* give evidence of savings budget risk management in innovative projects. Talking about index value *CPI*, it should be noted that in case of overcosts of funds it matters less than one, while saving is more than one.

Conclusions and propositions. Using the technique of risk management of innovation projects allows companies to fully and comprehensively evaluate all project risks, manage the process of risk management and making decision on implementation or rejection of the innovation project, to generate the most economic program of neutralizing the risks and introduce measurable performance risk management process innovation project.

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