The methodology of target programming of the evaluation innovative projects effectiveness

Aliya Raifovna Kharisova and Aidar Sultangalievich Puryaev

Kazan (Volga region) Federal University, Naberezhnye Chelny Institute, Mira Str., 68/19, 423810, Naberezhnye Chelny, the Republic of Tatarstan, Russian Federation

Abstract. The analysis of the position of the innovation sector in the Russian Federation was held. The problem of evaluating the effectiveness of innovative projects was considered. A method for evaluating the effectiveness of innovative projects was proposed, which based on target programing using a particular set of criteria, such as economic, social, technical, technological, environmental and ext. The proposed method can be used to evaluate the effectiveness of innovative projects, in cases where for investors and company management are important the various criteria for evaluating.

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Introduction

In the last few years, the stir around innovative technologies and innovation is gradually fading in general. Experts explain this phenomenon of market maturity. Not every venture project could interest investors at this time, as it was, for example, in 2008, at the peak of innovation. Now becoming increasingly important qualitative assessment of the effectiveness of the proposed new developments and innovative projects.

Research and results

Analysts of French business-school INSEAD, Cornell University and the world intellectual property organization put Russian federation on 62 place of 142 on the level of innovation development in the ranking Global Index 2013. This study takes into account a lot of criteria presented in addition to the volume of investment and the business environment is also an effect that innovation for economy of the state.

In the last few years apart from the competition are countries such as Switzerland and Sweden, which for many years been established infrastructure for implementing high-tech ideas into specific products and technologies. Of course, countries that do not suffer of economic and political upheavals for many years, have a more stable economy and favorable business conditions, including the venture. Economic and political stability are the guarantor for investors looking to increase their profit through investments in innovative projects. But Russian Federation does not have such stability yet and, sadly, is in the middle of the ranking, between Jordan and Mexico. Indeed, Russian Federation overtaken by Moldova and Armenia, 45th and 59th places respectively [1]. We should also note that we have lost our positions compared with 2012, when Russia was 51 line rating.

The main reasons for this situation, experts consider investors reduced activity, the outflow of capital from Russia and the deterioration in the business environment. A downturn in the market innovations noted in all the BRIC countries: Brazil and (-6 points) and India (-2 points), and China (-1 point) also lost their positions in the ranking [1].

The situation in Russia is due in our opinion the following. At first, it is unprofitable to invest great funds in risky innovative projects. Attracting investors is becoming more challenging, given the recessionary situation in the economy, and credits are often inaccessible luxury. Domestic banks lend small businesses under the 15–20 % per annum and this by 8–13 points above inflation. According to the Bank of Russia Russian debt growth of small and medium-sized businesses to banks over the past year was 13,9 % [2]. At second, state slows the development of innovative market as the main customer of high technology. About 75% of all organizations involved in developments in Russia state-owned. A state-owned enterprises are usually inflexible and difficult to adapt to the market. The share of industrial enterprises engaged in development, is only 6,8%, the share of schools – 15%, which too little for the normal development of the innovation market and the implementation of innovative projects. Besides, the state tends to fund basic research and development that business are not of interest, because the practical effect of such research will be felt not immediately.

However, experts Dow Jones VentureSource noted a positive trend in investments in venture projects. Their volume in the innovation sector in Russia has grown almost 10 times in 2012 compared with 2009 (from 26 million euros to 236,6 million

euros) [3]. Despite the upward trend in inflows this sector, there is a «fly in the ointment»: private companies that are establishing your business venture and effectively implement innovative projects, reaching a certain height, prefer to transport their business abroad. Opacity of the economy and business in Russia forcing them to export their capital and development outside of our state.

Ensuring transparency and efficiency of innovative projects is quite acute [4]. It is no secret that the social and environmental impact of innovation is more interested in the public authorities than ordinary businessmen whose aim is to increase income and, consequently, only the financial impact of innovation. Recently, however, the tendency of evaluating innovative projects by various criteria: economic, social, technical, technological, environmental, etc. Multicriteriality assess the effectiveness of innovative projects involves the use of a mathematical apparatus. Effective method for adequate functioning principles of the modern economy is a programming [5, 6]. We propose, in particular, to use a methodology to assess innovative projects on the basis of the methodology targeted programming.

Targeted programming is a relatively new concept, which aims to help in the development of management decisions in a many purposes. The main condition of linear programming is the presence of a single, explicit and quantitative determination of optimality criterion as the objective function. Usually it is the minimum cost or maximum profit. But the practice of economic activity shows that this is not the most important aims that we have to formulate and solve planning work for the future. The targeted programming can solve this problem.

The effectiveness of any project is characterized by many indicators, such as profitability, environmental of technology or product, macroeconomic significance, ecological and social responsibility, etc. Suppose we have a set of criteria, on which the score. Each of them it is desirable to maximize the set of possible solutions. In accordance with the methodology targeted programming believe that the criterion space is given a non-empty set, which is called the set of ideal vectors. It is assumed that this set is unattainable, i.e. equality holds $V \cap Y = \varnothing$, where Y denotes the set of possible vectors, i.e.: $Y = \varphi(X)$.

In addition, the criterion space R^m is given a numerical function $\rho = \rho(y, z)$ that each pair of vectors y and z space criterion compares certain non-negative number, where y, z – criterion space vectors.

In accordance with the methodology of targeted programming the optimal solution (best or the most satisfactory) will be considered such a solution for which the equality is right:

$$\inf_{y \in V} \rho(\varphi(x^*), y) = \min_{x \in X} \inf_{y \in V} \rho(\varphi(x), y) \quad (1)$$

where $\inf_{y \in V} \rho(\varphi(x^*), y)$ – exact (highest) lower bound, or infimum of function $\rho(\varphi(x^*), y)$, meaning that the vector corresponding to the optimal solution, should be placed on a variety of ideal vectors at a minimum distance. The choice of metrics is made from a parametric family:

$$\rho_a^{(s)}(y, z) = \left(\sum_{i=1}^{m} a_i \left| y_i - z_i \right|^s \right)^{1/s} \quad (2)$$

where $s \geq 1$ and $a = (a_1, ..., a_m)$; $a_i > 0$ for all $i = 1,2, ..., m$.

Changing a parameter vector is taken into account «disparity» criteria. Criterion with greater «value» component of the vector corresponds to a large value. In the particular case when projects are compared by two parameters $s = 2$, and $a_i = 1$, $i = 1,2, ..., m$, i.e. equivalent criteria used, the Euclidean metric [7,8]:

$$\rho^{(2)}(y, z) = \sqrt{(y_1 - z_1)^2 + (y_2 - z_2)^2} \quad (3)$$

It is expedient to identify the information about the relative importance of criteria at the beginning and comparing projects carried out already to the coefficients of importance of criteria [9,10]. The formula for determining the effectiveness of the innovation project, for example, based on five criteria will be as follows:

$$\rho^{(5)}(y^{(i)}, 0) = \sqrt[5]{\overline{y}_1^{\,5} + \overline{y}_2^{\,5} + \overline{y}_3^{\,5} + \overline{y}_4^{\,5} + \overline{y}_5^{\,5}} \quad (4)$$

where $\overline{y}_i$ – modified the criteria values.

Conclusion

We distinguish five groups of criteria:

1. Organizational and significant criteria: stability of the organization, the degree of influence of financial expenses and deferred profit on the state of the organization, the degree of risk to the organization.

2. Technical and technological criteria: the probability of technical success, patentability, the

availability of necessary resources for the implementation of the project.

3. Environmental criteria: air pollution, noise, vibration, water pollution.

4. Economic criteria: the need to attract credits, internal rate of return of the project (*IRR*), net present value of the project (*NPV*), payback period (*PP*).

5. Social criteria: safety product or technology, increasing employment.

This approach makes it possible to assess the effectiveness of innovative projects, using a variety of criteria and choose the most effective option for a particular company. The above method can be used to evaluate the effectiveness of innovative projects, in cases where the investor and the company's management is important to achieve the aim, taking into account simultaneously conflicting evaluation criteria.

Corresponding Author:
Dr.Kharisova Aliya Raifovna
Kazan (Volga region) Federal University, Naberezhnye Chelny Institute
Mira Str., 68/19, 423810, Naberezhnye Chelny, the Republic of Tatarstan, Russian Federation

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