Formation of Methods for Estimating the Economic Efficiency of Innovation Project

Yerkin Nesipbekovich Nesipbekov and Raziya Maratovna Ashimova
Kazakh National Pedagogical University named after Abai, Almaty, Kazakhstan

Abstract: Economists have long recognized that innovation is central to economic growth and development. But as a profession, economics is just beginning to model the many types of innovations that exist and the amazing heterogeneity in the firms that conduct research and development--from General Electric to Silicon Valley start-ups. A complete system of indexes to evaluate the global efficiency of a new product development project must approach at least the following perspectives: the financial performances of the project; the project's value; the technical performances of the project; the efficiency of research and development activities of the project; the capacity of fitting in the estimated cost and duration of activities; Therefore, in this paper is drawn up a method for new product development projects evaluation, based on those seven perspectives. It should be noted that innovation projects are usually accompanied by large public benefits compared with investment projects, as more often than not they have social and economic performances for the society including the related sectors of the economy, environmental, social and other non-economic effects. This is even more true for innovative projects in transport.

Key words: Innovation project • Innovative projects in transport • Financial performances • Evaluation method

INTRODUCTION

One of the problematic aspects of the decision-making on innovation projects is the lack of a unified concept to assess their cost-effectiveness. Some of the sources [1], [2], [3] recommend basing on the provisions of the UNIDO methodology [4] and the guidelines for evaluation of investment projects [5] providing the evaluation of two types of effectiveness:

- Effectiveness of the overall project;
- Effectiveness of participation in the project.

In the organizational context, innovation may be linked to positive changes in efficiency, productivity, quality, competitiveness, market share and others. However, recent research findings highlight the complementary role of organizational culture in enabling organizations to translate innovative activity into tangible performance improvements [6].

The first assessment is used to determine the potential attractiveness of the project for potential participants and to find the sources of funding. The second one is used to test the feasibility of the project and the interest of all its members. It is important to determine whether the project is socially significant or local. It influences the specification effectiveness evaluation stages.

Methodology and Data: In business and economics, innovation is the catalyst to growth. With rapid advancements in transportation and communications over the past few decades, the old world concepts of factor endowments and comparative advantage which focused on an area’s unique inputs are outmoded for today’s global economy. Economist Joseph Schumpeter, who contributed greatly to the study of innovation, argued that industries must incessantly revolutionize the economic structure from within, that is innovate with better or more effective processes and products, such as the shift from the craft shop to factory. He famously asserted that “creative destruction is the essential fact about capitalism.” [7] In addition, entrepreneurs continuously look for better ways to satisfy their consumer base with improved quality, durability, service and price which come to fruition in innovation with advanced technologies and organizational strategies. [8] One prime example is the explosive boom of Silicon Valley
startups out of the Stanford Industrial Park. In 1957, dissatisfied employees of Shockley Semiconductor, the company of laureate and co-inventor of the transistor William Shockley, left to form an independent firm, Fairchild Semiconductor. After several years, Fairchild developed into a formidable presence in the sector. Eventually, these founders left to start their own companies based on their own, unique, latest ideas and then leading employees started their own firms. Over the next 20 years, this snowball process launched the momentous startup company explosion of information technology firms. Essentially, Silicon Valley began as 65 new enterprises born out of Shockley’s eight former employees [9].

The project is socially significant if the results of its implementation are important to the society and meet one of the following requirements:

- The project is global, it affects the economic, social and environmental situation in the world;
- The project is economic, it has a significant impact on the economic, social and environmental situation in the country;
- The project is large-scale, its implementation significantly affects the economic, social and environmental situation in particular regions or industries of the country (while its evaluation we should not consider the impact of the project on the situation in other regions or industries);
- The projects not significantly affecting the economic, social and environmental situation in the region and not altering the level and structure of prices on commodity markets are local projects. A local project can be assessed by the participant of the project as large or small depending on its affects on the total turnover or the income of the company.

It should be noted that innovation projects are usually accompanied by large public benefits compared with investment projects, as more often than not they have social and economic performances for the society including the related sectors of the economy, environmental, social and other non-economic effects. This is even more true for innovative projects in transport.

The structure of the conceptual model of evaluating the effectiveness of the innovative project can be presented in the following diagram (Figure 1).

For assessment of the social effectiveness we suggest you to use the qualitative characteristics as the most appropriate for innovative projects.

For example, the qualitative indicators of social effectiveness of innovative projects in the rail sector of Kazakhstan can be:

- The expansion of trade-economic, scientific-technical and cultural relations;
- The growth of freight and passenger traffic;
- The growth of transit traffic;
- The growth of exports;
- The impact of the projects of replacement the locomotive fleet on the environment and human health;
- The enhancement of industrial and innovative development of the country and as a result strengthening of the national security.

Most of these indicators are quantitative, but they are not comparable with the economic results of the innovative project and only describe the qualitative effects of its implementation.

The calculation of quantitative indicators of the innovative projects’ social effectiveness requires determining in the cash flows the cost parameter of the effects of the project’s implementation in other areas of the economy. However, this calculation is quite complicated or not possible for innovative projects.

Thus, the social effectiveness indicators take into account the socio-economic effects of the innovative project for the society, including both immediate benefits and costs of the project and the "external" costs and benefits in the related sectors of the economy; environmental, social and other non-economic effects. In case of unsatisfactory social effectiveness such projects are not recommended for implementation and do not qualify for government support.

If the projects’ social effectiveness is sufficient, then their commercial effectiveness is evaluated. The indicators of the project’s commercial viability take into account the financial implications for the participant implementing an innovative project in case of his/her paying charges for the project and benefiting the results. If there is a lack of commercial viability of socially significant innovation project then it is advisable to use various forms of support and improve the commercial viability of the project to an acceptable level.

The objectives of evaluation of the second type of project efficiency (participation in the project) according to are a refinement of participants, determination the financial feasibility and effectiveness of participation in the project each of them.
1. Overall performance measurement of the project

- Is the project socially effective?
  - Yes
    - Determination of commercial efficiency
      - No
        - Review and assessment of options to support the project. Evaluation of commercial efficiency in terms of support
      - Yes
        - The project is ineffective
    - No
      - The project is ineffective

2. Determination of organizational-economic mechanism of the project and its membership

- Determination of organizational-economic mechanism of the project and its membership. Development of financing schemes for the financial feasibility of each of the participants

Graph 1: Structure chart of the conceptual model of assessing the effectiveness of the innovation project

Effective participation in the project includes:
- Effectiveness of the enterprises’ participation in the project (project efficiency for enterprises-participants);
- Effectiveness of investing in shares of the company (effective for shareholders of joint-stock companies - participants of the project);
- Effectiveness of participation in the project the structures of a higher level with respect to the companies - participants of the project, including the regional and national economy;
- Effectiveness - for some regions and the national economy of Kazakhstan;
- Branch efficiency - for certain branches of the national economy;
- Financial and industrial groups, associations of companies and holding companies;
- Budgetary effectiveness of the project (effectiveness of state participation in the project in terms of expenditure and revenue of all levels budgets).

However, an innovative project as a rule has a much larger number of participants in comparison to the investment project. Besides the classical participants of the investment process - the initiators of the project, investors, creditors, etc., in an innovative project an equally important role is played by research and development organizations, marketing agencies and venture funds. It complicates much the innovative project and increases the risks of its implementation as each additional member of the project is an additional source of uncertainty or risk. At the same time, additional participants are interested in good results of an innovative project, so it is possible to measure the effectiveness of innovations for each of them.

As far as we known [10], [11], to estimate the efficiency of the investment project we need the most recommended indicators:
- Financial return on investment;
- Indices of costs’ and investments’ profitability;
- Net present value;
• Internal rate of return;
• Payback period;
• Need for additional funding (other names - pF, project cost, risk capital).

But using these indicators to measure innovation project it must be taken into account the specifics of the latter.

Thus, the index of “financial return on investment” (ROI - return of investment or ARR - accounting rate of return) is calculated on the basis of the project’s annual net income (PN) and the residual value of the project. However, it is difficult to forecast earnings for the innovative project (PN) and residual value due to the unpredictability of the market response to innovation and price risk. Therefore, we believe that this index can only be used as part of a preliminary assessment of innovative projects.

The choice of the discount revenue rate plays an important role in estimation of “indices of costs’ and investments’ profitability" and “net present value” indicators.

In practice, the predominant are two ways of determining the discount rate. In both cases, the discount rate is defined as the rate of return expected by investors. However, the use of NPV indicator in its traditional form may prefer cheap obsolete projects.

Roughly, the last type of risk for innovative projects is recommended to estimate from 13% to 20% as while income discounting it is necessary to consider rapid obsolescence of innovation at an early stage of implementation.

However, the use of NPV indicator in its traditional form may prefer cheap obsolete projects.

The complexity and duration of the innovative projects require several discount rates and estimated "zero" period, which does not necessarily coincide with the implementation of major expense. Implementation of the innovative projects increases the probability of not accounting the additional effects that may not be subject to valuation. Therefore, the comparison of innovative projects on the net present value (NPV) is ambiguous.

NPV indicator is inconvenient because it requires the full forecast of cash flows including the cases when we cannot make such a forecast.

In the case of an innovative project while calculating the index of returns and net present value it is insufficiently to discount only revenue. The calculation formula should include the cost discount index; because investment costs in innovation projects as a rule are carried out not recurrently, but in stages, even after the sale. But it does not necessarily to take the costs discount rate equal to the income discount rate.

Internal Rate of Return (IRR) depending on the party for which it is calculated, must take into account not only the basic cash flows of the project, but the valuation of additional effects of the innovation project. Besides,
the innovative projects often have a multiplicity of effective values of IRR, as cash flows can be extremely heterogeneous. This issue is discussed in detail by Abdygapparova S.B. [12].

The rate of inflation is different for individual components of resources (input and output),

- The rate of inflation is the same for various components of costs and expenses.

Under either option accounting for inflation is different. Usually evaluation of innovative projects is first done at the design parameters (such as revenue, investment costs, etc.) and then by accounting uncertainty and risks. But as for the inflation, we should make assumptions that worsen the performance of the project as the forecast of exact values of inflation, if it is possible, is a task more difficult than the determination of the least profitable values (for innovative projects). Therefore, methods to account the effects of inflation from the very start are based on the general principle of "moderate pessimism". Its essence is to ensure that the conditions of the project should be taken so that:

- The real ones were better than expected;

Deterioration of the alleged conditions of realization when compared to the actual ones would not be excessive.

Based on the above, we have the following accounting for the effects of inflation.

- Assigning an arbitrary index of general inflation, we should determine whether the innovative project of the type of "production" or "trade".
- Then, on the basis of expert estimates we calculate the index of general inflation. In this case, to establish the effectiveness of the project, as well as in cases where choosing a loan scheme the real interest rate is taken as the initial one, or the other measures to reduce the medium-term effects of inflation (for example, the adjustment of interest rates with changes in inflation), for a project of the type of "production" we should focus on the likely upper limit of the inflation index values in calculation, for a project of the type of "trade" - on the lower limit (it can be set equal to one).

Use of the mentioned above methodology will allow to make adjustments to the cash flows and to increase the validity of calculations and objective decision making.

CONCLUSION

Thus, the structure of the methodology for assessing the effectiveness of an innovative project, as well as an
innovative project itself, can be divided into two types of assessment: the effectiveness of the whole project and the effectiveness of participation in the project. However, in contrast to the investment project, an innovative project is necessarily socially significant; otherwise it cannot be attributed to the innovative projects. In terms of the content we can speak of the significant differences in the evaluation of innovative and investment projects. In forming the methodology for assessing the effectiveness of an innovative project as opposed to an investment project it should be considered:

- The availability of "zero" period, which does not necessarily coincide with the implementation of major monetary costs;
- The floating rate of discount, not only based on incomes but also on the costs;
- The complex multi-step schemes of financing;
- The increase of the number of participants in the innovation project and their interests;
- The impact of inflation;
- The increase of uncertainty and hence risks almost in half.

The evaluation of innovative projects should be carried out taking into account the entire extra effects, both positive and negative, arising from the introduction of innovations. This is especially true for the projects cooperating with the state. For example, an innovation introduced in one industry can cause a positive result in the other. It is important for the state to have a positive economic impact in other industries and besides, the effect in the environment and social spheres. This must be taken into account in the implementation of innovative projects in the railway sector.

Thus, it is question about the broader concept than economic efficiency; it is question about the social effectiveness.

REFERENCES