

# ASSESSMENT OF INNOVATIVE PROJECTS IN THE ROCKET AND SPACE ENGINEERING

Yu A Anikina<sup>1</sup>, M A Ragozina<sup>1,2</sup>, Yu N Malanina<sup>3</sup> and D V Kurako<sup>1</sup>

<sup>1</sup>Reshetnev Siberian State University of Science and Technology, 31 Krasnoyarsky Rabochny Av., 660037, Krasnoyarsk, Russia

<sup>2</sup>Siberian Federal University, 79 Svobodny Av., 660041, Krasnoyarsk, Russia

<sup>3</sup>Irkutsk State Transport University, 15 Chernyshevsky St., 664074, Irkutsk, Russia

E-mail: yuliamalanina@mail.ru

**Abstract.** The article deals with the methodological assessment of innovative projects of the rocket and space engineering enterprises. Here are analyzed all the main features of the project such as the multi-stage, the investment and the innovation efficiency, specific risks, the economic development of the enterprise based on project efficiency, the social efficiency, the environmental efficiency and the application of non-standard forms of financing, such as government or venture capital, business angels, etc.

## 1. Introduction

In a market economy, innovation is based on the implementation of specific projects aimed at the development and construction of effective materials, devices, equipment, machinery, technologies or technological processes [1]. The main task of innovative projects assessment of the rocket and space engineering is to assess the scientific and technical level of the project for obtaining the product, the possibility of its implementation and effective functioning. Based on the assessment, a decision on the appropriateness and amount of funding is made. The lack of a unified methodological basis for the innovative projects assessing of space and rocket engineering explains the relevance of developing a methodology for innovative projects assessment [2].

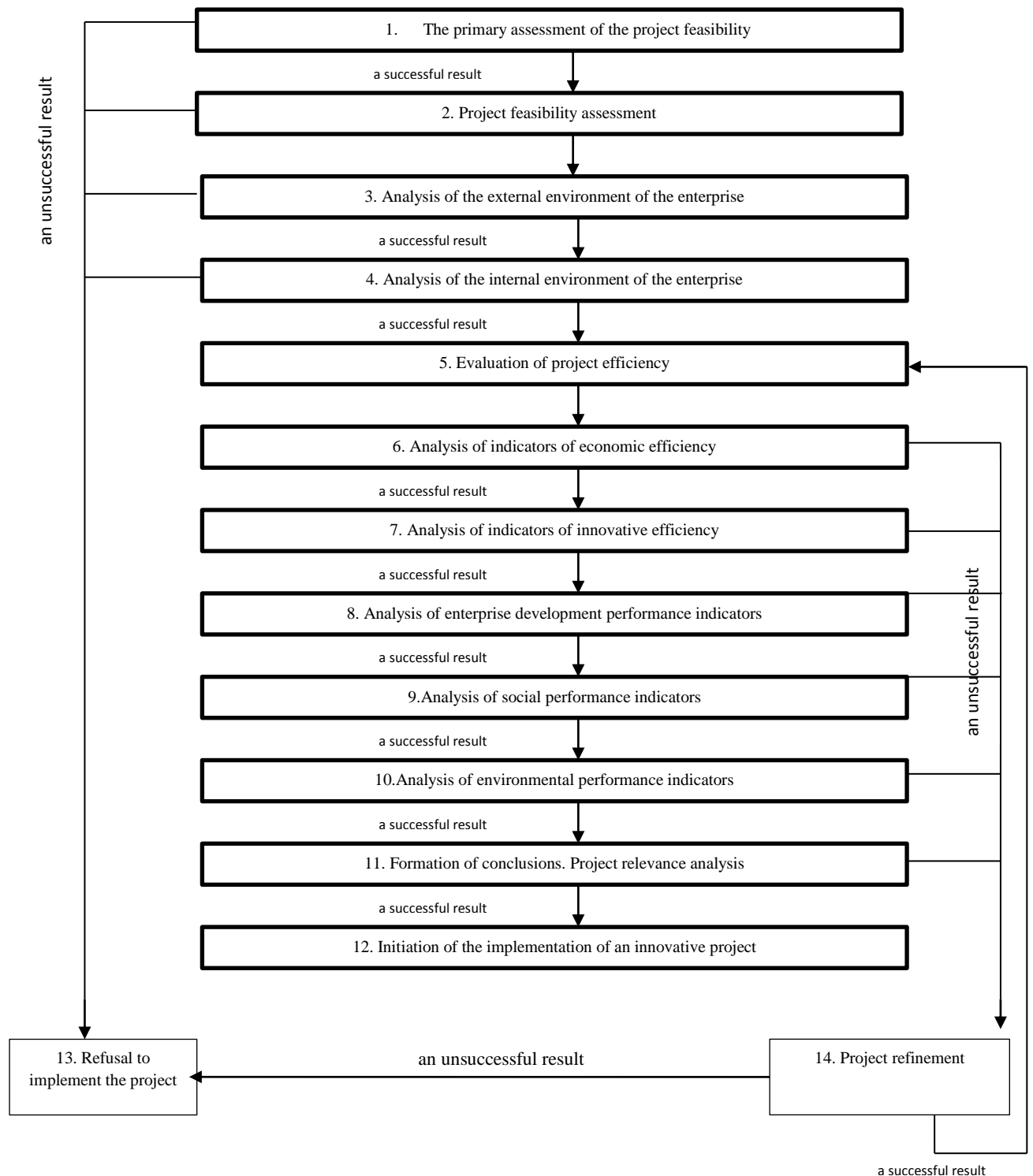
## 2. Methods and results

When deciding whether to implement the project of the rocket and space engineering enterprise, it is necessary to take into account many factors that affect the success of such a project. Assessing the success of an innovation project is a complex and multifaceted process, which, for clarity, should be divided into several main stages:

- assessment of the feasibility of the project;
- assessment of the project results;
- assessment of the relevance of the project [3].

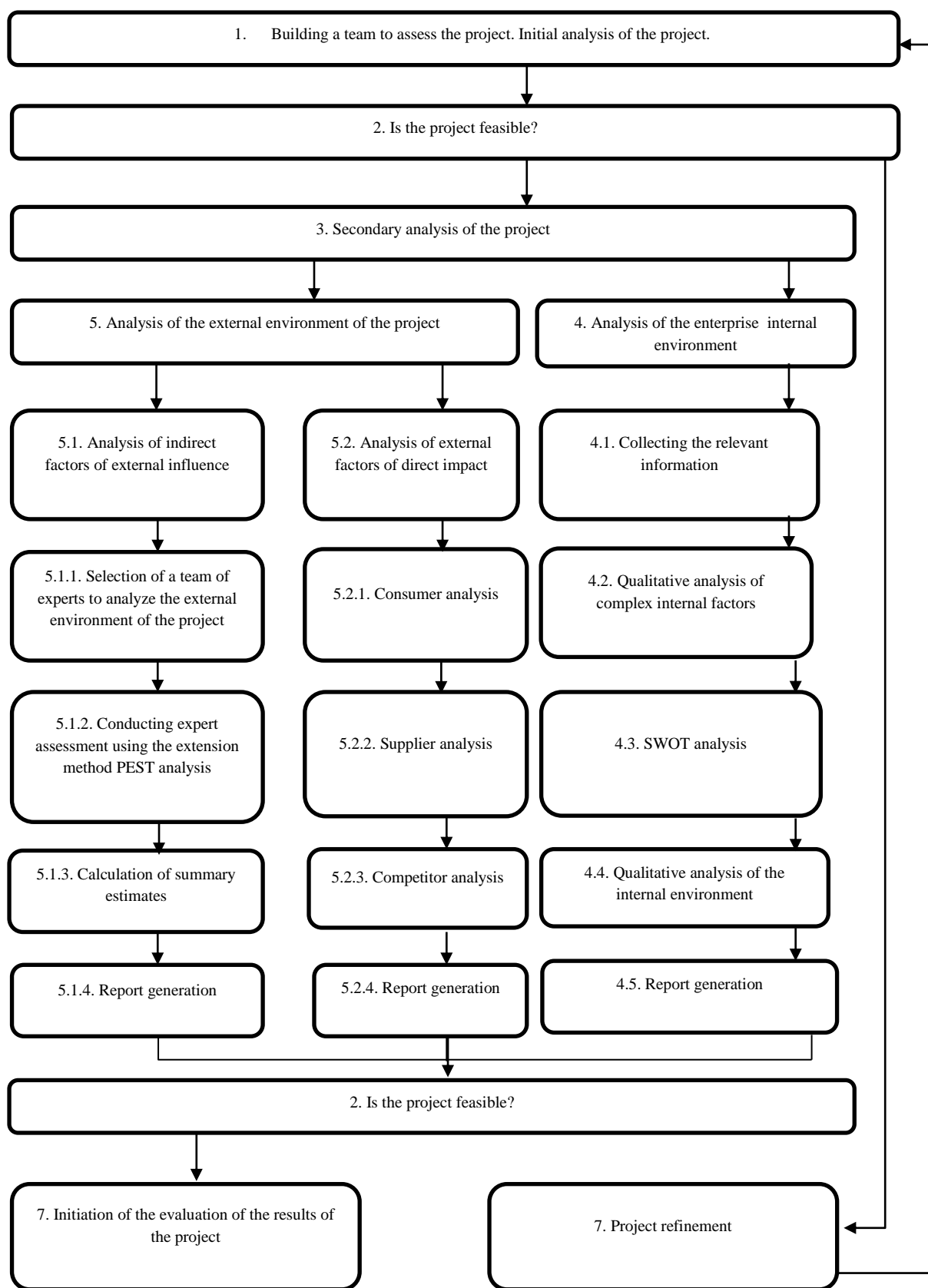
The scheme for assessing innovative projects of the rocket and space engineering according to the proposed methodology is presented in figure 1.

At the initial stage of assessing the project effectiveness, the relevance of the declared project is assessed [4]. In other words, it is necessary to determine the correspondence between the goals of the project and the problems existing in the industry at the current time. It is necessary to determine the



**Figure 1.** The scheme for assessing innovative projects

specifics of the project associated with the characteristics of the market segment. The scheme for assessing the relevance of an innovative project, according to the proposed methodology, is shown in figure 2.



**Figure 2.** The scheme for assessing the innovative project feasibility

To assess the innovation project according to the developed methodology, a team of specialists (groups of specialists) of different areas is created at the enterprise, the purpose of which is to assess the proposed innovation project. The project team manager is appointed to take responsible for assessing the innovation project and coordinating team members.

At the first stage, each specialist conducts a primary analysis of the project, based on the available information, and gives a conclusion about the possibility of implementing the proposed innovative project at the enterprise, in its area of competence.

Based on the reports received, the project manager answers the question about the relevance of the proposed innovative project for a specific enterprise. If the project is relevant, according to the manager of the innovative project assessment, it initiates a secondary assessment of the project relevance, with the involvement of additional funds and resources to obtain a more detailed analysis. If the project is deemed not relevant at this stage, the project is recognized not to be implemented at this point in time and is sent for revision to the project developer, with all critical remarks.

At the stage of the secondary analysis of the relevance of the project, a detailed analysis of the influence of the external and internal environment of the enterprise on the possibility of effective implementation of an innovative project is carried out. For a reliable and thorough verification of the relevance of the innovation project, two parallel processes are initiated to assess the external and internal factors of influence on the innovation project [5]. Each group of factors undergoes a qualitative and quantitative analysis. The results of the qualitative analysis are generated in the reports, the results of the quantitative analysis are generated in the form of tables.

Assessment of external factors affecting the innovation project is carried out by analyzing the impact on the project from external factors of indirect impact (the state of the world and national economy, public mood, socio-cultural and political factors), as well as external factors of direct impact (consumers, suppliers, competitors, government bodies).

To assess the impact of external factors of indirect impact, it is proposed to use an improved method of PEST analysis, supplemented by the method of expert assessments.

To assess the external factors of direct impact is supposed to derive an integral indicator of the influence of factors of direct environmental impact. For its calculation, it is necessary to evaluate each of the factors: consumers, suppliers, competitors, according to different methods by the project team. Evaluation of each factor involves the introduction of a score, indicating the degree of influence of this factor on the estimated innovative project.

Analysis of factors of the internal environment of the enterprise is designed to assess the internal strength of the enterprise. This analysis identifies internal reserves and potential weaknesses that may affect the implementation of an innovative project. As part of the analysis, a qualitative and quantitative analysis of the internal environment of the enterprise is performed.

After assessing the factors, we calculate the integral index of the impact of factors on the following formula. The higher the value of this indicator for assessing external factors of influence, the more favorable is the impact of the external environment.

$$Index = \frac{EI + EE + DI + IE}{3},$$

where  $IE$  is an index of the internal environment,  $EI$  is an environmental index of indirect impact and  $EE + DI$  is an index of the external environment of direct impact.

The project appraisal manager, responsible for conducting the assessment, draws a final conclusion based on the data received and generates a report.

For assessing the effectiveness of the proposed innovative project, it is proposed to identify five groups of integrated indicators into the toolkit. To assess the economic efficiency of the innovative project, the specialists of the project assessment team make an expanded cash flow table. It reflects the costs and material benefits arising during the project implementation, according to the project documentation, as well as the calculation of the credit load of the project and the main indicators of the project economic efficiency of the, taking into account the discount rate ("Cash Flow").

Based on the results of calculations, a report on the effectiveness of the claimed innovation project is compiled. After that, the report is sent for analysis to the manager of the assessment team.

The manager of the project appraisal team processes the obtained results and makes a conclusion on the feasibility of implementing the innovative project, reflecting the following aspects:

- the innovation market analysis and consideration of possible technological alternatives;
- the need to correlate project results with the existing level of scientific potential;
- the compliance of scientific and technical potential provides an assessment of the possibilities of achieving the specified characteristics of the products declared by the project, taking into account the available scientific and technical reserve and the capabilities of the enterprise's experimental base;
- the possibility of implementing the project taking into account the regional infrastructure;
- the multi-stage;
- the investment efficiency;
- the innovative efficiency;
- the existence of specific risks (for example, risks associated with the R&D success or pilot implementation);
- the economic development of the enterprise based on project efficiency;
- the social efficiency;
- the environmental efficiency;
- the application of non-standard forms of financing, such as government or venture capital, business angels, etc.

After that, the person responsible for the project initializing makes a decision on the feasibility of implementing the innovative project at the enterprise.

### 3. Conclusion

Thus, the developed methodology for innovative projects assessment of the rocket and space engineering enterprise, takes into account all the main features of the project. These features are the multi-stage, the investment and the innovation efficiency, specific risks (for example, risks associated with the R&D success or pilot implementation), the economic development of the enterprise based on project efficiency, the social efficiency, the environmental efficiency and the application of non-standard forms of financing, such as government or venture capital, business angels, etc.

### References

- [1] Chouprov E V, Malanina Yu N and Ragozina M A 2017 Machine-building production of increased reliability: features and solutions of the economic component *Scientist's Notes* **3(19)** 71-4
- [2] Ilyin A N, Gaidoukova O A, Malanina Yu N and Anikina Yu A 2017 Features of the production process of knowledge-based enterprises *Fundamental research: theoretical and practical aspects Proceedings of the III Intern. Sci. and Pract. Conf.* **II** 485-8
- [3] TsisarSKIY A D 2013 Improving the efficiency of projects to create promising examples of rocket and space technology based on the concept of Requirements Engineering *National Interests: Priorities and Security* **31(220)** 25-9
- [4] Khroustalev O E 2012 Instrumental methods for assessing the feasibility of a high-tech investment project *Economic Analysis: Theory and Practice* **41(347)** 45-52
- [5] Anikina Yu A, Fefelov A A and Malanina Yu N 2019 Research of adaptive features of industrial enterprise crisis management system *IOP Conf. Ser.: Mater. Sci. Eng.* **537** 042074