

**ICEST 2021****II International Conference on Economic and Social Trends for Sustainability of Modern Society****INNOVATION PROJECT MANAGEMENT: NETWORK  
RESOURCES AND ENGINEERING**

K. Sokolov (a)\*, M. Sokolova (b), R. Garipov (c), Yu. Markina (d), G. Pozdnakova (e)

\*Corresponding author

(a) South Ural University of Technology, ul. Kozhzhavodskaya, 1, Chelyabinsk, Russia, sokolov\_k@mail.ru

(b) South Ural State University, Chelyabinsk, Russia, somaig@mail.ru

(c) South Ural University of Technology, Chelyabinsk, Russia, garipov\_robert@mail.ru

(d) South Ural State University, Chelyabinsk, Russia, yulia27.86@mail.ru

(e) South Ural University of Technology, Chelyabinsk, Russia, pozdnakovags@inueco.ru

**Abstract**

According to the authors, the final result of the enterprise's innovative activity depends on the scientific and technical level at which the innovative project will be developed and how effectively it will be implemented. Analysis of international experience has shown that the competent application of project management methodology leads to a reduction in the duration of their implementation by 20-30%, and costs - by 10-15%. The article presents the author's approach to the concept of external management of the innovation process using crowdsourcing and engineering tools. The capabilities of network resources at each stage of the innovation process (generation of new ideas, development of innovations, production, promotion) are studied. A scheme for the development of an innovative product using crowdsourcing and engineering consulting is proposed. The advantages and disadvantages of using crowdsourcing platforms and engineering companies when performing work on a project have been identified. The authors found that an enterprise that does not have the funds necessary to work with engineering companies can create a crowdsourcing platform to solve its problems in the management of innovative projects and attract experts who can provide a sufficiently high level of quality in solving the assigned tasks.

2357-1330 © 2021 Published by European Publisher.

*Keywords:* Innovation project, network resources, engineering, crowdsourcing



## 1. Introduction

Modern economic relations are characterized by quick growth of the amount of knowledge products. This trend leads to an increase in the volume of work associated with solving complex scientific, technical and organizational problems. An important result of this trend is an increase in significance and volume of engineering activities.

Engineering as a sector of the market economy has appeared a century and a half ago in Great Britain, when services of engineers had started selling for the first time, demanded by manufacturers for construction of new and modernization of the existing plants. At the same time, the idea of engineering was formed as an activity to provide services in the design, construction and operation of industrial and infrastructure facilities.

In Russia, the engineering business is still undergoing the stage of its formation. In other countries, engineering is the basis of industrial production. Engineering company is capable to provide a full solution of the problem, starting from market research, identification of existing economic trends and potential demand for product. Then a feasibility study is conducted. As a result, the owner receives a comprehensive business plan from his idea to the product.

Firstly, the progression of engineering activities can be seen in innovative projects aimed at creation or modernization of complex economic systems or their components.

## 2. Problem Statement

The key challenge for many businesses is to be more innovative than their competitors. Being among the first to blaze new trails and implement new ideas is often a critical success factor in the global economy. Engineering and network resources plays an important role in this context.

The research is based on general systems theory and systems analysis, modern project management methodology, theoretical foundations of general and strategic management, systems engineering methods.

## 3. Research Questions

In the context of dynamically changing consumer demand, modern business must pursue a policy of staying ahead of its competitors, which can only be implemented through the active use of the advanced achievements of science and technology - innovations.

“Innovation is the result of the practical use of new knowledge in the form of a new or improved product, a factor in the strategic development of an enterprise” (Sokolov, 2019, p. 32). According to the data obtained as a result of a survey of company executives, of the total number of implemented innovations, only 25% fully met expectations, 60% did not fully meet expectations, and 15% of innovations did not give positive results (American Academy of Environmental Engineers, 2009). These results are a consequence of the poor quality of innovation management. This suggests that the effectiveness of innovation, and hence the quality of engineering, depends on the quality of project management primarily. Therefore, in engineering, special attention is paid to the design method. Today, the project is a key form of activity for the provision of engineering services.

As the analysis of international experience has shown, the competent application of project management methodology leads to a reduction in the duration of their implementation by 20-30%, and costs - by 10-15% (Rothwell, 1994). Thus, the design method in engineering plays an important role as a tool to ensure its effectiveness.

"Engineering is a set of intellectual activities associated with the implementation of projects for various purposes based on advanced scientific and technical achievements" (Smith, 2007, p. 97). According to this definition, in the life cycle of creating an innovative product, engineering is located between science and production, forming the scientific and technical base of the entire creation cycle. At the same time, the organizational and methodological basis of the engineering itself is the project, and the final result of all activities depends on the scientific and technical level at which the project will be developed and how effectively it will be implemented.

The following types of engineering are distinguished in the classification of the United Nations Economic Commission for Europe:

- consulting;
- technological;
- construction;
- technical assistance;
- complex.

#### **4. Purpose of the Study**

The aim of the study is to substantiate a scientific hypothesis about the possibility of using crowdsourcing tools to solve problems that were solved previously with the help of consulting engineering.

#### **5. Research Methods**

Most scientists agree that the innovation process consists of four stages (Ebert, 2012; Ernst, 2002). In our opinion, the following stages are part of the innovation process:

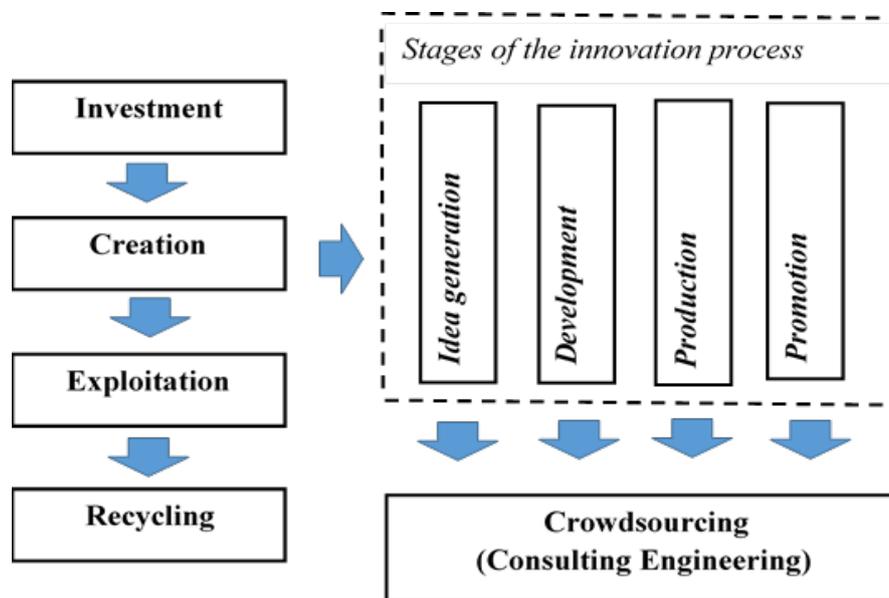
- "Idea generation". Result: a new idea.
- "Development of a novelty." Result: novelty.
- "Production". The result: innovation.
- "Promotion". The result: an innovative product.

A fundamental feature of the project management process in engineering is the application of modern knowledge and best practical experience, which can be provided by experts working remotely on the principles of crowdsourcing (inventors, designers, technologists, designers, marketers, etc.) (Proctor, 2013). Let's consider the life cycle diagram of the created innovative product, the role of crowdsourcing and consulting engineering in it at each stage of the innovation process (Figure 1).

The life cycle of the object being created generally consists of the following processes (Martensson, 2000):

- investment;
- creation;
- exploitation;
- recycling.

“Crowdsourcing is a tool for solving business problems based on the ability of the online community of experts to generate new knowledge” (Bassi et al., 2020, p. 299).



**Figure 1.** Scheme of developing an innovative product using Crowdsourcing and consulting engineering

Let us consider the possibility of using crowdsourcing at every stage of an innovative project. Obviously, at the stage of generating ideas, crowdsourcing will be most in demand. The Internet provides easy communication with experts who can generate new ideas themselves, as well as advise enterprise specialists on organizing the creative process.

If the organization does not have design or technological services, production facilities for the development and production of innovative products, using crowdsourcing, you can find the optimal solution to these problems. A community of experts can help the organization to best place development and production orders with external contractors or find partners to work together.

The use of crowdsourcing to promote innovative products can be carried out in three main areas. First, an organization can ask experts to write content for their websites. Second, an enterprise can use crowdsourcing for social media marketing. Thirdly, if a company needs a new logo or needs to finalize the packaging design, it is enough to go to the online platforms Crowdspring.com or Ponoko.com, describe the desired result and name the price. Designers will respond with sketches and, if necessary, revised prices.

One of the most important results from the participation of an enterprise in a crowdsourcing project is that its employees get the opportunity, through interaction with experts, to acquire an invaluable resource - new knowledge that can later be used in the development of innovative products (goods, services, technologies, business processes, etc.) (Howe, 2008).

## 6. Findings

Obviously, an enterprise that does not have the funds necessary to work with engineering companies can create a crowdsourcing platform to solve its problems in the management of innovative projects and attract experts who can provide a sufficiently high level of quality in solving the assigned tasks. Table 1 shows the advantages and disadvantages of using crowdsourcing platforms and engineering companies in the process of consulting support for innovative projects.

**Table 1.** Advantages and disadvantages of using crowdsourcing platforms and engineering companies when performing work on a project

	Crowdsourcing	Engineering company
Work principles:	The enterprise creates a crowdsourcing platform on the Internet, on which it places a task that attracts the attention of experts (specialists in this field of knowledge)	As a rule, an engineering company does not have the necessary human resources and attracts specialized companies or narrow specialists to carry out work on the project.
Advantages:	Experts can do the job for free or for little pay. Using the Internet allows you to attract an unlimited number of experts from all over the world.	The company attracts highly qualified specialists and pays well for their work. This is a guarantee of high quality work performance.
Disadvantages:	The proposed task may not interest experts, or experts of low qualification may respond.	High cost of services

## 7. Conclusion

Crowdsourcing can have a positive impact on all stages of the innovation process: at the stage of "idea generation", experts may receive the results of intellectual activity that can later become innovations; at the stages of "development" and "production" experts can provide the information necessary for the best placement of orders for the development of design and technological documentation and the production of innovative products; at the stage of "promotion" with the help of experts, the design of innovative products can be developed, and the ways of communicating information about it to potential consumers can be improved. It is obvious that crowdsourcing, with a competent approach, can become an effective tool for managing innovative projects.

## Acknowledgments

The work was supported by Act 211 Government of the Russian Federation, contract № 02.A03.21.

## References

- American Academy of Environmental Engineers. (2009). *Environmental Engineering Body of Knowledge*. AAEE.
- Bassi, H., Lee, C., Misener, L., & Johnson, A. (2020). Exploring the characteristics of crowdsourcing. *Journal of Information Science*, 46(3), 291-312.
- Ebert, C. (2012). *Systematic Requirements Engineering: Identify Requirements, Specify, Analyse and Manage*. Dpunkt publisher.
- Ernst, H. (2002). Success factors of new product development: A review of the empirical literature. *International Journal of Management Reviews*, 4(1), 1-40.
- Howe, J. (2008). *Crowdsourcing: Why the power of crowd is driving the future of business*. Crown Business.
- Martensson, M. (2000). A critical review of knowledge management as a management tool. *Journal of Knowledge Management*, 4(3), 204-16.
- Proctor, N. (2013). Crowdsourcing – an Introduction: from public goods to public good. *Curator: The Museum Journal*, 56(1), 105-6.
- Rothwell, R. (1994). Towards the Fifth-generation Innovation Process International. *Marketing Review*, 11(1), 7-31.
- Smith, D. J. (2007). The politics of innovation: Why innovations need a godfather. *Technovation*, 27(3), 95-104.
- Sokolov, K. O. (2019). Organizational forms of innovation activities of enterprises of the food and processing industry. *Encyclopedia*.