

An Adapted Method for Project Management by Digitalization of Innovative Activities in Domestic Enterprises

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ABSTRACT

Because of intensive and fast changes in environment, the current development of enterprises has to account for active implementation of innovations. In order to achieve the given goals, the processes of innovation activities should be accompanied by a widespread use of modern digital technologies, which greatly advance their efficiency and ensure the effective collaboration of all the involved actors, thus accelerating significantly a diffusion of innovations. The most effective tool to introduce digital technologies into innovation activities is the technology of project management, which can be implemented employing various approaches in dependence on the project content and its features. In our opinion, getting the best guaranteed result relies on a synergy of the existing known approaches which consider both the current trends and requirements for the implementation of digitalization projects in innovations. In framework of such an approach it is possible to successfully implement digital technologies into innovation activity that will be the most driving force to develop enterprises further.

Keywords: *Innovation, digitalization, project management, innovation, Agile method, Waterfall method,*

adapted project method

1. INTRODUCTION

A continuity of innovative development is currently a mandatory requirement for timely response to ongoing changes in modern conditions which are characterized by the dynamism of ongoing transformations. The yields of innovative activities allow one to maintain not only a strong powerful position in the market and to ensure the necessary financial performance of the business but also to optimize internal business-processes, to identify the reserves for further developing, and to enable a transfer up to a novel qualitative level of functioning.

In Russia, the innovative activity of economic actors is especially relevant. The significant changes in the social, economic and political spheres of management at the global level highlighted a plenty of problems which provoked some technology backwardness observed in the domestic economy. The appeared threats to national security are now recognized both at the expert level and at the highest levels of administration up to the government. Innovations, which result in advancing the characteristic performance indicators, can force developing the lagging sectors in the national economy, primarily in industry. Therefore, the creation of a national innovation system aimed at the appearance and implementation of innovative technologies in the industry is an adequate solution to challenges induced by turbulent changes in the environment [1].

When implementing innovation, there is a need to employ tools which could be highly productive in order to realize an innovative transformation and, globally speaking, to ensure the transition to a new type of economy. One of such tools, as the experience of developed countries exhibits, is a digitalization [2]. Many researchers note that the «transition to digits» underlies the changes in innovation activities, transforms it and excites new opportunities [3]. These opportunities are expressed as i) an advanced efficiency due to a data conversion into digital form, ii) ensuring the efficiency of their «movement» over an extensive infrastructure network with an enlarged number of users, iii) automated processing and analysis, which serves as «the basis for creating new knowledge that can lead to the creation of innovations» [4].

However, the process of digital transformation itself requires employing technologies which allow one yielding transformations in a certain direction with the required efficiency. Projects dealing with digitalization, similar to innovative projects, are characterized by novelty, uncertainty, limited resources, and require organizing team groups capable to solve complex problems. Therefore, to ensure a successful digital transformation of innovation processes, it is necessary to target the most promising option for the implementation of digitalization projects in order to activate and to maintain a development and implementation of innovations at domestic enterprises at a high effective level [5].

2. RESEARCH METHODOLOGY

2.1. Analysis of the level of innovation activity in domestic enterprises

For quite a long time, the major vector of innovative development in domestic enterprises was the Strategy for the Innovative Development of the Russian Federation for the period up to 2020 (hereinafter, referred to as the

Strategy-2020). The target indicators of this program pointed the accelerated increase in the rate of innovative activity to be expressed as i) a significant advancement of technological innovations in the total share of industrial enterprises (up to 40-50%), ii) an increase in export of high-tech goods produced in the country (up to 2% in the total world volume), iii) enhancing innovative products produced by industry (up to 20-35%). In fact, the achieved results are significantly lower than targeted goals, which is shown in Table 1.

Table 1 The timely dynamics of key indicators characterizing innovative activity of industrial enterprises according to Strategy-2020

Key indicator of the Strategy of innovative development of the Russian Federation for the period up to 2020	Target value	Analyzed period									
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
The share of innovative goods, works, services, in the total export of goods, works, services of industrial organizations (%)	20-35	4,5	8,8	12,1	13,7	11,5	8,9	8,4	7,1	6,6	5,2
The share of innovative goods, works, services, organizations new to the sales market, in the total volume of goods shipped, works performed, services of industrial production organizations (%)	2	0,8	0,6	1,1	1,1	1,1	0,9	1,0	1,3	0,9	0,6
Aggregate level of innovative activity of industrial organizations (%)	40-50	10,8	11,1	11,1	10,9	10,9	10,6	10,5	10,6	15,6	15,1

As one can see from the given data, not even a half of the target indicators was achieved although rather a positive trend is observed. According to the data for 2019, the aggregate level of innovative activity of industrial organizations is only 15.1 %, while this indicator has reduced when compared to data in 2018 by 0.5 %, and by 2.7 % when compared to data of 2017. The share of innovative goods, works, services that are new to the sales market of organizations in the total volume of goods shipped, as well as work performed, services of industrial production of organizations has also decreased: if this indicator was 1.3 % in 2017, then it goes to 0,9 % in 2018 and 0.6 % in 2019, respectively.

These rather unsatisfactory results of innovation activities in Russian industrial enterprises, which differ from those planned in Strategy 2020, suggest to talk about existence of «bottlenecks» in the implementation of the processes of development and implementation of innovations at domestic enterprises. Of course, one should not deny the general trend related to worsening a total economic situation but it is necessary to take into account the

problems associated with the management of innovation processes at enterprises.

2.2. Analysis of digitalization trends in the domestic economy

In addition to stimulating a research potential, the effectiveness of the development and production of innovative goods and services largely depends on the employed tools and the intensity of using the advanced technologies, both for the purposes of current activities and in the aspect of development. In this context, the implementation of digital technologies is being updated in order to create conditions for the automation and acceleration of many works and operations, and to enhance a speed of personnel interaction to solve many emerging problems.

The digitalization of innovative activities in the industry is currently one of the priority areas for Russia [6]. The most important value of digital transformation is its ability to

create the required conditions for enhancing innovative development, since the transition to digital technologies makes it possible to optimize business processes of functioning, to advance the efficiency of resource use and to increase their return, which form together a basis for successful innovation, as it leads to stimulation of innovation potential and free up financial resources that are much needed for transformation.

Some elements of information technology development are given in the 2020 Strategy. However, the pointed targets relate mainly to the provision by personal computers for households and the popularization of the Internet. Based on the official statistics for 2019, many indicators are quite close to the goals set in Strategy 2020. For example, the share of organizations using broadband Internet access in the total number of organizations has increased from 56.7 % (2010) to 86.6 % (2019). The share of organizations equipped with a website in the total number of organizations in 2019 was 51.9 %, which shows an increase in this indicator by 23.4 % compared to 2010. The indicator of using Internet resources among the population has also grown significantly, as evidenced by the data in the number of users: according to the data for 2019, the number of fixed broadband Internet subscribers per 100 people was 22.2, while 96.4 are users of mobile Internet. The comparing these indicators since the start of the implementation of Strategy 2020 show an almost 2-fold increase: in 2011, the number of fixed broadband Internet subscribers per 100 people was 12.2 people, while 47.8 used a mobile access. The presented data indicate a certain success in the development of Internet technologies, both at the enterprise and household levels, however, the digitalization of the industrial sector involves not only the development of Internet resources, but also using the modern digital tools and products.

The tasks for introducing digital technologies into the activities of industrial enterprises are reflected in the «Strategy for the development of the information society in the Russian Federation for the period 2017-2030» (hereinafter - Strategy-2030), approved by the Decree of the President of the Russian Federation No. 203 dated May 9, 2017. As a part of this strategy, it is planned to stimulate internal demand for digital technologies, including a digital transformation of large business. The list of end-to-end digital technologies planned for implementation includes: big data, industrial internet, Artificial Intelligence, wireless technology, robotics and sensors components, quantum technologies, distributed ledger systems, technologies of virtual and augmented reality.

It is too early to draw conclusions about the achievement of the key indicators laid down in the Strategy-2030. Nevertheless, some facts can be cited that reflect the process of introducing digital technologies into the innovative activities of enterprises. Based on a survey of specialists from Russian companies in various industries, 34 % of them transferred certain business processes to “digit” in 2017, while the trend in subsequent years (2018-2020) has the same values in the plans of these companies. The most common advanced technologies in the industrial sector of the Russian Federation in 2019 are electronic

document management (56 %), advanced accounting systems (42 %) and a shared service center (35 %). Every fifth company (21 %) has implemented a full automation of a separate business process. The most popular technologies at this time are augmented and virtual reality (61 %), alternative energy sources (58 %) and the blockchain system (56 %).

Based on the given indicators, it can be noted that there is a tendency at the enterprises of the Russian Federation to introduce digital technologies into innovative activities. However, if we turn to the results of analytics which reflect a level of implementation of digital technologies at Russian enterprises, then such technologies are only expected to be introduced for the most part [7].

By analogy with the phenomenon of «creative destruction» highlighted by Schumpeter, the initiation of projects for the digital transformation of innovation processes determines the entropy and imbalances the state which was prior the changes. This leads to a new round of development and the establishment of a new equilibrium, which requires an appropriate response from the current management system, primarily in the applied management approaches and technologies, on the basis of which the transformations are carried out [8].

A study conducted by Capgemini Consulting and MIT Sloan Management over more than 400 large businesses operating in various fields of activity, demonstrated a possibility to increase profits by an average of 26 % due to the active using digital technologies and new management methods, while organizations focused only on investments into production digital technologies that are not accompanied by a corresponding change in the management system, do not achieve a synergistic effect and do not create additional value from the use of digital applications [9].

In the context to transfer all the spheres of activities to a digitalization, science, industry and the state are jointly involved in accelerating the processes and adapting new complex production processes from the "drawing board" to commercial activities related to innovations in order to accelerate the introduction of output products and services. In this regard, the project management system is of particular importance, which is a set of specially created events and works limited by time and resources, aimed at achieving the set goals related to digital and innovative transformation [10]. It is the project-based approach that allows economic entities to make decisions faster and better and to bring goods and services to the market.

3. ANALYSIS OF THE MAJOR METHODS OF PROJECT MANAGEMENT USED IN THE PRACTICE OF DOMESTIC ENTERPRISES

Project management has two key benefits. First, project management, in contrast to operational management, is aimed at achieving goals, and not at ensuring the process.

Second, project management focuses on communicating and managing stakeholder expectations to improve stakeholder satisfaction. Setting itself as the main task of optimal and efficient distribution of available intra-production limited resources to achieve the set goals of functioning, such a technology is extremely relevant in the modern economic situation.

The most commonly used design approaches are Agile and Waterfall methods [11]. In the practice of domestic enterprises, the introduction of these methods began relatively recently: for example, the Agile method started to be massively used only in 2016 and mainly in such industries as finances and telecommunications, which speaks of the «youth» of this project management [12]. But, as statistics shows, the number and range of industries implementing the Agile method in 2019 is growing significantly [13].

The major industries using the Agile method are companies related to information technology and finance

[14]. Nevertheless, heavy industry enterprises have recently (2019) started to actively use this method and almost doubled their share compared to the previous year. Organizations that use Agile typically seek to become more competitive in their specific field through a digital transformation to accelerate the adoption of change in the industrial environment.

In the practice of foreign enterprises, the Waterfall method is used in rather simple and well-defined projects where all the requirements are sufficiently known and stable. In addition, it is believed (Munassar and Govardhan 2010) [15] that Waterfall minimizes a waste of effort and can be a good alternative for technically weak and inexperienced employees. However, when it is necessary to create digital products containing a high level of uncertainty, then Agile is the most appropriate method. The comparative characteristics of these two methods carried out by the authors are shown in Table 2 [16,13].

Table 2 Comparative characteristics of the Agile and Waterfall methods

Parameters	Agile	Waterfall
Purpose of the project	Reduce time to market	Get a finished high-quality product without making changes
Orientation	Client	Process
Characteristics of the external environment	A private, chaotic, unstable environment with no clear vision	Structured and predictable
Advantages	Flexibility, speed of appearance of the result, the ability to improve the quality of the results obtained, minimize risks	Simplicity, ease of use, easy to document the project and its results, high efficiency with stable requirements
disadvantages	Difficulty planning the final costs, the need for motivated highly qualified employees	Rigidity, the customer can check the conformity of the product only at the end of the development, the impossibility of changing the requirements
Principle	Short cycles with end results	Sequential transition from stage to stage without the possibility of returning to the beginning of the iteration
Management style	Decentralized	Autocratic
The nature of the project	Iterative	Linear
Reaction to changes	Easy to change, at any stage of the project	Resistant, not amenable to change
Interaction with the customer	Throughout the duration of the project	At certain stages of the project
Ability to use parts of the project	You can use each section as a separate finished product and bring investment	Complete project implementation

Thus, it can be summarized that the Waterfall method i) finds an application in projects with clearly defined stages of implementation, ii) does not provide for any changes in the project, and iii) is suitable for relatively simple activities that do not require the development of “creative” solutions. However, exactly this approach ensures a tightly timed process of project execution.

The Agile method is used in cases when there is a need for a flexible response to changes, both on the part of the customer's requirements and during the implementation of

the project, associated with the novelty, not enough practice development and an uncertainty arising under executing the tasks. This approach provides more opportunities in terms of developing "creative" solutions. However, it is complicated by additional iterations in terms of their coordination and finding the best option. Despite the existing advantages of the applied methods of project implementation, at present experts note an insufficiently high level of effectiveness of the project approach. In particular, according to a study by

PricewaterhouseCoopers, conducted on more than 10,640 projects, only 2.5 % of companies complete their projects with 100 % success. The main problems that determine the failure to achieve the goals of projects lie either in the failure to fulfill the tasks set, or appear due to provoking by non-compliance with the budget or project deadlines. Obviously, such a statistics is absolutely unacceptable, especially in the context of the need to intensify efforts in the implementation of projects for digitalization of innovative activities.

In our opinion, accounting for a general trend forward to a digital transformation of the Russian economy, project management based on these approaches should be widely applied at domestic enterprises, primarily with the aim of translating innovative activities into digital form. However, it is extremely important to determine the most optimal option for their application, which allows one taking into account both the specifics of the current situation at domestic enterprises and the peculiarities of innovative activities.

4. AN ADAPTED METHOD OF PROJECT MANAGEMENT FOR DIGITALIZATION OF INNOVATIVE ACTIVITIES

Digital transformation is also driving a change in project management, says Martin Sedlmeier, vice-president of the international project management association IPMA. Thus, computer technologies are currently among the five main trends in the development of project management. File sharing, time tracking, email integration, Gantt charts, and budget management are five of the most used and requested features in project management software.

Currently, there is a number of problems associated with the implementation of projects. Most of them lie in the plane of digitalization of the project management process itself. According to a Wellington survey, only 22 % of organizations use project management software. Just over half of organizations (55 %) do not have an access to real-time KPIs. According to 50 % of respondents, the generation of project reports can take up to several days as a result of «manual assembly» of information. Between 2017 and 2018, the percentage of organizations using spreadsheets to manage their Agile projects dropped from 74 % to 67 %.

Obviously, when considering the management of digitalization projects in the field of innovation, taking into account their complexity and the novelty of both the projects themselves and the environment in which they are implemented, a variant of the project approach is required that will satisfy both the needs of the general trend of «transition to digit», and the specifics of innovation, expressed in uncertainty, high risks, a negative response to the transformations made by the project participants. In this regard, at present the new approach adapted to the management and implementation of digitalization projects for innovation should be employed founding on the advantages of Agile and Waterfall methods, but also

providing opportunities to take into account the specifics of the existing management systems at domestic enterprises and the high risks inherent in implementation innovative projects.

We propose the development of existing approaches by forming an adapted approach including elements of Agile and Waterfall methods, to be projected onto an information platform and a risk management system, which will determine in synergy a creation of the necessary platform for effective planning and implementation of digitalization projects in the innovation sphere of domestic enterprises. The concept of this method is based on the direction towards achieving a result within the established time and budgetary boundaries, subject to the timely leveling of the influence of risk factors due to high uncertainty, the possibility of which is determined by integration during execution with the information system that permeates all stages of the digitalization project. Like to the Waterfall method, the planning and implementation period of the project should be clearly established for the main milestones and do not provide for shifts in the implementation process, in accordance with the approved terms of reference. However, each of the stages of the project provides for the possibility of adjusting, by analogy with the Agile method, the included tasks with a focus on achieving the subgoals of each stage. In other words, there must be a “creativity” to be limited by strict target frames. Digitalization of innovation activity is unpredictable, both due to the inherent novelty of the digital transformation process and the development and implementation of innovations itself; therefore, it requires a prompt response. The concept of a design approach based on an adapted method excludes the following major elements:

- the methodology of project management is based on the synergy of Agile and Waterfall methods, which ensures the implementation of project tasks within the established time frame and budget, but provides for the possibility of iterations within individual stages of projects that will allow one achieving project goals without changing the set deadline and complicating the project implementation process;
- the process of managing a digitalization project is based on creating an information contour aimed at optimizing the trajectory of movement, volume and composition of management information, stages of its collection, consolidation and processing, stages and resources of management business processes in the framework of the implementation of digitalization projects for innovation;
- the applied project management toolkit is based on modern information technologies and equipment, modern means of collecting and processing management information on ongoing digitalization projects.

At the same time, the most important principle of the adapted method is the principle of information security, compliance with which is achieved by creating the necessary information circuit, the elements of which permeate all the structural components of the digitalization project. First, it allows one to effectively plan the project, and, second, it provides the monitoring system with the necessary information. Third, it ensures an effective

interaction of all project participants. Finally, it has a certain leveling effect on resistance to change, since the use of information technology is a part of the digitalization process.

In our opinion, the use of this method in the implementation of digitalization projects in the innovation activities of domestic enterprises will ensure the effectiveness of the implemented changes and thereby increase the efficiency of the development processes for the implementation of innovations that underlie the acceleration of the innovative development trend of Russian enterprises.

5. CONCLUSION

Summarizing the reported results, it seems appropriate to us to highlight the following aspects, namely:

- the activation of the innovative development of the Russian economy should be conditioned by the use of modern tools, one of which is digitalization;
- the introduction of digital technologies in the process of innovation should be carried out on the basis of a project approach as the highest priority option for implementing changes;
- based on a comparison of the currently used project management methods, it is proposed to use an adapted approach, including elements of Agile and Waterfall methods, projected onto an information platform and a risk management system, which will determine in synergy the creation of the necessary basis for effective planning and implementation of digitalization projects in the innovation sphere of domestic enterprises.

In our opinion, the implementation of these areas will make a positive contribution to solving the existing problem of increasing the innovative activity of domestic enterprises.

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