Trends in the Development of Digital Transformation of Organizations based on Artificial Intelligence

L.V. Shabaltina[a], V.V. Maslennikov[b], E.V. Popova[c] and S.A. Gonchukova[d]
Russian University of Economics named after G.V. Plekhanov,117997, Russian Federation, Moscow, Stremyanny lane, 36
Shabaltina.LV@mail.ru

Keywords: Digitalization, Digital transformation, Innovative technologies, Artificial intelligence, Agile method.

Abstract: The article is devoted to the study of general trends, the current state and prospects of digital transformation in management and project management. The article reflects the general trends in the development of artificial intelligence technologies in the world and in Russia, presents the results of the analysis of activity in the field of the introduction of artificial intelligence elements, identifies promising areas for the development of artificial intelligence in Russia. A brief excursion into the field of artificial intelligence, research directions in this field, the general trend of modern research and development of artificial intelligence systems, the main trends in the field of artificial intelligence, the possibilities of application in the field of management of artificial intelligence systems are considered. The authors identify the main concerns about digital transformation and consider its advantages, substantiate the need for its implementation and planning of its activities, give examples of leading Russian organizations that go through this process.

1 INTRODUCTION

New problems require new methods of solving them. As humanity grew in number and increasingly complicated its social and economic structure, there was a need for more and more effective and modern methods of management and administration. Of course, when the world was covered by a wave of digitalization, the developments of this "fashion trend" penetrated into the management area. At the same time, we can talk about both simple digitalization (delegating some human functions to computer algorithms) and the introduction of new and sometimes even revolutionary concepts of work organization for a complete transformation of business and approaches to its management. It is the latter that will be discussed in this article.

The problem area of the research is to identify trends in the application of predictive models of artificial intelligence methodology to making managerial decisions on the development of the organization.

2 INVESTIGATION OF THE PROBLEM.

What is probably the first thing that comes to mind with the words "digitalization", "digitization", "computerization"? Of course, artificial intelligence. Despite the fact that we are still very far from creating full-fledged AI, theoretical work on its implementation in our lives was carried out 30-40 years ago, including in the field of project management. The article "The Use of artificial intelligence in project management" by William Hosley (Michurina, 2010) was released in 1987 and is a kind of milestone in this matter. All the thirty-odd years that have passed since then, computer technologies have developed rapidly, many other studies and works have been published in the field of artificial intelligence in general and its use in management in particular.

On June 21, 2019, the Project Management Institute (PMI) (Hosley, 1987) released its research on promising technologies in the field of artificial

[a] https://orcid.org/0000-0001-6943-629X
[b] https://orcid.org/0000-0002-8334-1075
[c] https://orcid.org/0000-0002-9293-2897
[d] https://orcid.org/0009-0007-2535-500X

intelligence in project management. The main areas that currently have an impact in this area, according to the Institute, are knowledge-based systems, machine learning technologies and decision management. The former, understanding the context of the processed data, allow better training of people and making more informed decisions; the latter help to build more accurate models and make decisions with minimal or no human involvement; the third allow you to make decisions automatically based on certain predefined algorithms and rules.

Artificial intelligence (AI) has been developing steadily since the middle of the last century, and at the same time the main areas of its development were laid.

The definition of "Artificial Intelligence" originated within the walls of Stanford University, and this was due to the need to solve a logical problem.

The start of the first cycle of artificial intelligence research was initiated by an attempt to develop a program for language translation by means of a machine from one language to another, this happened simultaneously in the Soviet Union and in America, as well as the successful development of a game program for a chess game by REND, and this launched the development of mathematical linguistics "... based on ... rules for choosing a decision in the absence of theoretical grounds" (Harris, Shaffer, Stokes, Goldstein, 1987), and the successful creation of a program for theorems in geometry and problems in algebra "General Problem Solver" (GPS). The next stage was functional programming, logical programming and expert systems, although many more operations were performed manually, but this was already a new qualitative leap in the development of artificial intelligence.

The second cycle of artificial intelligence development improved the chess program, the Soviet program "Kaissa" became the world champion in 1974. All programs developed within the framework of the first cycle were developed and qualitatively improved.

Modernity reflects the third cycle of artificial intelligence development, and it is characterized by great scope and scale, this became possible due to the fact that the Internet has spread everywhere and technical development has significantly accelerated. Genetic programming and artificial neural networks have appeared.

3 DIGITAL DEVELOPMENT BASED ON DIGITAL MATURITY PARAMETERS

Technologies of expert systems, machine learning and robotic automation of processes are gaining more and more weight. Expert systems, as the name implies, are designed to fully or partially perform the function of experts – that is, their task is to acquire knowledge and simulate the activity of human intelligence in a particular area. Machine learning technologies are aimed at improving the methods of training neural networks in order to use them in various kinds of analyses and predictions of probable outcomes of events. Robotic automation is engaged in imitation of human activity in any corporate processes. Do not think that these are some kind of interchangeable things – it is the combined application of all these areas that in the future can give artificial intelligence systems the opportunity to fully assume human responsibilities in the management of companies or individual projects and simplify the work of managers as much as possible.

PMI considers it necessary for enterprises to increase their PMTQ (Project Management Technology Quotient). This coefficient allows us to assess how companies are ready for implementation and successfully implement innovative ways of project management. In other words, as far as the company keeps up with the requirements of the time – since now an increasing number of enterprises of various sizes and various types of activities are beginning to use certain technologies based on artificial intelligence in their work, this coefficient can be used as an indicator of the "development" of the organization. A high PMTQ can serve as an additional competitive advantage. Michael DePrisco, vice president of PMI, believes that for the successful application of these technologies and, as a result, the correct use of this coefficient, a radical change in people's thinking will be required. Since project specialists have a great responsibility to facilitate the implementation of changes, they will play a crucial role in influencing the impact of these technologies on their organizations. Based on the PMI study, we summarize that organizations with a high Project Management Technology Quotient believe that AI training will take longer than just implementing this technology. Creating an organizational infrastructure that will lead an organization to success will require new thinking, a learning culture, and leadership support.

For those who plan to use innovative technologies in the future, it is proposed to use the MELDS system (Fig. 1) – Mind, Experience (or Experiments), Leaders, Data, Skills.

Figure 1: MELDS Components.

As it is clear from the transcript, according to this concept, for the successful implementation of digital technologies, the company needs to change the thinking of employees, encourage experiments, find and support leaders in their environment, introduce data into the company's business strategy, develop new skills among employees.

The Pulse of the Profession report of the Project Management Institute states that among those using the MELDS concept, the indicators of project timeliness, project payback and the realization of benefits are 12-16 percent higher than those of companies that do not use this concept in their work.

In practice, currently available developments in the field of artificial intelligence can be divided into two categories: AI, project manager and personal assistants of the project manager.

Artificial intelligence for project management is represented by such systems as TARA.ai , PineStem, Aurora, PsodaVision and many others. Despite the purely English-language names, there are also domestic products in the AI line for project management - for example, the Smart Project system (Fig. 2).

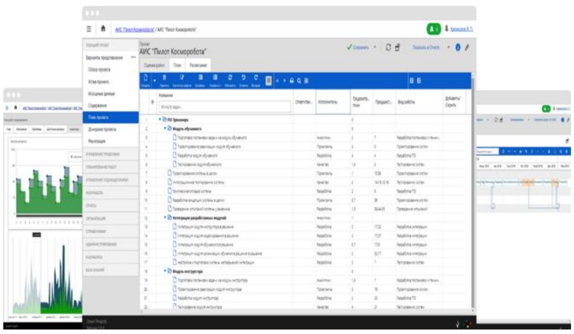

Figure 2: Smart Project Components.

They cover different needs – from the creation of project implementation schedules (Aurora) to the selection of personnel for a specific project or budget planning, which offers, for example, TARA.ai. (Fig. 3).

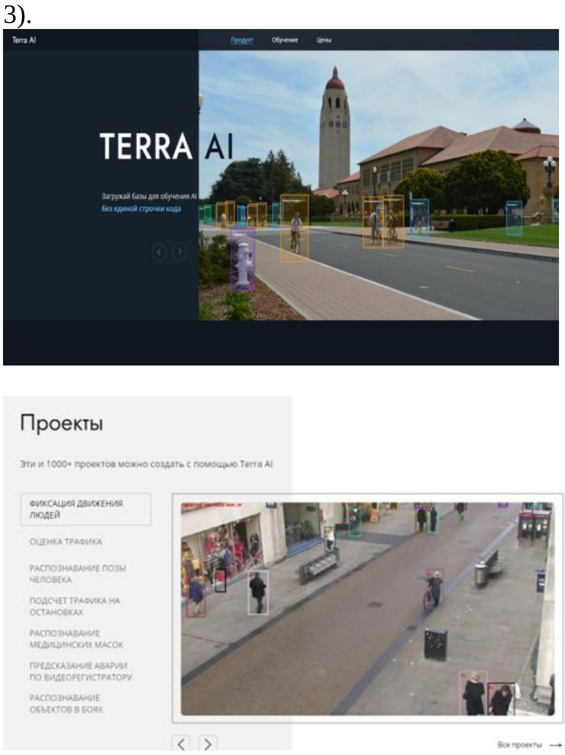

Figure 3: Components of TARA.ai.

PsodaVision is designed to transfer the real state of the Kanban board to the "virtual world" using machine vision technology. At the same time, different products may not be interchangeable at all: for example, PineStem is suitable primarily for software developers. Without a doubt, as artificial intelligence systems are increasingly improved, more and more solutions of this kind will appear, and their functionality will expand. Now these systems still remain quite specialized, however, there is an opportunity and space for their enlargement and expansion of applications – Smart Project is an excellent example of this thesis. This is a whole family of individual products that together form a system that covers a fairly wide range of tasks and allows you to establish a full cycle of project planning and management.

A personal assistant, although based on the same AI principles, is a simpler tool. Despite the existing specialization of various assistants, in general they represent some kind of replacement for a secretary and, in fact, a personal assistant. This class of solutions is most often a kind of chatbot and allows you to make various requests by voice or in text format: from tracking the current status of the project to templates of various project documents. At the same time, communication with the assistant can be carried out both through specially designed applications and with the help of common messengers, for example, Telegram. They often have integration with project planning and management tools, as well as office programs and many other applications that are required by project managers in various spheres and fields of activity.

Among other things, both those and other subspecies of artificial intelligence for solving project management problems can be useful in the organization of work itself, and not only in solving specific tasks. Many of them can be applied to organize team activities in accordance with the requirements of the now widespread Agile practice. This word can be translated into Russian in several ways, but the word "flexible" conveys its essence best. The essence of this management style is successfully formulated in one of its postulates: readiness for change is more important than the initial plan. Initially, this method was created for software development, but it turned out to be universal to a certain extent. In addition to the already indicated postulate, Agile manifests the following theses:

The cooperation of people and the person himself are much more important than tools and business processes;

More important than the working documentation is the current software;

The relationship with clients and the client himself is much more important than the assessment of requirements and the conclusion of an agreement;

More important than the initial project is loyalty to change.

The main thing in implementing the Agile style is the involvement of all parties, including the client, and the motivation of all participants in the process. In addition, for efficient and maximally fast work, the Agile method suggests dividing all the work into many small tasks and performing them in parallel, rather than in a pipeline way. Thus, all parts of the project are executed simultaneously, and the total time spent on its completion is significantly reduced. The final stage is the "assembly" of these disparate parts into a single whole.

"Agile is not a panacea or a guarantee of success, but it allows you to set the right course and find landmarks on the way". Based on this, transparency of production processes comes to the fore – after all, many people should work together on them, and at the same time, each of them should be clear about the current situation – and work with the project manager. In this case, he is not just a director giving instructions, but a kind of mediator and arbitrator in the relations between the other participants in the process. He defines the rules and principles of the work of a particular group or project as a whole.

Although this method was originally created for software development companies, it can easily be adapted to almost any activity, which has created a well-deserved popularity for it.

However, despite the obvious advantages and the growing popularity of the Agile method, it also has disadvantages. Among them, we can highlight the need for constant involvement of the client in the work process, as well as the need for constant, albeit short, meetings to discuss the current state of affairs and future plans . Therefore, including this method in all processes without exception will be an unsuccessful decision. Vlad Perevoshchikov, Chairman of the Board of Directors of Pantey, believes that there cannot be universal recipes for all industries and companies, and even for an individual company, focusing only on Agile management will not be optimal for all projects without exception.

The two most striking and obvious trends in the "digital transformation" are mentioned above. They have become so largely due to their versatility. However, each branch of business may have its own, more highly specialized solutions. For example, "digital cinemas" are now at the peak of popularity. People increasingly prefer to watch a movie at home, and cinemas are becoming more of a place for a rare gathering with friends than an institution where you can get acquainted with the novelties of cinema. And ordinary, classical cinemas have to put up with this state of affairs or change their business model. The same, only to an even greater extent, applies to video rental salons. We can say that this industry has completely undergone a "digital transformation" by switching to an online format. Of course, their approach to business process management cannot be applied in practice in all other industries, but this is a fairly vivid and illustrative example of readiness for innovation and progress.

Another argument in favor of digital transformation is the example of companies that successfully implement it. Forbes in the article 7 Examples Of How Digital Transformation Impacted Business Performance dated 21.07.2019 provides the following statistics:

Table 1:Dependence of share price rise on the duration of digital transformation.

Company name	Duration of digital transformation	Share price rise
Microsoft	5 years	258%
Hasbro	7 years	193%

BestBuy	7 years	198%
HoneyWell	3 years	83%
Nike	2 years	69%
Target	8 years	66%
Home Depot	2 years	59%

Source: compiled by the authors based on materials

Thus, thanks to the digital transformation, for example, Microsoft has increased its value by 3.5 times. According to the magazine, this procedure saved the BestBuy company from bankruptcy altogether, "at the same time" increasing its value three times.

To actually support the theoretical calculations, we will give an example of a company in the process of digital transformation.

Until 2025, the Russian Railways company has ambitious plans for digital transformation. According to the basic scenario, the company plans to invest 8,658 billion rubles in new technologies by 2025. Of course, in addition to automation and digitalization of managerial and non-production processes, the organization relies on such a popular idea as unmanned transport - in this case, a train. By 2025, Russian Railways plans to recoup investments in digital transformation by one and a half times.

4 DIGITAL DEVELOPMENT BASED ON DIGITAL MATURITY PARAMETERS

The analysis of digital transformation through the introduction of artificial intelligence into the management system, using the example of companies, shows that they expect the process of digital transformation to reduce costs and increase productivity.

However, along with the unconditional arguments FOR, there are also arguments AGAINST. However, this aspect of the trends in the development of digital transformation in management requires more detailed consideration in a separate article.

And an important question for understanding the current cycle of development of artificial intelligence systems and technologies is which way AI systems will develop, whether we expect a decline in artificial intelligence research or we will reach a peak in the field of AI and progress will be irreversible.

REFERENCES

Michurina, O.YU., 2010. Teoriya i praktika integracionnyh processov v promyshlennosti.287 pages.

Hosley, W. N., 1987. The application of artificial intelligence software to project management. *Project Management Journal*, 18(3). pages 73–75.

Harris, R.M., Shaffer, S.C., Stokes, J., Goldstein, D., 1987. Application of expert systems in project management decision aiding. Scientific and Technical Report.

Iskusstvennyj intellekt: sovremennoe sostoyanie i perspektivy. Vvedenie v metody II //https://www.hse.ru/ [Elektronnyj resurs]. Rezhim dostupa: URL: chrome-extension://oemmndcbldboiebfnladdacbdfmadadm/https:// cs.hse.ru/data/2017/10/08/1159578493/.

Slides-IntroToAI-HSE-2017-01-Panov.pdf (data obrashcheniya: 28.01.2023g.).

Iskusstvennyj intellekt. Perspektivy razvitiya // XIV Mezhdunarodnaya studencheskaya nauchnaya konferenciya Studencheskij nauchnyj forum - 2022 [Elektronnyj resurs]. Rezhim dostupa: URL: https://scienceforum.ru/2022/article/2018031957 (data obrashcheniya: 26.01.2023g.).

Iskusstvennyj intellekt v upravlenii proektami: plyusy i minusy. [Elektronnyj resurs]. Rezhim dostupa URL: https://www.itweek.ru/ai/article/detail.php?ID=205252 (Data obrashcheniya: 25.01.2023)

AGILE – gibkaya sistema upravleniya proektami. [Elektronnyj resurs] URL: https://4brain.ru/blog/agile/ (Data obrashcheniya: 26.01.2023)

Examples Of How Digital Transformation Impacted Business Performance. [Elektronnyj resurs]. Rezhim dostupa: https://www.forbes.com/sites/blakemorgan/2019/07/21/7-examples-of-how-digital-transformation-impacted-business-performance/#21525e7d51bb (Data obrashcheniya: 26.01.2023)

Pakhomova, A.I., Yalmaev, R.A., Belokurova, E.V., Shabaltina, L.V., 2020. Scenario of Hi-Tech Growth of Innovative Economy in Modern Russia. Lecture Notes in Networks and Systems, Vol. 91. pages 544–551.

Kakimi cifrovymi proektami zanyaty rossijskie predpriyatiya. [Elektronnyj resurs] Rezhim dostupa URL: https://www.vedomosti.ru/management/articles/2019/12/04/817894-kakimi-tsifrovimi (Data obrashcheniya: 23.01.2023).

Rasporyazhenie Pravitel'stva RF "Dolgosrochnaya programma razvitiya otkrytogo akcionernogo obshchestva «Rossijskie zheleznye dorogi» do 2025goda" ot 19 marta 2019 g. № No 466-r // Sobranie aktov Prezidenta i Pravitel'stva Rossijskoj Federacii. [Elektronnyj resurs] Rezhim dostupa:chrome-xtension://oemmndcbldboiebfnladdacbdfmadadm/.

http://static.government.ru/media/files/zcAMxApAgyO7PnJ42aXtXAga2RXSVoKu.pdf (Data obrashcheniya: 27.01.2023).