



UNAPREĐENJE POSLOVNIH PROCESA U PREDUZEĆU ZA PROIZVODNJU NAFTE KROZ
ANALIZU I RAZVOJ PRILAZA ZA NJIHOVU AUTOMATIZACIJU

IMPROVEMENT OF BUSINESS PROCESSES IN AN OIL PRODUCTION ENTERPRISE
THROUGH ANALYSIS AND DEVELOPMENT OF AN APPROACH FOR THEIR AUTOMATION

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Kratak sadržaj – Rad prikazuje analizu i diskusiju o mogućnostima korišćenja digitalnih tehnologija za automatizaciju poslovnih procesa. Autor analizira uspešne slučajeve drugih kompanija i predlaže pristup za automatizaciju poslovnih procesa u naftnoj proizvodnji kompanije Tatneft, uzimajući u obzir specifičnosti industrije i trenutne trendove. Rad se fokusira na činjenicu da je automatizacija poslovnih procesa ključni faktor za povećanje efikasnosti kompanija u industriji nafte i gasa. Autor identifikuje specifične načine korišćenja digitalnog pristupa u upravljanju kako bi se optimizovala i povećala konkurentnost preduzeća.

Ključne reči: *automatizacija, poslovni procesi, tehnologija, proizvodnja nafte.*

Abstract - The article shows the analysis and the discussion on the possibilities of using digital technologies to automate business processes. The author analyzes successful cases of other companies and proposes an approach for automating business processes at Tatneft oil production enterprise, taking into account the specifics of the industry and current trends. The article focuses on the fact that automation of business processes is a key factor in increasing the efficiency of oil and gas companies. The author identifies specific ways to use a digital approach to management in order to optimize and increase Tatneft's competitiveness.

Keywords: *automation, business processes, technology, oil production.*

1. INTRODUCTION

The paper discusses the possibilities of using digital automated business is becoming more widespread in the modern world and its success depends on the organization and management of key business processes. Business processes in the oil and gas industry are a consistent algorithm of actions aimed at creating specific services.

As a rule, a business process has a certain life cycle, which can be formalized and standardized and optimized to increase efficiency.

NOTE: This paper resulted from the master's thesis whose mentor was Prof Dr. Branislav Stevanov.

At modern enterprises of the oil and gas sector, business processes have features due to the use of digital technologies. It is important to take into account that the oil and gas industry is characterized by a cyclical supply and demand for related raw materials.

In the context of constant changes and growing competition, the oil and gas industry needs new management approaches. Automation of business processes is becoming a key factor in improving the efficiency and competitiveness of companies. This article examines the Tatneft enterprise experience in implementing digital technologies to automate business processes.

The best practices of other companies will be analyzed, and a strategy for the development of automation of business processes at the Tatneft enterprise will be proposed, which will allow it to strengthen its position in the market.

2. BUSINESS PROCESS IMPROVEMENT AND AUTOMATION

The concept of business process can be defined in different ways. A business process is a chain of logically related, repetitive actions, as a result of which the resources of an enterprise are used to process an object (physically or virtually) in order to achieve certain measurable results or products to satisfy internal or external consumers.

The main idea is that any business process has an internal or external consumer. Based on this definition, all actions within an organization (company) can be considered either as a business process or as part of it.

The analysis of the problems allowed to create a basis for making changes that have occurred in the last few years. Currently, an enterprise is considered not as a set of departments, but as a set of business processes. Here are the arguments for such a transition:

- Every process has a consumer, and focusing on each process contributes to better customer satisfaction.
- Value creation in relation to the final product is concentrated in the production processes.
- Defining the boundaries of the process under consideration, as well as suppliers and consumers, will allow for better interaction and understanding of the requirements to be met.

- When managing a holistic process that runs through multiple departments rather than individual departments, the risk of suboptimization is reduced.
- When assigning process owners responsible for the process, it is possible to avoid the distribution of responsibility by fragments, which often happens in specialized enterprises.
- Process management allows to create better grounds for controlling work time and resources.

Optimization of business processes is one of the main tasks of the enterprise. An enterprise that strives to optimize its business processes, it is called process-oriented. Automation of business processes is the introduction of specialized information systems or complexes that take over the performance of standard tasks and operations. Initially, the term "automation" was applied only to production processes, but over time its meaning has expanded to cover all areas of activity of companies.

Automation is aimed at reducing costs, reducing the influence of the human factor, improving the quality of products (services) and performing tasks in parallel. It solves key tasks such as supporting operational activities, accounting, optimizing personnel costs and improving the quality of customer service [1].

There are three levels of automation: performing day-to-day operations, managing production and resource processes, and analytics and forecasting for senior management (Figure 1).

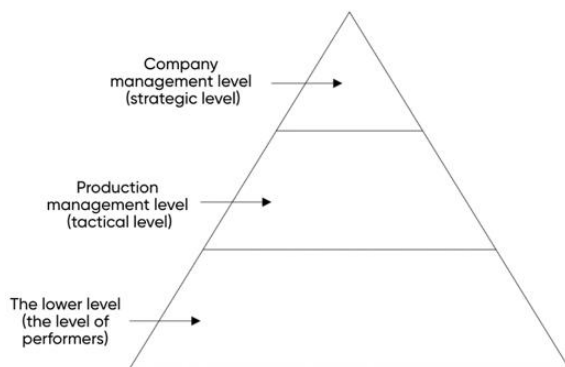


Figure 1. *Levels of automation of the company's business processes [2]*

Automation should be consistent, integrated into the overall company environment and independent in execution. It allows to speed up the execution of tasks, reduce errors, improve the quality of work, perform several tasks simultaneously and make decisions faster.

Current trends in automation include the use of artificial intelligence-based technologies, the robotization of business processes, as well as the concepts of no-code and low-code.

3. SUCCESSFUL EXAMPLES OF PROCESS AUTOMATION IN COMPANIES

3.1. Case studies representation and analysis

Automation covers a wide range of tasks, from simple administrative processes to complex production operations. It helps to reduce the influence of the human

factor, minimize errors and speed up the completion of tasks. The introduction of automation requires a thorough analysis of current processes and the selection of appropriate technologies, including software and hardware. In the manufacturing industry, automation optimizes the processes of assembly, packaging and quality control.

Since 2014, Amazon has been actively implementing robots in its warehouses by acquiring Kiva Systems, which is now known as Amazon Robotics. At the moment, the company employs more than 100 thousand robots, which helps to reduce labor costs, reduce the tax burden and increase efficiency. Automation in warehouses allows to speed up the search, packaging and shipping of goods, as well as provides employees with the opportunity to engage in more intelligent work [3].

UPS company is also implementing automation, using advanced technologies for sorting, processing and collecting data. In the company, 57% of parcels go through automated installations [4]. UPS uses algorithms to optimize delivery routes and is testing drones to monitor and deliver cargo.

Digitalization and automation are becoming key factors of competitiveness in the oil and gas industry. Russian companies such as Rosneft, LUKOIL and Gazprom Neft are implementing digital technologies to optimize production processes, reduce costs and increase efficiency. Examples of successful projects include reducing oil losses, reducing logistics costs, and improving field process management.

3.2. Recommendations and plans for process automation

Having studied the experience of leading companies, we can conclude that the automation of business processes is aimed at improving efficiency and competitiveness. Automation helps to reduce the likelihood of errors, ensures transparency of processes and the possibility of detailed analysis, which in turn helps to increase productivity and profit of the enterprise.

The choice of automation tools is critically important. The wrong choice can lead to inefficiency of the project. It is necessary to clearly identify the processes that require automation and select the appropriate tools, whether ECM, CRM, ERP systems or software robots (RPA). Each of these tools solves its own tasks, the discrepancy between the goals and the selected tool may result in the failure of the project, because the result will be very different from expectations.

The main reasons for automation failures include a lack of understanding of processes, poor choice of tools, insufficient assessment of infrastructure, and user resistance. It is important to carefully plan the introduction of new technologies, train employees and manage the project correctly.

Digital transformation is of strategic importance in the Russian fuel and energy complex. The use of digital technologies, such as the creation of digital twins and robotization, helps to increase efficiency and reduce costs. According to 2020 data, the total costs for the introduction and use of digital technologies by enterprises in the mining sector in Russia amounted to 53.3 billion

rubles, of which 32% were for communication services [5]. The general cost structure is shown in Figure 2.

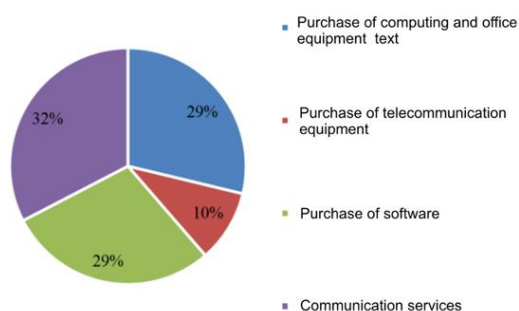


Figure 2. The cost structure of the organization of the mining sector for the introduction and use of digital technologies in 2020, % [5]

Despite the advantages, the implementation of digital technologies faces difficulties, such as insufficient financing, imperfect interaction between government and business, and administrative barriers.

4. DEVELOPMENT OF THE PROCESSES AUTOMATION APPROACH

4.1. Processes analysis and identification of needs for process improvement at Tatneft enterprise

Digital business models help oil and gas companies optimize processes and implement strategies. They simplify the modeling of social systems, improve communication and promote change.

PJSC Tatneft successfully applies digital technologies, such as digital twins and artificial intelligence, to reduce costs and increase efficiency. They integrate information systems, use domestic software and create a "data lake" [6].

However, the introduction of digital technologies faces difficulties, such as a lack of funding and qualified personnel. The successful transition to intelligent management requires the modernization of practices, the introduction of new technologies and legislative regulation.

The degree of automation systems providing technological and environmental safety for the gas transmission system is shown in the form of a complexity graph in Figure 3.

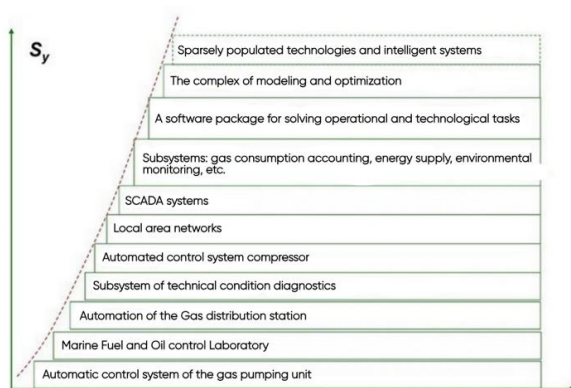


Figure 3. Graph of the analysis of the complexity of automation tools and systems [7]

The graph considers the degree of automation of facilities, the number of information sensors of processes, the

complexity of implemented algorithms in software and hardware complexes used at facilities.

Considering the trends in the development of modernization processes taking place in advanced oil and gas companies and the best practices in the application of new technologies, it is possible to predict a further increase in the complexity of the applied control systems in the oil and gas sector.

4.2. Development of a business processes automation strategy

The main goal of the enterprise is to ensure the necessary speed of digitalization of processes for the successful implementation of the strategy. Tatneft is advancing in a digital development strategy aimed at reducing costs, increasing competitiveness and investment efficiency. The problems that need to be solved include high-quality scenario business planning in oil production, regulation of processing plants and robotization of production processes.

Prioritization of projects is based on their economic impact and importance for the company's strategic goals. In conditions of limited resources, it is necessary to substantiate the relevance of the problem, its severity and the real source. The stages of diagnosis are important: identifying symptoms, analyzing the causes and determining the nature of the problem.

The second important component is the strengthening of digital development competencies necessary for the successful implementation and effective application of new technologies. It is not only about IT specialists, but also about business users – these are both managers and ordinary employees who must actively and competently use digital tools. Such a two-way development of competencies is a difficult but very important task, in which the company's IT unit is directly involved.

Changing exploration and production methods in Russia requires adaptation to new technologies and requirements. The use of neural networks, fuzzy logic, and expert systems can improve forecasting, optimization, and decision-making processes.

The complexity of technological equipment is increasing, which requires an increase in the speed of transition between stages of technological development. Industry 5.0 self-learning systems and technologies contribute to the intellectualization of processes, increase the speed of decision-making and robotization.

The integration of information systems into a single digital platform will ensure effective interaction and management. Interfaces should be developed for each system and specialized tool to enable the exchange of information between them. New functional modules can be implemented as separate services, known as microservices, which can be reused or easily replaced.

Cybersecurity requires the creation of a specialized unit and integration with a common business strategy to minimize risks and increase reliability.

Replacing imported solutions with domestic ones includes improving the stability of the corporate network and data protection.

5. CONCLUSION

The study defines the role of automation in the oil and gas industry and identifies key trends in its implementation.

The main conclusions are:

1. Automation significantly improves efficiency in the mineral resources sector.
2. Foreign experience shows the economic and technological advantages of digital transformation. Tatneft is implementing automation, but is lagging behind in digital maturity.
3. Global trends and peculiarities of Russia create new challenges for the automation of the oil and gas complex. It is necessary to adapt to the specifics of the facilities and overcome systemic problems.

Understanding the impact of business processes on competitiveness will help in developing automation strategies and strengthening market positions.

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