

# Digital transformation tools in the economy and transport sector

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**Abstract.** The current state of the economy and society is characterized by the beginning of intensive development and use of digital technologies. They create a new reality, make changes in the life of society, company principles, decision-making methods and relations with the environment. Under their influence, the processes taking place in the economic, industrial and transport spheres are radically changing. Inversion indicators in different countries, regions, companies and industries are characterized by different results, sometimes negative. Digital technologies are fundamentally changing transport networks and their importance for the economic development of the territory. With a variety of existing works on the problems of transformation and digitalization of economic sectors, the implementation of these processes at the level of subjects of the real sector of the economy and the transport industry remains insufficiently developed. The purpose of the work is to consider the main aspects of digital transformation in the sectors of the real sector and transport and to determine the opportunities and prospects for the digitalization of enterprises in the economy. The scientific novelty lies in the development of tools that allow the digitalization of production processes and, on this basis, increase the efficiency of the entire enterprise. In the new economic conditions, digital transformation will allow business entities to diversify their activities, increase competitiveness and strengthen their positions in the market.

## 1 Introduction

The modern economy and society are rapidly entering a new era that can be called digital. During the life of one generation, the formation, evolution and transition of the post-industrial society to the information society and then to the digital one took place. All countries have begun to intensively deal with issues of digital transformation of their economies, our country is one of them, but it is in a difficult situation, although, as the group of researchers notes, “industrial sectors form the foundation of the Russian economy, which is already a competitive advantage, but its low level does not allow full use of the potential inherent in these (industrial) sectors” [1].

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For Russia to be able to preserve not only political, but also economic sovereignty, it is now necessary to lay the foundations for digital transformations of economic sectors, paying more attention to the industrial sector. Usually, it is difficult for a pioneer to master new heights, especially technological ones, but having mastered them they increase their competitiveness. When analyzing the traversed path of such countries and the company, it is found that it could have been traversed with lower costs and more efficiently. Followers (competitors) can take advantage of the “backwardness advantage” to improve these technologies and be ahead of the pioneers, not to mention the fact that completely new technologies appear with the help of which it is possible to carry out the same process or produce the same product, but already at lower costs and more productive. We see a similar picture with digital technologies. The economic and social well-being of a country largely depends on how developed the industry and its branches are. This is confirmed by sufficiently reasoned facts, which are set forth in the work of E. Reinert [2].

Other researchers adhere to similar views as E. Reinert, who note that “digital technologies influence differently different spheres of activity. Considering that the main multiplier effect on economic growth is provided by such an important sector of the national economy as the manufacturing industry, we believe that digitalization of the industrial sector is a key factor in intensifying economic growth” [3, p. 900].

Katz believes that in order to solve the problems of increasing international competitiveness, many countries, especially developing countries, need to actively promote the digitalization of production and digital transformation. To do this, you need to “move along the path of industrial digitalization, paying special attention to policies focused on accelerated digitalization of production of small and medium-sized enterprises” [4, p. 34. ].

The potential of the Russian economy is based on industrial sectors, its share in GDP is more than one third of the total. The economy is dominated by the fourth technological order, but the stages of Industry 3.0 have not yet been completed. Right now, a unique opportunity is being created for its completion and transition to the Industry 4.0 rails. And you need to start this process from the industries that create material products and, first of all, from the industry.

Currently, there is no shortage of methods for the transition to the use of digital technologies, they are presented in various sources and affect various industries, the experience of the largest companies in the world is described, analyzed by many experts from different countries [5-8].

## 2 Materials and methods

The methodological basis of the study was the classical economic theory, systems approach and predictive analytics, empirical and statistical data were used, in the analysis of the features of digital transformation, they relied on the works of foreign and domestic researchers, as well as on various scientific areas, including the theory of information processes and systems. , industry market theory, firm theory, value chain theory. The methods used are characterized by validity and show a high degree of effectiveness.

In order to engage in digitalization, you need to know the state of the object that we want to digitalize. Many methodological guidelines and especially in the works of foreign researchers emphasize that it is necessary to start with a comprehensive analysis of the state of a given object, to find out at what level of development it is, what market niche it occupies and, most importantly, whether top management wants and can do this, a very difficult process and does this business entity have the necessary specialists.

Whatever processes take place in the economy as a whole, the production of a material product will remain a necessity. Therefore, it is important to find out how various digital

technologies can be used in the intensification and effective organization of the production process in the branches of the material (real) sphere.

### 3 Results and discussion

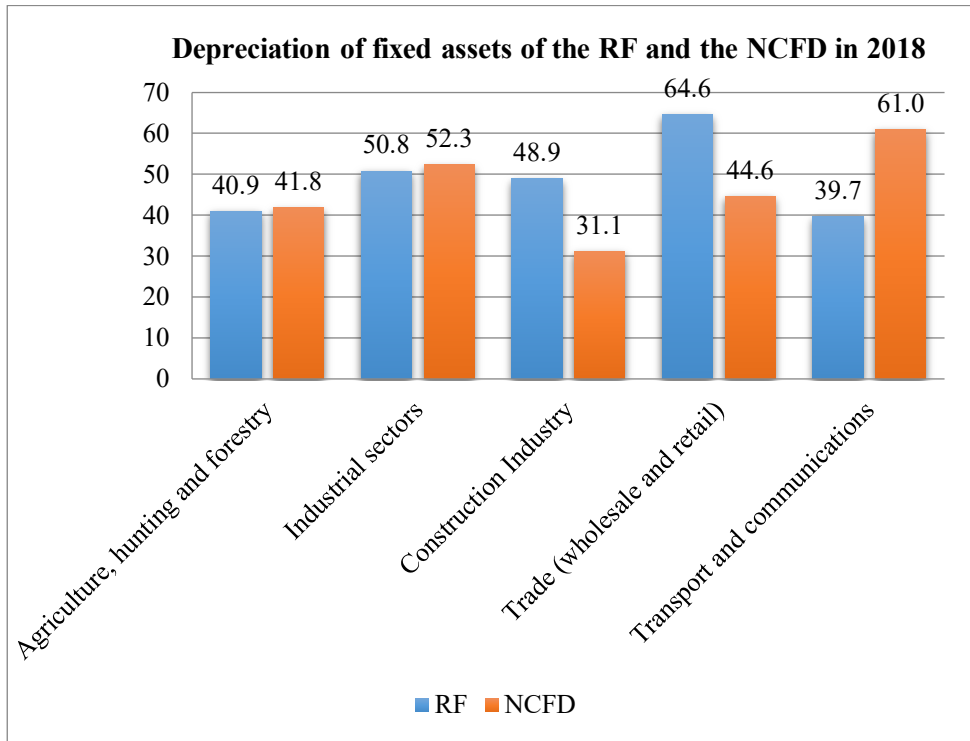
The object of our research is the material sphere of the economy of one of the federal districts of the Russian Federation (Russian Federation), namely the industry. In these industries, the effectiveness and efficiency of the production process is determined by the state of fixed assets (fixed capital). Table 1 provides data on the structure and investments in fixed assets, commissioning and depreciation of fixed assets. In the process of analyzing the state of these indicators, we will compare the average Russian indicators with the indicators of the subjects of the North Caucasian Federal District (NCFD), which belongs to the underdeveloped districts.

Analysis of the state of fixed assets shows that in terms of the structure of GDP (GRP), the sectoral structure and the input of fixed assets, on average in the Russian Federation, industrial branches dominate. In the North Caucasus Federal District, the prevailing sectors are the agro-industrial complex. The manufacturing industry (processing), which remains a priority industry, can be separately noted.

**Table 1.** State of fixed assets of the material sphere of the Russian Federation and the North Caucasus Federal District, %.

Subjects	Agriculture		Industrial branches		Construction		Trade (wholesale and retail)		Transport and communication	
	2010	2018	2010	2018	2010	2018	2010	2018	2010	2018
GRP structure (GDP)										
RF	4.3	4.6	32.6	33.4	6.9	6.2	19.3	16.7	10.5	11.0
SKFO	14.5	15.2	14.0	14.0	12.3	11.1	22.0	19.4	8.7	7.9
Sectoral structure of fixed assets										
RF	3.1	3.1	25.6	31.4	1.6	1.3	3.3	2.5	27.8	25.2
SKFO	8.6	8.4	16.9	16.1	2.1	2.8	3.7	5.4	27.4	22.7
Structure of commissioning of fixed assets										
RF	5.0	4.7	37.6	41.5	2.4	3.0	4.0	3.7	17.3	20.8
SKFO	7.4	12.9	22.0	15.4	2.0	10.1	8.1	7.2	19.9	13.5

The Russian economy is at the level of the fourth technological order, the third one prevails in the North Caucasus Federal District. Meanwhile, the level of the technological order is determined by the manufacturability of fixed capital and its working condition. Wear parameters are indicators informing about the working condition of the equipment (Figure 1).

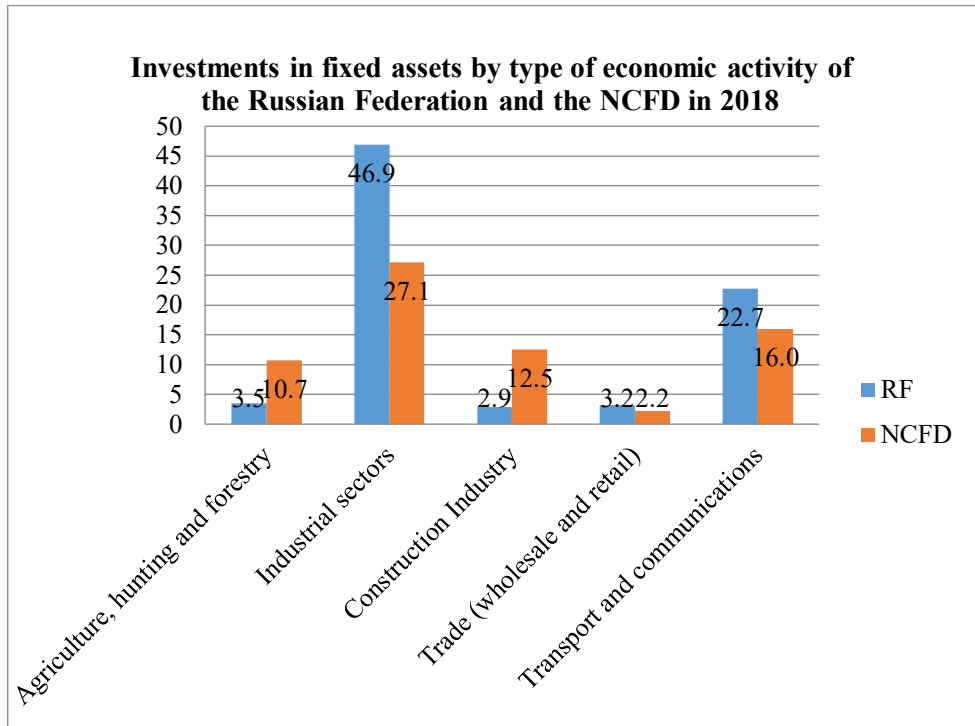


**Fig. 1.** Depreciation of fixed assets in the Russian Federation and the North Caucasus Federal District.

The clearest picture can be obtained by using statistical data and visual material (Figure 1). They show that the depreciation of all fixed assets in industrial sectors in 2018 on average in the Russian Federation amounted to 50.8%, in the North Caucasus Federal District - 52.3%. Manufacturing industries are also characterized by high wear rates. The existing indicators informing about the state of depreciation of fixed assets in the economy are critically high. And the incompleteness of Industry 3.0, which was mentioned just above, is also associated with high depreciation of fixed assets.

With this amount of worn-out equipment, pursuing a digital transformation strategy becomes difficult. Our country and its regions, especially the North Caucasus Federal District, face extremely difficult tasks in transition to new rails associated with the use of digital technologies. But these tasks cannot be postponed, they must be accomplished.

The main resource for eliminating the problems associated with the critical state of fixed capital is investment. Based on the situation that has developed in the global economic space and the situation in the Russian economy, investments should be directed to those industries that will allow the completion of Industry 3.0. and digital transformation of industries.



**Fig. 2.** Investments in fixed assets in the Russian Federation and the North Caucasus Federal District.

From the data in Figure 2, we can conclude that in the Russian Federation, the main investment flows are directed to the industrial and transport and logistics industries. In the North Caucasus Federal District, the dominant factors in obtaining investment are agricultural sectors and construction. The main disadvantage that accompanies the investment process in the country and the region is that it is focused on traditional industries, and not on the use of advanced technologies.

As noted in the source [9], "about 60% of investments in fixed assets will be made in the constituent entities of the Russian Federation, in which information production is not even developed, which reduces the investment attractiveness of both the regions themselves and the innovative projects implemented in them" [9, p. 1026-1027].

The priorities that are beginning to dictate the economy how to develop indicate that it is necessary to switch to the use of digital technologies. Meanwhile, according to the data of O. Romanova and A. Ponomareva, the issues of financing digitalization issues are significantly lagging behind global trends. "In 2018, 55% of industrial enterprises of the country have expenses for digitalization and development of IT infrastructure no more than 1% of their budget. Only 20% of the surveyed industrial enterprises have implemented automated production planning systems, which indicates the minimum starting basis of readiness for the digital environment, which creates the possibility of mutual communication of machines and devices" [10, p.21].

The situation in which the Russian economy finds itself causes the search for suitable ways to carry out digital transformation. One of the options for solving this problem is the transfer to the micro level of all digitalization processes. The micro-level was and remains the foundation of the economy, its digital transformation leads to transformations in all spheres of life. The same conclusion is reached by T. Aleksandrova, who notes that in order to succeed in their activities, enterprises must intensively engage in digitalization, since "the prospects and scale of the use of digital products and technologies in the industries of the

regions and the national economy depend on the results of the use of digital innovations in individual enterprises" [11].

In the economic literature, various researchers [12, 13] propose different approaches to digital transformation and the creation of new business models. Most often, the authors note the process approach, which involves the decomposition of the production process, as a result of which any (each) individual element of the production chain is "digitized" using possible and available digital transformation tools.

The proposed approach has some schematic similarities with the concept of creating value chains according to M. Porter [14] and concerns the division of the production process into its component parts. According to the concept, we are talking about comparing the analyzed subject with a leader in some kind of activity in order to catch up or overtake him and thereby increase his competitiveness and stability in the market. The difference lies in the fact that with digitalization, the production process is transformed and intensified, changes its content, can be combined with another process (action) and proceed simultaneously. As a result, productivity and competitiveness increase, overall and transaction costs are reduced, the process is rebooted with the help of digital technologies and new functions and qualities are given to it (the process).

Foreign and domestic practice shows that digitalization is a systematic and comprehensive event that covers all stages of the production process. In the general economic understanding, the production process is a set of actions of people and tools of labor, the interaction of which makes it possible to manufacture or obtain finished products. Depending on the industry, the production process can be different, but at the same time it has a general scheme that can be divided into three parts: main production, auxiliary and service processes.

Let's consider what digital and information technologies can be used to organize each stage of the production process. We will pay more attention to industrial enterprises. Depending on their specialization, such enterprises can use robotic devices, use the Internet of Things with the creation of cyber-technical systems of a network type, etc.

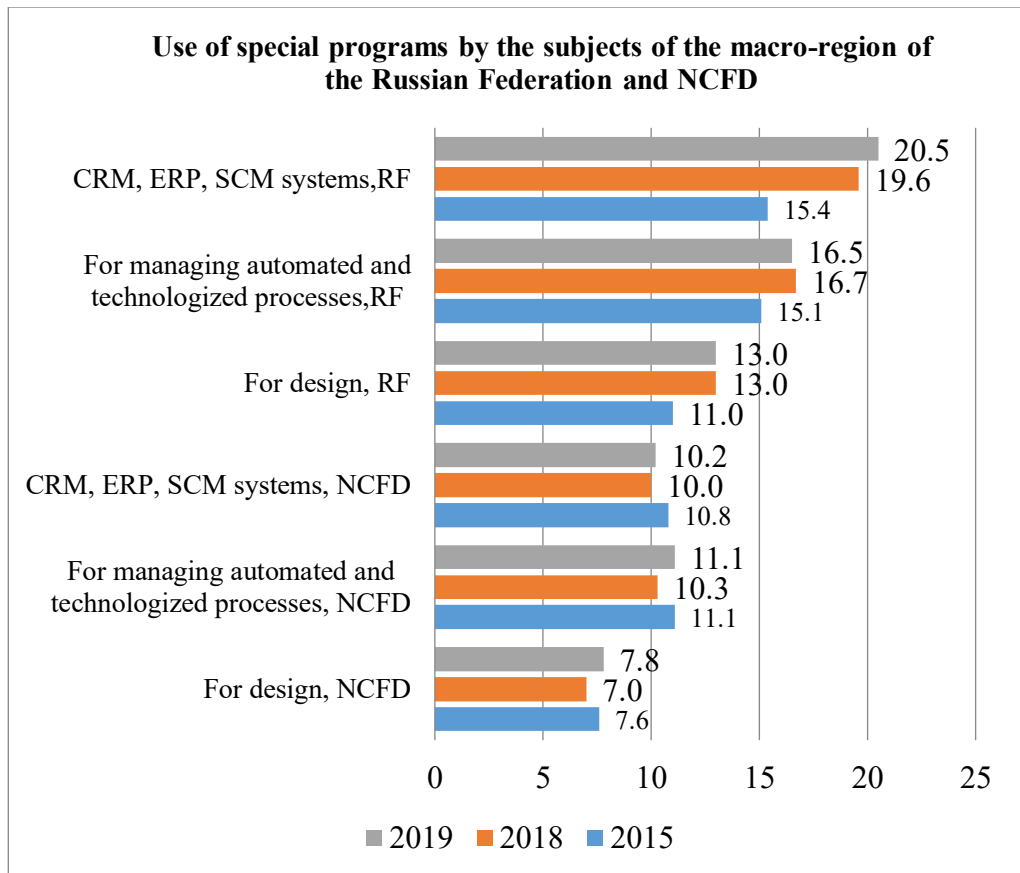
Currently, industrial enterprises have begun to intensively use RFID technologies to organize a clear and well-coordinated execution of the main production. These technologies can monitor the operating status of equipment and transmit information and data about the progress of the production process. In addition, they can participate in the digitalization of the entire process. According to O. Artemova and A. Savchenko, "RFID technologies allow using RFID tags to digitize production processes (a set of equipment operating in automation mode), accumulate this information in "big data", make optimal decisions about production processes, their changes and adaptation to specific tasks of the enterprise in automatic mode" [15, p. 41]

The production process cannot be carried out without auxiliary units, which are designed to ensure the uninterrupted flow of the main production. These include departments for equipment maintenance, infrastructure maintenance (budget planning, accounting, financial management, legal support, service maintenance, information support, document management, personnel management, etc.). Many of these functions can be transferred to digital technologies using SCM systems.

Service departments (processes) also take part in the production process, which perform functions that contribute to the efficient flow of the main and auxiliary processes. These include transportation, storage, manufacturing of parts and tools. In Russian conditions, the WMS system began to find application, which can ensure effective warehouse management, optimally placing finished products and controlling the correct shipment, identifying each product and each batch.

With digitalization in industry, many coordination and regulation functions are transferred to management technologies. Among them: ERP (enterprise resource management system), SCADA (dispatching system for industrial enterprise management),

CRM system (program for digitalization of logistics business processes), SCM system (supply chain management). The use of these technologies in the Russian Federation and the North Caucasus Federal District is taking shape in different ways (Figure 3).



**Fig. 3.** The state of the use of special programs by the subjects of the macroregion.

Figure 3 informs that the use of advanced technologies in the North Caucasus Federal District is at a low level. This situation leads to the fact that enterprises and products remain uncompetitive, labor productivity and efficiency of resource use remain low. The most critical thing in this situation is the conservation of technological backwardness. Meanwhile, special software and digital technologies remain the most important tools for transferring the economy of the subjects to a higher level of development.

An important point in the transition to the use of digital technologies is the need for clear coordination of interaction within the enterprise, as well as with external stakeholders. If an enterprise or company carries out digitalization, and other entities with which they interact remain on traditional principles, then the effect of digitalization will be low or there will be none at all.

We can agree with the experts of the Higher School of Economics, who note that one of the serious barriers in the widespread dissemination of digital technologies is often the need for a synchronous transition to work with them at once for a whole group of companies that form cooperation chains. This can apply to the introduction of unified workflow standards, and to digital design and modeling, and to the Internet of Things. If only one company switches to a new technology, the efficiency of its investments sharply decreases in

comparison with the effect that is achieved with a synchronous transition to it by a significant number of subjects of cooperation.

Thus, a significant problem, without the solution of which digitalization will not be effective, is that it must be end-to-end, that is, it must cover all stages of the movement of the product, from the manufacturer to the consumer. Each digital system must be adapted to the peculiarities of the production process of the enterprise. The consumer must also be digitalized.

As an example, we can cite the enterprise LLC "Nalchik Dairy Plant", which has begun modernization. The strategy that the company will adhere to is based on the use of digital and information technologies. Currently, work has been carried out to introduce a SCADA system, which allows automatic control of various parameters at each production site. The products themselves are controlled using modern RFID and bar-coding technologies. Here they understand that without the use of information and digital technologies, they will not be able to reduce the cost of production and, in general, production costs, and for this it is planned to use a modern ERP system. The little that has been done on the use of information technology to automate the production process, control logistics and optimize operating costs have allowed the company to save up to 8 to 12% of costs.

The work carried out allowed us to reduce production costs and strengthen our position in the dairy market. This is evidenced by the increase in production volumes, improved product quality, expansion of sales geography, penetration into the dairy product markets of Moscow, St. Petersburg, Stavropol and Krasnodar regions, which themselves are powerful producers of food products.

## 4 Summary

Digital transformation and digitalization of the enterprise are the most important aspects of increasing labor productivity, strengthening competitiveness, and meeting consumer needs. They can improve products, processes and services, give them a new quality through the optimization of production (operational) processes. To organize digital transformation, it is necessary to break down the production process into stages and digitize each of them. The choice of a specific digitalization tool depends on the specialization and resource capabilities of an economic entity. Digital tools (RFID technologies, ERP systems, CRM systems and others) can be effective if all stages of the production process are covered by digitalization. The challenges of implementing digitalization are associated with three major problems: lack of resources; high cost of technologies and their imported origin; the human factor - the unwillingness of top management to deal with this issue and the unwillingness of ordinary workers (Luddites) to change their attitude to the new situation. Solutions to these challenges are imperative to achieving the goals of digital transformation.

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