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ASSESSING THE READINESS OF OIL AND GAS COMPANIES
FOR DIGITAL TRANSFORMATION

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Abstract

The process of digital transformation in the Russian Federation started long ago, but it is not evident in its scale, although the strategic development of industrial companies shows the transformation of their traditional lines of business under the influence of competition intensified by the introduction of high digital technologies. According to statistics, one in three companies in Russia uses a digital transformation strategy. Analysing the choice of an organization's development strategy largely depends on the level of management's readiness to optimize business processes, change the organizational structure, and transform the management decision-making process. To date, there is no unified toolkit for assessing companies' readiness for digital transformation, so parameters have been developed to assess the readiness of representatives of Russian companies. The article identifies criteria for assessing companies' readiness for digital transformation, including such parameters as digital transformation status, companies' readiness to use data, the level of developing digital infrastructure, efficiency from customer experience management, digital collaboration, employee competencies, and Russian companies' budget for digital transformation. The authors conducted a study to identify the level of the digital readiness of various Russian companies, including oil and gas companies, which showed that most organizations have an average level of readiness for digital transformation, as the digital infrastructure does not fully meet business needs, management is based on superficial data analytics, and the most organizations generally not include digitization in their overall development strategy to date.

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Keywords: Oil and gas companies, digital transformation, business processes, digital infrastructure, development strategy



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1. Introduction

An analysis of current academic research on the prospects of the digital economy has shown that Russia's lag in digital skills availability and the rate of digital adoption itself is significant and is likely to increase further. Data from the 2019 International Network Readiness Index (NRI) shows that the Russian Federation ranks 48th in economic and innovation performance in using digital technologies. For example, Sweden is in the first place, with Singapore in second and the Netherlands in third. Russia ranks 38th in the IMD World Digital Competitiveness Index (Teske et al., 2019).

Although our country shows low levels of innovation and underdeveloped business in the global digital market, lagging the world's IT leaders, there is a drive by leading oil and gas companies to automate business processes and introduce smart technologies.

The digitalization of the oil and gas industry has become comprehensive, integrated and focused. In the past, calculations were time-consuming and conducted offline, but now the information is processed in real time, which dramatically expands the boundaries and possibilities of digital technology (Azieva, 2020).

It is not surprising that this situation has led to the increasing use of digital technology in the sector. There is a consensus among market leaders that digitalization brings them a new and tangible competitive advantage (Kotarba, 2017).

As a result, major oil companies around the world are moving towards digital technologies: Shell and Total use robots, Chevron and Shell use drones, Statoil uses 3D visualisation, Chevron uses video analytics to detect leaks in oil pipelines, and BP is implementing a major project involving the industrial IoT on offshore production platforms (Honore et al., 2018).

In addition, virtually all players in the global oil and gas industry are already using artificial intelligence and virtual and augmented reality capabilities in industrial oil technologies. There is not even ignoring such technology as blockchain.

2. Problem Statement

Given the increasing role of digital technologies and their involvement in the production process, as well as the lack of a unified toolkit for assessing digital transformation readiness of various Russian companies, including oil and gas producers, there was a proven need for preliminary diagnosis of companies for digital transformation, which would allow organizations to assess their capabilities and limitations.

3. Research Questions

In a globally competitive environment, the digital transformation of businesses and industries is a particular challenge, and the oil and gas industry is among the priority areas for digitalization.

4. Purpose of the Study

The purpose is to identify the level of the digital readiness of various companies in the Russian Federation, including oil and gas producers.

5. Research Methods

The main methods that we use in our research are the general scientific method based on ranking, which was carried out through the problem prioritization method according to its importance for the successful implementation of transformation, and the empirical method of scientific research, i.e. the method-operation based on a survey of managers from different sectors and an electronic questionnaire system.

6. Findings

The current trend of Russia's digital economy is encouraging companies to make the transition to digitalization, where the key challenge for any organization is choosing an effective development strategy. For example, the oil company Gazprom Neft defines its strategy by focusing on company leadership, eliminating an outdated management structure, developing in areas such as safety, efficiency and technology, and becoming a benchmark for other companies in developing digitalization. But, only 48 % of companies across various industries were in the process of implementing a digital transformation strategy in 2020, which is 23 % less than in 2018. Executive experience shows that understanding the goals of digital transformation and its content is large-scale, requires a competency-based approach and in-depth knowledge for effective business process automation. However, company leaders responsible for choosing a digital transformation strategy often have neither the experience nor the tools to implement it successfully. As a result, the share of successful implementations of automation processes in companies is understandably low, as businesses cannot objectively assess their level of readiness for digital transformation due to a lack of appropriate tools.

The academic literature extensively discusses the digital transformation of companies, but differently treats the concept in different studies. For example, foreign researchers Bowersox et al. (2005) have proposed a framework for integrative management of the digital enterprise in terms of supply chain excellence. The authors argue that 'true supply chain excellence can only be achieved through digital business transformation'. According to Schallmo and Williams (2018), digital transformation is using technology to radically improve production efficiency. Galimova (2019), took a slightly broader view of this notion, revealing that in addition to using new technologies in the transition to digital transformation, managers need to change the type of thinking and business strategy by defining new roles and skills in the organization, optimizing organizational structures and operational models, and adapting employees to a much faster pace of change. The Digital Transformation in Russia 2020 report understands digital transformation as a strategically managed process of transforming an organization's business model using digital technologies. We should note that the concept of digital transformation is not exhaustive and needs further clarification.

In recent years, digital transformation has moved from being a buzzword to the strategic agenda of most companies in Russia, and the coronavirus pandemic has given digitalization a boost. Today, digital transformation has actually become a prerequisite for the sustainable development of an organization (Elokhov & Aleksandrova, 2019) and companies aim within digitalization to increase efficiency, innovate, refocus and enter new markets.

In addition, digital transformation allows companies to develop new qualities and be successful in an environment of constantly accelerating processes and constant unexpected changes.

The effectiveness of implementing a digital transformation strategy largely depends on the readiness of companies for such a change. Different research studies provide different tools for assessing the digital readiness of organizations. For example, in the writings of Dolganova and Deeva (2019), diagnosing company readiness at the initial stage of digital transformation uses such an indicator as the level of digital maturity in terms of different countries, and a method for ranking in terms of the importance of problems arising in Russian companies during digital transformation for organizations.

The methodology for assessing readiness to digital transformation by the Chairman of the IRIO Board of Directors, Khokhlov (2020), is based on the calculation of the national index of digital economy development, using factors that have a direct impact on the development and use of digital technologies. Such factors include public policy and regulation, human capital, R&D, business environment, information security, digital sector, digital infrastructure.

This study has attempted its own assessment of Russian companies' readiness for digital transformation. We used an electronic questionnaire system as the main tool for data collection. The completeness of the responses was ensured by interviewing top managers and executives from different sectors (IT, marketing and oil and gas companies). The survey covered a sample of 112 respondents from organizations located in the Russian Federation (Table 01).

Table 1. Criteria for assessing the readiness of Russian companies for digital transformation

Parameters for assessing digital transformation readiness	Answer options	Rating scale
Digital Transformation Status	<ul style="list-style-type: none"> – We don't do digital transformation; – We are just studying and analysing the information; – We do stand-alone digital projects (patchwork digitalization); – We are implementing a transformation strategy 	<ul style="list-style-type: none"> The high level of manifestation – 3 points; The average level of manifestation – 2 points; The low level of manifestation – 1 point; There is no manifestation of the parameter – 0 points
Readiness of companies to use data	<ul style="list-style-type: none"> – We do not use the data (step 1); – We collect and store data (step 2); – Clean, analyse, segment the data (step 3); – We use the data to make decisions (step 4); – We use the data to adapt products and services (step 5); – We sell our data (business model) 	<ul style="list-style-type: none"> Ranked on a 6-point system according to the stage: the first stage corresponds to 1 point; the sixth stage corresponds to 6 points

(step 6)		
Level of developing digital infrastructure	<ul style="list-style-type: none"> – Unconnected infrastructure, there is a digitalization of the individual elements (Level 1); – The elements of infrastructures are linked and integrated (Level 2); – The infrastructure serves as the basis for a complete digital model of the company, with all processes digitized (Level 3); – There is already the implementation of predictive self-correction tools (Level 4); <ul style="list-style-type: none"> – There is a fully mature open infrastructure (Level 5) 	The ranking is on a 5-point scale, where level 1 corresponds to 1 point; level 5 corresponds to 5 points
Effectiveness of managing the customer experience	<ul style="list-style-type: none"> – Increased loyalty and satisfaction rates; – Increased margins per customer; <ul style="list-style-type: none"> – Increased repeat sales; – Reduced customer acquisition costs 	Each indicator is rated at 0.5 points. The maximum score is 2 points.
Digital cooperation	<ul style="list-style-type: none"> – We don't think we need to; – We are about to launch; – We are actively implementing it 	The high level of manifestation – 3 points; The average level of manifestation – 2 points; The low level of manifestation – 1 point
Personnel competences	<ul style="list-style-type: none"> – Personnel have in-demand skills and competencies for digital transformation; – Personnel are not fully competent; <ul style="list-style-type: none"> – Personnel do not have the competencies for digital transformation 	The high level of manifestation – 3 points; The average level of manifestation – 2 points; The low level of manifestation – 1 point
Budget for digital transformation of Russian companies	<ul style="list-style-type: none"> – Up to 10 million (Level 1); – From 10 to 50 million (Level 2); – From 50 to 100 million (Level 3); – From 100 to 500 million (Level 4); – More than 500 million (level 5) 	The ranking is on a 5-point scale, where level 1 corresponds to 1 point; level 5 corresponds to 5 points

Based on the sum of the scores on these scales, we have identified the following levels of readiness of Russian companies for digital transformation:

- Low level of readiness is the 0–10 point range;
- The average level of readiness is 11–21 points range;
- High level of readiness is 22–29 points range.

We will present the results of the survey of CEOs and top managers of companies on the parameter 'Digital Transformation Status' (Fig. 01).

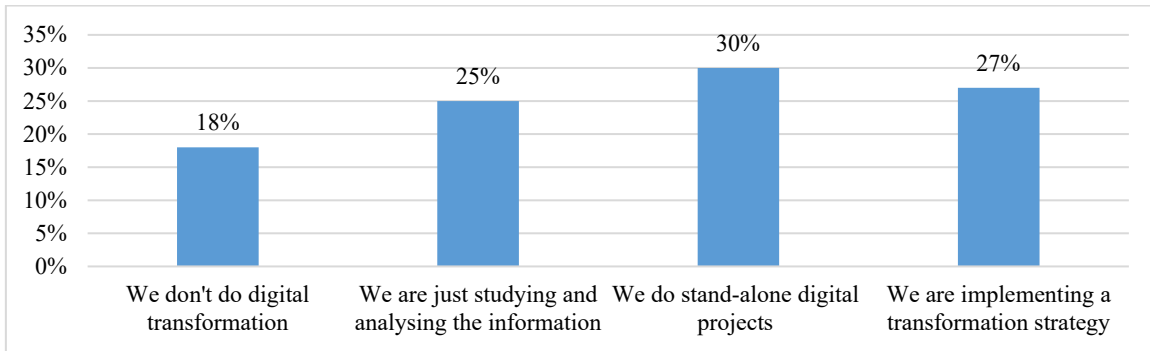


Figure 1. Digital transformation status of Russian companies, %

Based on CEOs' assessments of the digital transformation status of their companies, we found that the majority of organizations implements stand-alone digital projects in practice (30 %) or are in implementing a transformation strategy (27 %). The analysis shows that Russian companies are aware of the importance and benefits of digital transformation, approach the issue systematically and implement the transformation within the framework of a specifically developed strategic plan. Only 18 % of the businesses in the sample are not engaged in digital transformation, indicating a traditional leadership mindset and a lack of readiness for radical change.

The maturity of data use is also an important criterion that determines the readiness of companies for digital transformation. We will define digital maturity as a state where the efficiency of digital processes reaches its maximum and everything works in such a way that the entire team works as a cohesive team to achieve the company's business goals with the help of implemented IT solutions (Khalilova & Kuznetsova, 2019).

We should note that the purpose of using data in most companies is not the data itself and its accumulation, but a qualitative interpretation based on deep analytics (data-driven management), allowing the most effective decisions to be made in a short period of time with the least expenditure of resources (Fig. 02).

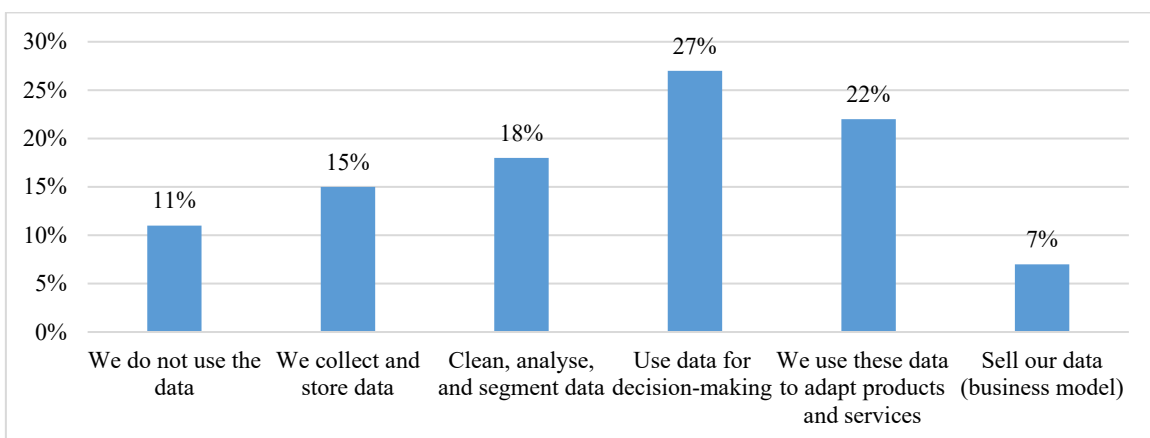


Figure 2. Readiness of companies to use data, %

Thus, the maturity of Russian companies in using data is determined by different stages of analytics: descriptive analytics (answers the question: what happened?); diagnostic analytics (why did it happen?); predictive analytics (what will happen?); prescriptive analytics (what to do to make it happen?). Analysing the result of the parameter estimation shows that only 11 % do not use the data. The majority use data for decision-making (27 %), adapting products and services (22 %). Only a small proportion of companies is in the highest degree of maturity in using data (7 %), with a functioning business model. 33 % of Russian companies are in the data-ready phase, with 15 % collecting and storing data; 18 % are already cleansing, analysing and segmenting data.

The main types of data used by Russian companies include personal user data; data from information and production systems; information on customer behaviour, transactions, communications; equipment sensors and alarm system indicators; business process performance indicators; and data from external sources to enrich their database.

The development of data infrastructure enables a wide range of analytics, the value of which grows with each stage of a company's digital transformation. By increasing the maturity of data analytics, a company can move from a retrospective analysis (what happened?) to a proactive strategy (what to do to make it happen?). This allows the organization to make decisions based on more information and to take a better position in all external circumstances.

Figure 03 shows the level of development of the digital infrastructure.

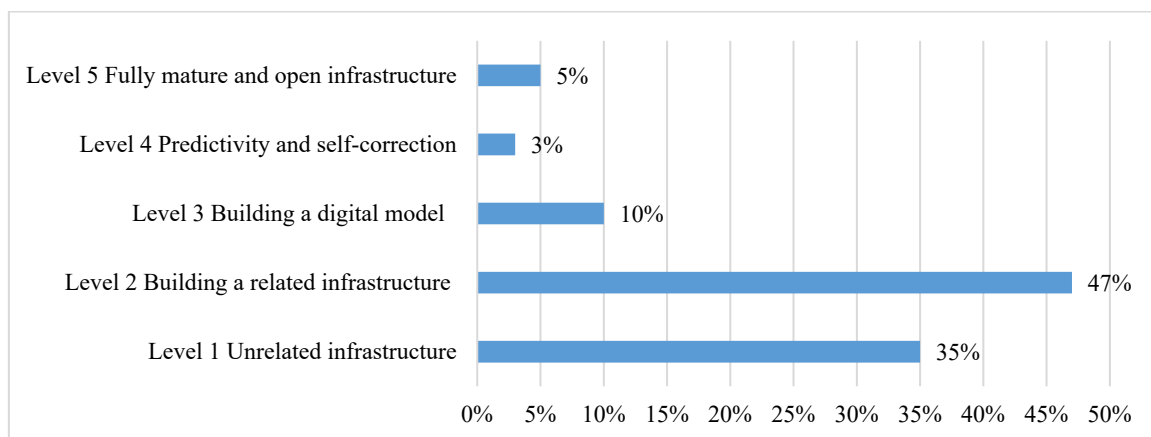


Figure 3. Assessing the development level of the digital infrastructure of Russian companies, %

The results shown in Figure 03 indicate that 35 % of companies have a digital infrastructure consisting of separate and unconnected elements, which imposes serious constraints on the development of the organization. Even a small change in external circumstances can contribute to the increased likelihood of such organizations becoming at risk.

The challenge for companies with the first level is to move from a digital infrastructure as a collection of individual elements to a connected digital infrastructure. This opens up additional opportunities for automation and the construction of more complex digital systems. So, 47 % of respondents said that their companies already have an integrated digital architecture. In addition, building a full digital business model makes any business development and scaling processes flexible and less

costly, as well as increases the sustainability and efficiency of the entire system. 10 % of respondents said that their companies already have a full digital business model.

The introduction of precautionary and self-correcting tools can further increase the sustainability and efficiency of the digital infrastructure, hypothesis building and generally playing ahead of the competition. Here, there was a 3 % response rate from executives, suggesting that there are a number of challenges that are creating barriers to the digital transformation of Russian companies.

Only 5 % of CEOs in the current sample have a fully mature and open infrastructure. This group includes leaders in the digital transformation of their industries and the economy as a whole. The principle of building infrastructure with open interfaces provides new opportunities for enriching data from external sources, as well as for finding completely new products and services in digital partnerships. On the one hand, it should be noted that companies are prioritizing the digitalization of business processes, but on the other hand, they are experiencing difficulties in implementation due to a lack of competencies among employees. We note the efficiency of customer experience management as perceived by respondents (Fig. 04).

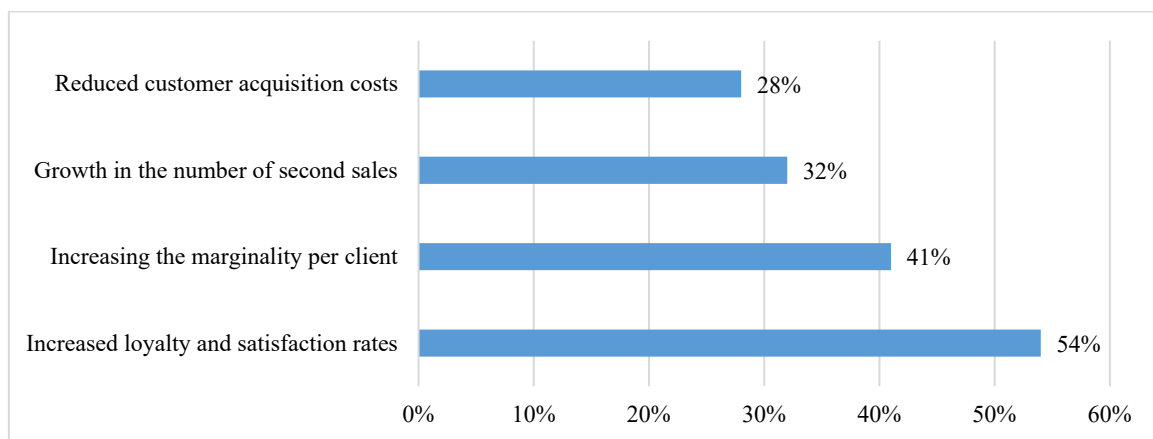


Figure 4. Efficiency from customer experience management, %

According to interviewees, the work of researching and managing the customer experience is gaining traction generally. Recently, special units have been set up within organizational structures to study customer behaviour and implement changes to staff, products and services. Thus, by moving to elements of digital transformation, companies could increase customer loyalty scores by an average of 54 %; customer margins increased by 41 %; there was an increase in repeat sales (+32 %) and a reduction in customer acquisition costs (-28 %). Russian companies use digital channels such as e-mail, texting, social media, messengers, chatbots, call centres, mobile apps, etc. to interact with customers.

Even with a detailed digital transformation strategy, most companies face significant challenges in putting it into practice. One reason is the lack of digital competences among personnel (Fig. 05).

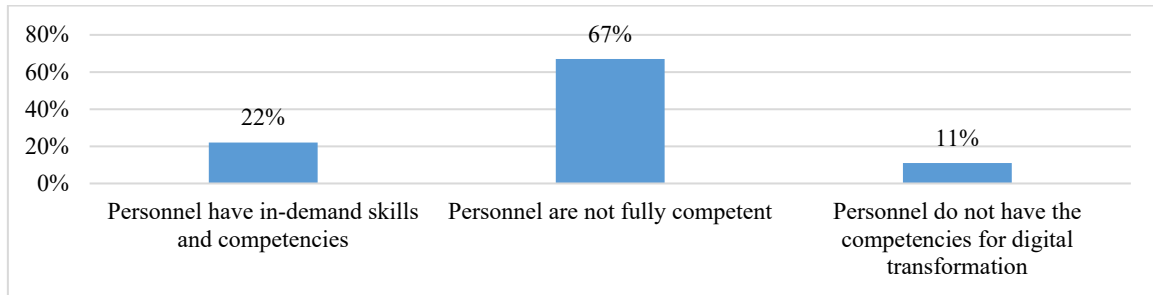


Figure 5. Personnel competencies for digital transformation, %

Only 22 % of personnel, for example, have competencies for digital transformation, where it mostly affects management's employment decision-making in a fundamental way. 67 % of personnel, according to CEOs, do not fully possess competencies in the digitalization of business processes, which slows down the transition to the digital transformation of the organization. 11 % of personnel do not have relevant competencies, as these companies do not plan education programmes in the digital competencies.

Next, we will provide an assessment of the readiness of Russian companies for digital cooperation (Figure 06).

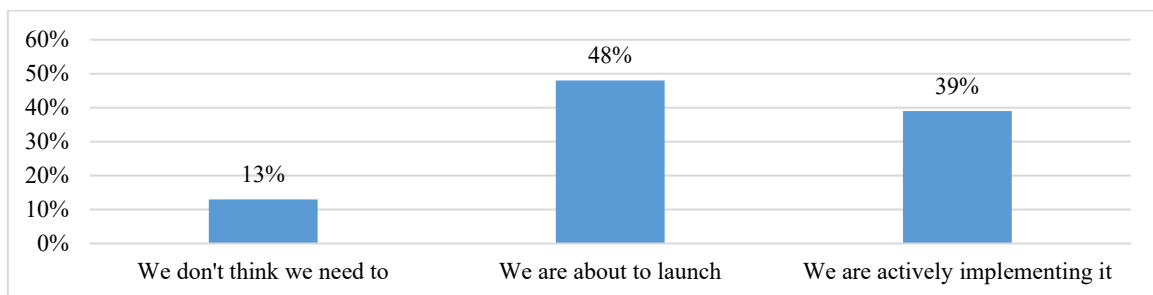


Figure 6. Digital cooperation, %

We should note that CEOs and company representatives may include various interactions in the concept of partnerships, including data enrichment from partners, sales of goods and services through aggregators and marketplaces, and other technical integration. Overall, we can observe an active use of this toolkit (39 %), including great prospects for implementation (48 %). Only a small proportion of organizations do not consider it necessary to implement digital cooperation in their activities (13 %). Overall, Russian Federation statistics show a positive trend in digital partnerships. However, such partnership business models are often unsustainable and have limited potential.

Now we consider the planned budget of Russian companies for digital transformation, as perceived by the respondents (Fig. 07).

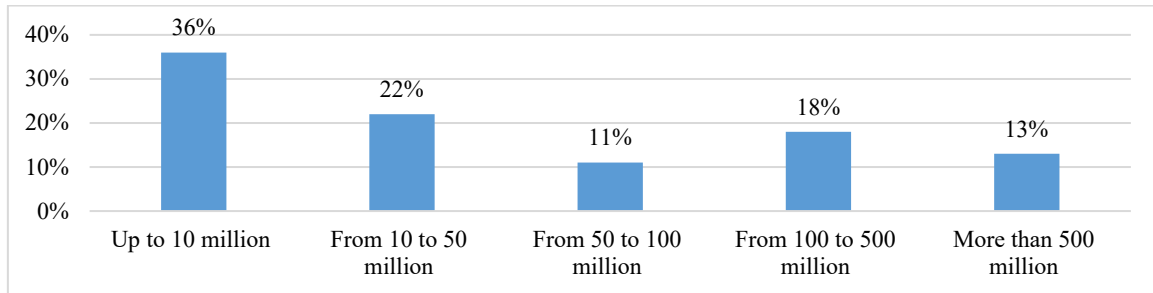


Figure 7. Budget for digital transformation of Russian companies, %

More than half of the companies plan to allocate up to 50 million rubles (58 %) to digital transformation programmes, mainly to fund technology solutions that improve operational efficiency. Generally, the expected average payback period for investments in digital transformation is 3–4 years. With an average duration of 2–3 years for transformation programmes, many companies expect to start getting a financial return on their investment while they are still in implementation. Introducing digital solutions into business models can produce results quickly.

In the study, the 100 companies that are leaders in digital transformation have the following characteristics:

- digital transformation as a real change (61 % assume that digital transformation is a core business goal for the company; 96 % assume that digital transformation is an opportunity to shape new business models);
- customer experience as a top priority (70 % note an increase in customer satisfaction; 92 % note that companies have a customer experience strategy);
- a strong focus on talent (54 % are investing in high digital talent; 71 % are attracting and retaining talent personnel);
- investment in digital technologies (94 % invest in big data; 76 % invest in the Internet of Things; 50 % invest in machine learning).

7. Conclusion

Thus, the survey of CEOs showed the following results: 19 % of companies have high readiness for digital transformation (range 22–29 points), indicating that these organizations are open to new technologies, digital infrastructure meets business needs, management is based on deep data analytics, and digital is embedded in the organization's overall development strategy.

Also, we find that 22 % of companies have low readiness for digital transformation, due to a lack of planned, systematic work to create an effective digitalization strategy for all business processes, a lack of a digital transformation governance body and low employee competence.

59 % of personnel have an average level of readiness for the digital transformation of the company, which may indicate a lack of experience of managers in implementing this strategy. However, we cannot ignore that the 2020 pandemic has led to 'forced digitalization', which has acted as a catalyst for the need for phenomenally fast adoption of technology in marketing, HR, operations, management and other areas of business. Companies that survive the COVID-19 pandemic will rely on updated procedures

and business models adapted to the new reality, while ensuring maximum safety and efficiency. The move to telecommuting has opened up the possibility of recruiting people from any city based on competencies rather than geography, which solves the problem related to personnel competencies. At different levels of digital maturity, Russian companies have encountered a wide range of challenges in organizing their interactions within the new mode of operation. However, in general, managers are convinced that the formula for success in digital transformation is competent managers and a team acting according to a developed strategic plan. In the ongoing digital transformation strategy, a special trigger is the management support expressed in the effective coordination of all project initiatives and the provision of cross-functional management tools as well as sufficient funding. The proposed toolkit for assessing the readiness of companies for digital transformation is not exhaustive and can be expanded and refined in future studies.

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