



28th International Scientific Conference
Strategic Management
 and Decision Support Systems
 in Strategic Management
SM2023

Subotica (Serbia), 18-19 May, 2023

Tatiana Lapina

Dostoevsky Omsk State University,
 Omsk, Russian Federation

Lapinaomgu@gmail.com

Tatiana Stuken

Dostoevsky Omsk State University,
 Omsk, Russian Federation

Stuken@mail.ru

Olga Korzhova

Dostoevsky Omsk State University,
 Omsk, Russian Federation

Olishb@yandex.ru

DIGITAL BUSINESS TRANSFORMATION: EXPECTATIONS AND REALITY¹

Abstract: Businesses implement digitalization for many reasons - to save costs and resources, to attract the best employees, as well as to gain competitive advantages. Therefore, it is interesting to study the decision-making process about digitalization: reasons, goals, its impact on changing the activities of an industrial enterprise, and on business as a whole. This study makes an attempt to assess several parameters of digital transformation based on industrial enterprises in one of the Russian cities. There were assessed parameters such as goals of digital transformation, barriers to its implementation, current and necessary scale of digitalization, digitalization results, and changes in the company's activities as a result of digitalization. There were interviewed 103 experts - top managers and IT specialists of industrial enterprises in Omsk, Russia. Methods of information processing are descriptive statistics, analysis of averages, factor analysis. Information was processed in the SPSS 22.0 package. The results show that digitalization is considered by experts as a positive factor in enterprise development. It has a significant impact on the current activities of enterprises, helps to work and make decisions faster and attract the best employees from the labor market. But at the same time all enterprises face problems and barriers in the process of digitalization solutions implementation, and, what is more, some of the problems can be generated by digitalization itself.

Keywords: digitalization, business, transformation, Russia

1. INTRODUCTION

Digitalization of industrial enterprises has long been a trend of modern management. It is even considered as a matter of survival for modern-day organizations (Chan, 2020). Organizations need to integrate digital technologies and their capabilities to transform processes, engage talent and drive new business models to compete and strive in the digital world (Schwertner, 2017). Today many organizational processes are being automated, people are being replaced by artificial intelligence, and workplaces are being digitalized. The benefits of the introduction of digital technologies are obvious, but at the same time, there are certain problems and barriers associated with digitalization: it is necessary to retrain personnel, revise organizational processes, and re-equip the organization, etc. (Vogelsang et al., 2019; Raj et al., 2020; Jones et al., 2021). Vogelsang et al. identified five different categories of digitalization. They include missing skills (IT knowledge, information about and decision on technologies, process knowledge), technical barriers (dependency on other technologies, security (data exchange), current infrastructure), individual barriers (fear of data loss of control, fear of transparency /acceptance, fear of job loss), organizational and cultural barriers (keeping traditional roles/principles, no

¹ The article was prepared at the expense of the grant of the Russian Science Foundation No. 22-28-20336, <https://rscf.ru/project/22-28-20336/>

clear vision/ strategy, resistance to cultural change / mistake culture, risk aversion, lack of financial resources and time), and environmental barriers (lack of standards and laws) (Vogelsang et al., 2019).

Therefore, for every enterprise that wants to use digital technologies, it is natural to think about the ratio of the costs of digitalization and the potential results from it. One of these indicators is labor productivity.

Let's consider the reasons for the growth of labor productivity during digital transformation. First, it is an increase in business efficiency, that is, a change in the return on resources in financial terms. This direction is considered as a comprehensive result of the introduction of digitalization. Second, it is a reduction in the amount of time for decision-making. This allows companies to react faster and in the conditions of the VUCA-world and the BANI-world is very important. Third, it is getting rid of routine operations. These operations do not require highly intellectual activity and, in fact, do not require human mental activity to perform them. At the same time, such operations are often accompanied by high monotony and lead to increased fatigue, which negatively affects job satisfaction. That is, it is in the interests of the management of organizations to reduce the number of such operations. And in this case digitalization is a good technology to eliminate them. Fourth, digitalization is a trend, it is an obligatory attribute of a modern enterprise and a modern workplace, which definitely contributes to the formation of a positive HR brand and allows attracting more qualified specialists compared to enterprises that have not implemented digitalization yet. Therefore, in this case, digitalization leads to a greater attractiveness of the organization in the labor market. Fifth, digitalization saves time resources (we make decisions faster), material resources (we use the best options for using equipment, technologies, materials), and human resources (fewer workers are required for the same amount of work). Sixth, digitalization is a factor of competitiveness of organizations in the modern world. In the conditions of competition in various markets, digitalization allows us to keep up with competitors both in terms of quality and quantity of products produced, and in terms of quality and quantity of resources spent. That is, digitalization in this case allows organizations to survive in competitive markets. Seventh, digitalization leads to a decrease in the number of errors, defects, and accidents at work. Industrial production is often accompanied by various mistakes, including those leading to the death of people. The introduction of digital technologies leads to increased control over occupational safety, acting as accident prevention.

It is intuitively clear that replacing people with digital technologies should lead to an increase in labor productivity, otherwise such a replacement does not make sense, but the problems arising from digitalization can lead to a decrease in the productivity of an industrial enterprise.

In order to understand to what extent business expectations from digital transformation were met and what effects were obtained from it, we conducted an applied study.

2. RESEARCH

2.1. Methodology

In order to conduct an empirical study we chose the Omsk region, the industry of which is represented by military, aerospace and agricultural engineering, petrochemical, light and food industries, and the production of building materials. The objects of the study were top managers and IT specialists of Omsk industrial enterprises. There were interviewed 103 experts, 92 expert questionnaires were accepted for processing. The method of collecting information was a questionnaire survey according to the author's methodology. Descriptive statistics, analysis of averages, and factor analysis were used to process the collected information. The processing was carried out in the SPSS 22.0 package. The measured parameters and their indicators are shown in Table 1.

Table 1: Measured parameters and indicators

Parameters	Indicators
The goal of digital transformation	To increase business efficiency (Yes/No) To work/make decisions faster (Yes/No) To get rid of routine operations (Yes/No) To attract the best employees (Yes/No) To save resources (Yes/No) To keep up with the competition (Yes/No) To reduce errors/defects/accidents (Yes/No)
Barriers to implementation of the solution	Lack of necessary software (Yes/No) Lack of necessary domestic software (Yes/No) Unwillingness and/or inability of employees to work in a new way (Yes/No) Lack of funds necessary for digitalization (Yes/No) Proposed digitalization solutions did not fully meet the needs of the organization (Yes/No) Digitalization has not solved the old problems and has created new ones (Yes/No) Long process of digitalization (Yes/No)

	Lack of digitalization standards (Yes/No) Diversity of digital products and their incompatibility (Yes/No) Complexity of bureaucratic procedures (Yes/No)
Assessment of the current scale of digitalization	From 1 to 10
Assessment of the necessary scale of digitalization	From 1 to 10
Digitalization results	Change in personnel labor costs (Growth/Unchanged/Decline) Change in the quality of work (Growth/Unchanged/Decline) Change in the amount of work (Growth/Unchanged/Decline) Change in the speed of work (Growth/Unchanged/Decline) Change in occupational safety (Growth/Unchanged/Decline) Change in the consumption of material and financial resources (Growth/Unchanged/Decline) Change in customer satisfaction (Growth/Unchanged/Decline) Change in the rhythm of production (Growth/Unchanged/Decline)
Assessment of changes in the company's activities as a result of digitalization	From 1 to 5

Source: authors

2.2. Results

2.2.1. Expectations from digitalization

In order to analyze business expectations regarding digitalization, we analyzed the goals of digitalization. They are presented in Table 2.

Table 2: Distribution of answers to the question about the goals of digitalization (the amount is more than 100%, since it was possible to choose several answers)

Digitalization goals	Share, %
To attract the best employees	16
To keep up with the competition	24
To get rid of routine operations	60
To save resources	60
To reduce errors/defects/accidents	64
To increase business efficiency	68
To work/make decisions faster	80

Source: authors

As can be seen from Table 2, among the reasons for digitalization, the main one for most experts (80% of responses) is the reduction of decision-making time and acceleration of work processes. The modern world and the markets of goods and labor require rapid response, flexibility, adaptability. And this distribution of responses indicates that digitalization is considered as a factor affecting the flexibility of enterprises, allowing them to adapt to changing conditions in a timely manner. Assessing their experience of participating in digitalization projects, 90% of experts noted that these projects led to an increase in the speed of work. In our opinion, such high ratings are also due to the visibility of the results of digitalization projects – it is easy to notice the reduction in time. At the same time, experts who indicated this reason by an average of 2.18 points estimate the current scale of digitalization of the enterprise in which they work higher (6.68 points versus 4.5 points on a 10-point scale, where 10 is the maximum digitalization of an industrial enterprise. The results are statistically significant according to the Fisher criterion ($F=24,004$, $p=0.000$)). Apparently, the focus on the speed of work contributes to the digitalization of industrial enterprises. Also, according to the analysis of the expert survey, it was revealed that the focus on increasing the speed of work during digitalization changes the current activity of the enterprise more strongly (on average by 3.79 points against 3.0 points on a 5-point scale. The results are statistically significant according to the Fisher criterion ($F=25.825$, $p=0.000$)).

The second place in terms of the consequences of digitalization is occupied by improving business efficiency. This consequence is complex in its content and includes many indicators. In our opinion, this direction generalizes all the consequences of digitalization. At the same time, according to experts, this direction of the impact of digitalization is most associated with resource savings (according to the results of factor analysis, this indicator was included in one factor with increased efficiency. The percentage of the total variance explained by this factor was 20.4%). If customer satisfaction is considered as an indicator of efficiency, then half of the experts indicated that as a result of digitalization, customer satisfaction will increase. Experts also rated the improvement of the quality of the organization's work as a result of digitalization very highly (90% of experts). 60% of experts noted that the last digitalization project in which they

participated contributed to the growth of production. That is, specific indicators of the effectiveness of the implementation of digitalization projects confirm the high estimates of this consequence for industrial enterprises. Industrial enterprises focused on increasing business efficiency during digitalization estimate the scale of their current digitalization and the necessary digitalization higher than other enterprises (the results are statistically significant according to the Fisher criterion), which indicates that the focus on improving business efficiency is the strongest driver of digitalization development.

64% of experts answered that enterprises are engaged in digitalization to reduce the number of errors, defects, and accidents. This direction is very relevant for industrial enterprises and it is logical that experts highly appreciated the possibilities of digitalization to solve problems in this area. But at the same time, when answering questions about real projects in which experts participated, only 21.4% noted that labor safety will increase after the implementation of the project. The majority of experts 71.4% said that the safety of work after the implementation of the digitalization project will not change. The rhythm of production was estimated by experts slightly higher – 35% of experts expect that the rhythm of production will increase. That is, at the level of declarations, experts note the importance of using digitalization to improve occupational safety, but when making decisions when choosing the implementation of specific digitalization projects, the choice is made in favor of other advantages and opportunities of digitalization. This fact is very alarming, since we are talking about industrial enterprises for which occupational safety, reduction of defects are very important indicators of activity.

According to 60% of expert assessments, the fourth most important consequence of digitalization is the reduction of routine operations and resource savings. On the one hand, this fact indicates the importance of optimizing activities, but, on the other hand, it indicates the insufficiency of the motive for reducing costs (only fourth place). The incentive to reduce routine operations is lower monetary costs during digitalization compared to the cost of maintaining employees. As it is known, the Omsk region has a relatively low cost of labor, so this incentive, as a rule, does not exist – the costs of enterprises for labor are low and there is no material interest in replacing people with technology. In addition, the orientation of the region to preserve jobs leads to the fact that enterprises, as a rule, do not dismiss employees. This thesis is confirmed by the results of an expert survey: for most categories of personnel, there is a preservation of the number of employees after the introduction of digital technologies. Only 20.8% of experts said that the number of support staff has decreased, while the reduction in number of other categories of personnel is lower. There is no reduction in the number of IT specialists at all. But at the same time, experts in 55% of cases noted a reduction in personnel costs as a result of the implementation of digitalization projects, and in 50% of cases there is a decrease in the use of material and financial resources. That is, there is still a saving of resources, but it cannot be traced through a decrease in the number of personnel. Most likely, industrial enterprises transfer the released employees to solve other tasks. This circumstance, of course, is an incentive for the introduction of digitalization projects for employees, since they may not be afraid of dismissal after digitalization.

24% of experts noted that industrial enterprises are engaged in digitalization in order to keep up with competitors. And only 16% noted that digitalization is a factor in attracting the best employees. In our opinion, this situation is explained by approximately the same level of digitalization of industrial enterprises of the Omsk region on the one hand, and, on the other hand, by the presence of more important organizational tasks for which enterprises are implementing digitalization.

Since several reasons for digitalization could be indicated in the expert survey, we then analyzed the interrelationships of various reasons. Factor analysis (rotation by Varimax method) carried out in order to identify the relationships between the causes of digitalization revealed three groups of factors (Table 3). The first factor (broad impact on labor productivity) included the following reasons for digitalization: getting rid of routine operations, reducing the number of errors, attracting the best employees, saving resources, keeping up with competitors (33.78% of the total variance explained). The second factor is focused on efficiency associated with resource savings (20.4% of the total variance explained). And the third factor includes such reasons for digitalization as increasing the speed of decision-making and keeping up with competitors (16.22% of the total variance explained). Thus, we have identified the relationship between the causes of digitalization of industrial enterprises.

Table 3: Digitalization factors

Digitalization goal	Broad digitalization goals	Saving resources	Speed
To get rid of routine operations	0.811		
To reduce errors/defects/accidents	0.791		
To attract the best employees	0.440	0.394	0.358
To increase business efficiency		0.857	
To save resources	0.433	0.774	
To work/make decisions faster			0.866
To keep up with the competition	0.515		0.589

Source: authors

Experts' assessment of the current and necessary scale of digitalization has shown that the current scale of digitalization of industrial enterprises is statistically significantly influenced by business efficiency orientations, speed of decision-making, getting rid of routine operations, attracting the best employees, saving resources, keeping up with competitors, reducing defects. In turn, higher estimates of the required scale of digitalization are influenced by business efficiency orientations and keeping up with competitors.

In addition, the change in the current activity of an industrial enterprise is more strongly influenced by the orientation to the speed of decision-making and attracting the best employees.

2.2.2. Barriers to digitalization

We also analyzed the barriers and difficulties of digitalization of industrial enterprises. The frequency of prevalence of individual barriers is shown in Table 4.

Table 4: The frequency of digitalization problems in industrial enterprises in the Omsk region, %

No	Digitalization problems	Frequency, %
1	Lack of necessary software	21.7
2	Lack of necessary domestic software	39.1
3	Unwillingness and/or inability of employees to work in a new way	52.2
4	Lack of funds necessary for digitalization	52.2
5	Proposed digitalization solutions did not fully meet the needs of the organization	39.1
6	Digitalization has not solved the old problems and has created new ones	13.0
7	Long process of digitalization	34.8
8	Lack of digitalization standards	26.1
9	Diversity of digital products and their incompatibility	17.4
10	Complexity of bureaucratic procedures	39.1

Source: authors

Table 4 shows that in the first place in terms of the frequency of problems are the unwillingness /inability of employees to work in a new way and the lack of funds necessary for digitalization - every second industrial enterprise faces these problems. Moreover, every fourth enterprise has both problems at the same time. Of course, the lack of funds from the very beginning limits the possibilities of enterprises in digitalization. At the same time, when introducing any product, it is necessary to pre-train personnel to work in new conditions, otherwise there will be no effect from the introduction of new technologies, in this case digitalization. But staff training is an additional financial and organizational investment. It turns out that digitalization requires both direct financial investments related to the purchase of equipment, programs, technologies, and indirect ones required to ensure the introduction of digital technologies.

Three problems are in second place in terms of prevalence: the lack of necessary domestic software, digitalization solutions did not fully meet the needs of the organization and the complexity of bureaucratic procedures – 4 out of 10 enterprises indicate such problems. The listed problems also cannot be solved promptly, which will also significantly slow down the introduction of digital technologies.

Least of all enterprises face the problem that digitalization has not solved old problems, but at the same time has contributed to the emergence of new ones – 13% of enterprises. Of course, the fact that enterprises note that digitalization generates new problems without solving the old ones is a very negative situation that can lead to a significant slowdown in the introduction of digital technologies. But it is definitely pleasing that the percentage of such enterprises is not very large.

On average, each enterprise indicated 3.35 problems, while the maximum number of these problems was 7 out of 10 possible (9% of enterprises).

3. CONCLUSION

As a result of the analysis of the experience of digitalization at industrial enterprises of the Omsk region, it was revealed that digitalization is considered by experts as a positive factor in the development of the enterprise. Experts noted the high importance of digitalization for solving the problems of enterprises in the external market. Digitalization, according to experts, leads to faster work and attracting the best employees. Digital transformation has also had a significant impact on the current activities of industrial enterprises. At the same time, all enterprises face problems in the process of digitalization, and some of the problems are generated by digitalization itself.

REFERENCES

- Chan, J. O. P. (2020). Digital transformation in the era of big data and cloud computing. *Int. J. Intell. Inf. Syst*, 9(3), 16.
- Schwertner, K. (2017). Digital transformation of business. *Trakia Journal of Sciences*, 15(1), 388-393.
- Vogelsang, K., Liere-Netheler, K., Packmohr, S., & Hoppe, U. (2019). Barriers to digital transformation in manufacturing: development of a research agenda. *Proceedings of the 52nd Hawaii International Conference on System Sciences*, 4937-4946.
- Raj, A., Dwivedi, G., Sharma, A., de Sousa Jabbour, A. B. L., & Rajak, S. (2020). Barriers to the adoption of industry 4.0 technologies in the manufacturing sector: An inter-country comparative perspective. *International Journal of Production Economics*, 224, 107546.
- Jones M. D., Hutcheson S., & Camba J.D. (2021). Past, present, and future barriers to digital transformation in manufacturing: A review. *Journal of Manufacturing Systems*, 60, 936-948.