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DIGITAL MATURITY LEVEL ASSESSMENT AS AN ELEMENT OF DIGITALIZATION OF RUSSIAN ECONOMY

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Abstract

Coronavirus pandemic greatly affected the whole world. Global digitalization was also influenced by it. Safe and fast data interchange, Internet services, and distant work and education have become the most important issues. Irreversible and comprehensive digitalization should be controlled and managed. The leading role pertains to the government as the legislative and regulatory force that forms national policy and redistributes financial resources. Russia has digitalization strategy where so-called digital maturity has been described. This term concerns countries, economic spheres and even single organizations. Digital maturity needs certain indicators to be formulated. As for Russia, the indicators must be different for different industries and regions. The government has already given orders and made recommendations. The authors of the article propose a new model for digital maturity level assessment that includes key aspects of all subjects. All future models and conceptions should be based on a system approach as a condition of efficient digitalization.

Keywords: Digitalization, digital transformation, information technology, digital maturity

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1. Introduction

The global crisis caused by the coronavirus (COVID-19) pandemic has affected the economy, employment and population incomes. The situation was aggravated by the fact that there were many problems in the economy before the so-called "coronacrisis": protectionist policies of some countries, trade wars and, as a result, restrictions on international trade; oil price crisis; general geopolitical tension and a number of local conflicts.

The combined effect of all the factors determined the beginning of a new stage of digital economy development in the world. Globally, in 2020-2025, the third, digital, revolution, which began in the second half of the 20th century, is coming to an end. Fully automated production has become one of the important features of Industry 4.0: all processes are controlled in real time and taking into account changing external conditions. Among the advanced technologies that can become effective tools for digital economy are the following: cloud computing, machine learning, augmented reality, digital cloning, big data and analytics, the Internet of things, additive manufacturing (3D printing) (Torgovtseva, 2020).

However, digitalization is not something that will happen in the future. Experts argue that digital future of the world has already arrived. On the one hand, process of global digitalization began long before the 2020 pandemic: people actively used services such as online shopping, mobile banks and ordering food. On the other hand, it was the consequences of the coronavirus pandemic that brought to the fore urgent need for digital economy tools and, accordingly, new technologies. The global epidemic can be seen as a signal to accelerate globalization and unite all countries within the framework of free trade.

With the beginning of the pandemic, digitalization rate of global economy has increased tenfold. Prior to that, topics such as digitalization, remote work, distance education, telemedicine were mostly discussed, but were not implemented. The coronavirus pandemic has forced to turn these conversations into a practice. The corona crisis is not the first in history, but the situation in which the whole world is currently found is fundamentally changing the future of mankind.

2. Problem Statement

Digitalization is a global process that needs to be constantly analyzed. Tracking and managing trends is a sine qua non condition for digitalization to have more positive than negative impacts. In turn, management of digital effect without assessing its current state, or digital maturity of a given subject is impossible.

3. Research Questions

Within the framework of this study, firstly, it is necessary to analyze mutual influence of coronavirus pandemic and digitalization process. Secondly, it is necessary to assess current level of development of digital technologies in Russia, as well as the steps that are being taken in this direction. Thirdly, it is necessary to reveal the concept of digital maturity and provide various methods for assessing its level. The fourth task is to develop the author's methodology to assess level of digital maturity.

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4. Purpose of the Study

The purpose of this study is to substantiate the importance of assessing digital maturity at present stage of technology development and its implementation in all spheres of human activity.

5. Research Methods

Lockdown, imposed in almost all countries due to the pandemic, contributed to the rapid introduction of digital technologies in different spheres of life. This gave impetus to the development of technology sector, while most economy sectors faced a crisis. Nevertheless, some areas have benefited from the pandemic (Table 1). Under certain conditions, digitalization can become one of the areas of economic recovery, affected by coronavirus crisis. During a pandemic, when the first priority was to ensure safety and health of the population, digital services contributed to rapid development of digital technologies.

Table 1. Covid19 pandemic effect on industries in Russia (for the period from January 2020 to January 2021, %) (Zubkov, 2021)

Industries having shown growth	Industries having shown decrease
production of beverages (+26.1)	production of leather (-2)
production of tobacco products (+8.7)	production of leather (-11.4)
production of textiles (+11.5)	printing industry (-21.2)
clothing manufacturing (+3.9)	production of coke and petroleum products (-8.2)
wood handing and manufacture of wood products (except furniture) (+3.4)	metallurgical production (-3.1)
production of paper (+1)	production of finished metal products (-6.2)
production of chemicals and chemical products (+9.2)	production of electrical equipment (-2.1)
production of medicines and medical products (+74.9)	
manufacture of rubber and plastic products (+12)	
production of computers (+16.9)	
production of motor vehicles (+7)	
furniture manufacturing (+17.4)	

In the second half of 2020, the position of digital technologies has strengthened in many areas of the economy, while one of the main issues remains direction of further development of digitalization.

After analyzing the impact of the coronavirus pandemic on information technology industry, it can be noted that many companies have suffered, despite general increase in interest in various services. Revenues of most IT companies fell by 40-60%, and cost of innovation was kept to a minimum. Even industry leaders find themselves in a difficult situation. In this regard, the Russian government has taken a number of measures to support IT. For example, since 2021, the so-called "tax maneuver" has been in effect: taxes for companies accredited as digital developers, as well as those involved in sale and implementation of software, have been significantly reduced. Targeted support measures were also taken with regard to developers who create and implement domestic products in the field of information technology. Firstly, there is a traditional form of financial assistance, grant programs. In 2020, the volume of grants issued amounted to almost 7 billion rubles. Secondly, an important anti-crisis measure was the

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reduction in companies' own funds share in co-financing project (it fell to 20% of the total cost). In addition, income tax for IT companies was reduced from 20% to 3% since the beginning of 2021, which is an unprecedented measure for the market. The steps outlined above are intended not only to help development companies overcome temporary difficulties associated with economic recovery, but also to lay the foundation for the further development of entire industry.

It is important to note that digital technologies have penetrated into healthcare sector as well. First of all, this concerns not even high technologies themselves, which have long been adapted, in particular, to the procedure for conducting operations, but interaction between a doctor and a patient. During the coronavirus pandemic, the number of requests for an online doctor's appointment increased sharply, which led to development of a telemedicine consultation system (telemedicine is the use of modern technologies and telecommunications for remote provision of medical and consulting services). At the end of 2020, Deputy Director of the Department of Digital Development and Information Technologies of the Ministry of Health of Russia Oliya Artemova said that at that time more than 10 thousand services of this kind were provided to population (Online forum by The Businessman, 2020). Thus, telemedicine consultations became a forced experiment, the result of which was recognized as successful. The next step in digitalizing healthcare is likely to be online diagnosis. In modern medicine, without a full-time examination of a patient, a doctor cannot diagnose a disease. Nevertheless, remote dispensary observation of a patient already exists today. Telemedicine technologies is one of the most promising areas of digitalization. A doctor will be able to see a patient simply having access to an Internet channel with required speed and security. Many experts agree that further development of digital technologies in healthcare sector is associated with telemedicine.

Digital technologies in this area have proven to be worth in a field hospital in Wuhan, where telemedicine carts operating on 5G basis were used in April 2020. Infrared thermometers with 5G support continuously measured the body temperature of patients, online notifying doctors about patients in serious condition. Decisions on patient’s treatment were made by consultations in which experts participated remotely. This is made possible by Huawei and China Telecom deploying a 5G remote diagnosis platform at Hoshenshan Hospital in Wuhan, providing doctors with reliable video communications and remote patient monitoring. It has become beneficial in the context of rapid spread of coronavirus, accompanied by a shortage of medical personnel (Huawei, 2020). The example of the Chinese region has clearly demonstrated to the whole world the need to use 5G technologies in medicine. This is especially true for Russia with its large territory and low population density: remote regions of the country need high-quality medical services.

The current operating principles need transformation not only in healthcare, but also in almost all areas. High-quality, intensive development of economy is impossible without a well-built digital infrastructure. It is important to note that there are all prerequisites for continuing to widely use digital services after the end of the coronavirus pandemic and related restrictions. Research data from the Boston Consulting Group (BCG) shows that in 2019 Russia ranked 9th in terms of the use of digital public services and 25th in the index of online services (Tadviser, 2021). In 2020, along with these indicators, consumption of entertainment, educational services and telemedicine also increased significantly not only in large cities, but also in small regional centers. This means that Russia has a good chance of entering the top ten actively digitizing countries (Online forum by The Businessman, 2020).

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Russia can already be called one of the leaders in digital transformation. Along with China, it is ahead of many other countries in maintaining the sovereignty of its data, which is one of important advantages of our country. In the modern world, market situation depends not so much on oil or gas as on ability to process data. Russia is one of the few countries that has its own really working search engine, social networks, and legislation that regulates data sovereignty. It is evident that Russia has one of the fastest growing digital economies (Kodachigov, 2020).

It is important to remember that digital transformation is not an abstract striving forward, but the achievement of that level of digital maturity that corresponds to both the subject itself and its external environment, but taking into account the desired development perspective.

- For a business, digital maturity is, first of all, the ability to offer the best product to its customers.
- For the state, it is an ability to effectively regulate internal issues, perform its functions and provide high-quality public services.
- For civil society, it is an ability to come together in communities and solve social problems in a compromise manner.

In a general sense, digital maturity can be defined as a measure of awareness and readiness for successful implementation of digital transformation tasks. Dmitry Chernyshenko, Deputy Prime Minister of the Russian Federation for Digital Economy and Innovation, Communications, Media, as well as Culture, Tourism and Sports, believes that in order to adequately assess the level of digital maturity at state level, it is necessary to develop a separate measuring methodology, which includes a number of specific criteria for each industry. More than 200 defining criteria have been developed for all industries (The Ministry of Digital Development, Communications and Mass Media, 2021).

Let's turn again to such an important area as healthcare. One of the criteria for digital maturity is conversion of paper medical records to electronic form. Development of appropriate methods was completed at the end of 2020, and on February 1, 2021, an order of the Ministry of Health of Russia came into force, according to which clinics and hospitals were able to completely abandon paper medical records and switch to electronic document management. A medical organization has the right to independently make a decision on full or partial transition to electronic document flow, it determines timing of transition to a legally significant electronic document flow and types of documents to be converted into digital format. According to the content of the federal project “Creation of a unified digital circuit in health care based on the Unified State Health Information System and the Healthcare National Project, implementation of medical information systems (MIS) and transition to electronic medical records will be completed by the end of 2021 (Manukiyan, 2020).

Criteria for assessing digital maturity common to all industries are personnel and investment. In other words, the digital maturity of each industry is primarily determined by the number of specialists using information technology solutions in their work, and volume of industry investments in the use and implementation of digital solutions.

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The following are the main blocks of digital maturity, according to the adapted methodology for its assessment:

- digital culture (the level of organizational culture that supports the processes of continuous improvement and innovation is assessed);
- staff (the degree of employees' compliance with the employee's competencies necessary for successful work in the digital economy);
- processes (application of process management practices: methods of process optimization, lean manufacturing, design thinking, as well as continuous analysis and updating of processes);
- digital products (monitoring existing products and identifying promising areas of development in terms of meeting user needs);
- models (updating models, their inclusion in the processes of activity);
- data (providing access to necessary data in real time with ensuring the required level of security; completeness and reliability of data for decision-making);
- infrastructure and tools (access to modern digital infrastructure and provision of work on all types of devices) (CPUR, 2020).

6. Findings

Digital maturity is a key indicator of readiness degree of state and companies to implement digital solutions in their processes. The Ministry of Digital Development, Communications and Mass Media of the Russian Federation (Mintsifry) has developed a general methodology for calculating an indicator. Today, the lack of a working model of digital maturity makes it difficult to assess digital transformation, but indicators are expected to appear for individual industries. At the same time, under the influence of the pandemic, large companies are already adjusting their development strategies, paying more attention to investments in digital technologies.

In accordance with the updated national goals, by 2030 Russia must achieve “digital maturity” of public administration and key sectors of the economy and social sphere. The level of "digital maturity" serves as an indicator of the state's readiness for digital transformation. In September 2020, Deputy Prime Minister of the Russian Federation Dmitry Chernyshenko called on the business community to send proposals to the White House on formats for measuring digital maturity, adding that "... we will take this into account when developing approaches to measuring such an important and such a complex indicator ... We need to do" roadmap "so that we can truly arrive at the result of complete digital maturity in all industries."

To calculate the level of digital maturity of Russia, the Ministry of Digital Development has already developed a general methodology consisting of three indicators. The first takes into account the number of specialists intensively using information and communication technologies (ICT). This takes into account the number of both ICT specialists (software developers and analysts, multimedia designers) and representatives of other professions (financial activities, administration, marketing, etc.). In accordance with national goals, by 2030 the number of such specialists should reach 10.8 million, compared with 8.7 million in 2019. The second indicator is the volume of expenses of companies on the implementation and

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use of modern digital solutions (their target volume by 2030 should be 3.4 trillion rubles (in 2019 - 1.7 trillion rubles)). The third indicator characterizes the level of digital maturity depending on the achievement of the 2030 target in ten sectors of the economy and social sphere: in industry, agriculture, construction, urban development, transport and logistics, energy infrastructure, financial services, health care, education and science, and public administration. A methodology for calculating digital maturity for each of the industries is still being developed.

In April 2021, the Government of the Russian Federation approved the directives worked out by the Ministry of Digital Development and aimed at improving the efficiency of state-owned companies through the introduction of Russian digital solutions and stimulating import substitution in IT sector. Representatives of the Russian Federation on the boards of directors must, within ten days, initiate meetings of the boards of directors to discuss development or update of digital transformation strategies for the period up to 2024. The strategies need to be brought in line with methodological recommendations prepared by the Ministry of Digital Development and approved by the Presidium of the Government Commission on Digital Development. These guidelines allow you to assess current level of digitalization, set goals and identify key performance indicators, assess human resources, create a digital transformation management system and a model for financing strategies, and create roadmaps. Previously, the recommendations were tested in large Russian companies - JSC Russian Post, JSC Russian Railways, PJSC Aeroflot, AK Alrosa, PJSC Gazprom Neft.

Digital transformation strategies for state-owned companies should be developed by September 1, 2021, and then agreed with line ministries and the Ministry of Digital Development. Also, within this period, it is necessary to appoint the leaders of digital transformation in a particular organization. Strategic documents should take into account the requirement of directives to increase the share of purchases of Russian digital products (in 2024 this figure should be at least 70% of the total amount spent on software). At the first stage, directives will apply to state-owned companies from the list approved by the Government.

It can be stated that the degree of digital adoption varies widely among different public companies. Some of them do not consider this direction to be a priority. By 2024, the guidelines designed not only to control companies, but also to help them with methodological recommendations, expertise and financial instruments should be implemented by all enterprises with a 50% state participation. Thus, guidelines will ensure structuring and streamlining of digitalization and import substitution activities, as well as give it the proper scale (The Ministry of Digital Development, Communications and Mass Media, 2021).

Experts from the Higher School of Economics note that international studies show Russia's promising positions in key indicators of development and implementation of digital technologies across the entire range of factors. In all major international ratings of digital development, Russia is in the top 50, and most often it takes higher places in terms of the quality of labor resources and lower ones in terms of management quality. In September 2020, the Global Innovation Index was published, and Russia took 47th place among 131 countries. Since 2007, Cornell University, INSEAD Business School and the World Intellectual Property Organization have ranked countries on 80 indicators. The final index is calculated as the average of two sub-indices: resources for innovation (institutions, human capital and science, infrastructure, level of market and business development) and their results (development of technologies and knowledge economy, results of creative activity). Unfortunately, Russia ranks higher (42nd in the

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ranking) in the segment of resources for innovation than in the segment of performance (58th) (Institute for Statistical Studies and Economics of Knowledge of HSE University, 2021).

Digitalization is a process that manifests itself at all levels of economicy. It is important that much more models have been developed to assess the digital maturity of companies than for the economy on a national scale. Analysts of the Boston Consulting Group draw attention to the relationship between level of digitalization of companies and indicators of their profitability, competitiveness, and even market share. According to research by BCG, digital leaders among the surveyed organizations have achieved revenue growth 1.8x higher than those lagging behind in digital race. In addition, they at least doubled the growth in the total value of enterprise. During the crisis, funds previously invested in innovation give companies a “sustainability dividend” due to flexibility to customize processes (the coronavirus pandemic has demonstrated an urgent need for this). In particular, Chinese digital leaders will recover from the coronavirus at a faster rate than their European and American competitors.

The Chamber of Commerce and Industry of the Russian Federation identifies four levels of "digital maturity" of enterprises: low (digital transformation carries risks), basic (transformation is possible, but requires clear resource planning and prioritization), advanced (company is implementing digitalization initiatives) and high (digitalization is integrated into operational and production activities of a company). Companies at the fourth level can gain the status of a digital transformation leader (which means that their business grows as a result of innovation) or a digital transformation driver (if they form a digital environment around themselves, uniting partners, suppliers and customers). The activities of companies are assessed in five areas: “goal setting, strategy, business model”, “organizational structure and processes”, “people”, “product”, “resources”.

Deloitte analysts offer an alternative model of “digital maturity”: in addition to analyzing strategy and organizational structure, it evaluates application of technology, work with clients and conduct of organization's operations. Summing up, we note that the digital maturity model is the tool with which it is possible to assess the level of digitalization of a state, a sector of economy, and even an individual company (Kuzin, 2019).

Unfortunately, at the moment the ratings indicate that Russian companies are lagging behind the leading countries in digitalization of business processes. Thus, the value of business digitalization index, developed by the ISSEK of the Higher School of Economics, for Russia was 31 points against 50 points for Finland, 49 for Belgium and 48 for the Netherlands. This index allows us to assess the pace of adaptation of companies to digital transformation, the main technologies of which are broadband Internet, cloud services, radio frequency identification technologies, and e-commerce services. In the ranking in terms of the degree of penetration of digital technologies in entrepreneurship, Russia is next to Latvia, Greece and Poland.

The coronavirus pandemic, however, pushed Russian businesses to actively implement digital products in their activities (organizing remote work). The results of a joint study by the Agency for Strategic Initiatives (ASI) and international consulting company KPMG have shown that a third of large Russian companies are ready to invest up to 10 billion rubles in innovative projects every year, and every tenth company - more than 10 billion rubles. ASI notes that the process of digital transformation of activities of Russian companies is irreversible, and many of them are actively investing in innovative projects. The most

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willingly funded is implementation of robotic technologies (RPA), the Internet of things (IoT), quantum technologies and digital twins, cloud services, blockchain and artificial intelligence. Almost half of the companies surveyed consider insufficient maturity to be the main obstacle to digitalization. Digital transformation of business, being a priority of Russian economic policy, is supported by the government (Kulagin et al., 2019).

At the state level, an example of digitalization can be the concept of electronic (digital) government. Most of existing digital government strategies are lightly edited versions of the previous ones. Governments seeking to develop a realistic strategy and apply it in practice should rely on the Gartner Maturity Model. It consists of five levels, the first two being characteristic of e-government and open government.

- At the first level, the main task is to modernize services for user convenience and cost optimization;
- at the second level, transparency, citizen engagement and development of data economy are ensured;
- at the third level, the emphasis shifts from focusing on user needs to exploring new possibilities for collecting and using data;
- at the fourth level, state structures are completely information-oriented (this simplifies interagency interaction and improves citizens service);
- at the fifth level, data is introduced into all processes; optimization is assumed only in case of failures.

It is important to take into account the fact that the level of digital maturity of state (municipal) management differs significantly from region to region and from municipality to municipality. The leaders in this area are Moscow, the Moscow region and Tatarstan, which are very much ahead of the rest of the regions of the Russian Federation. Strong differentiation complicates digital transformation of the public administration system as a whole, and this situation requires adoption of specific targeted measures, taking into account regional specifics. The Russian government has already appointed the leaders of digital transformation in each constituent entity of the Russian Federation, however, in addition to this, it is necessary to determine the criteria for digital maturity of a region.

This is how the state gradually becomes a single digitized platform. For this process to be successful, the actions of all its participants must be synchronized: the government not only supports the market and formation of its new infrastructure, but also takes active actions itself, being open to innovation (Galieva, 2020).

The main obstacle to digitalization is still local legislation, which is why regulatory initiatives are so important for creating a digital state. In addition, the Russian authorities are working to develop digital skills among population. This is extremely important, because an increase in the number of IT professionals, an increase in developers' interest in creating new tools and services, as well as digital literacy of citizens, as a result, have a beneficial effect on GDP growth.

The following recommendations can be formulated for managing digitalization in Russia. First, digital technologies should first of all be implemented in priority sectors of the economy (for example, in

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oil and mining industries). This will improve technological process and create new opportunities for the entire production chain. Secondly, the state needs to constantly and systematically support development of 5G, artificial intelligence and cloud technologies in industry. Thirdly, it is necessary to improve education in the field of information technology, train personnel for digital economy and increase the level of digital competence of population. Foreign companies plan to increase investment not only in Russian technologies and industry, but also in personnel training programs. Fourth, it is extremely important for Russia to assess the level of digital maturity of each industry, taking into account its distinctive features. For this, specific methods for measuring digital maturity should be developed with a set of specific criteria.

The foregoing shows the advantages of all sectoral ministries to be involved in the process of managing digitalization of Russian economy. The Ministry of Finance can develop a general program, but adapting it to the specifics of each industry is the task of relevant ministries (Ministry of Education, Ministry of Health, Ministry of Industry and Trade) (Online forum by The Businessman, 2020).

As a result of the study, the author's model for assessing the level of digital maturity was developed (Figure 1). It should be noted that it can be applied to subjects of any level (organization, branch of the economy, state, union of states). The model is based on five basic aspects of the functioning of almost any structure. First, it assesses how the subject uses information - the main resource of industry 4.0 society. Secondly, management and its components are analyzed. Third, human resources are assessed in terms of their relevance to digital culture. Fourth, the material base is analyzed. Fifth, the interaction of the system under consideration with the external environment ("competitors", that is, similar systems with similar goals, and "consumers" (for a company these are customers, for a state - population to whom services are provided)) is assessed.

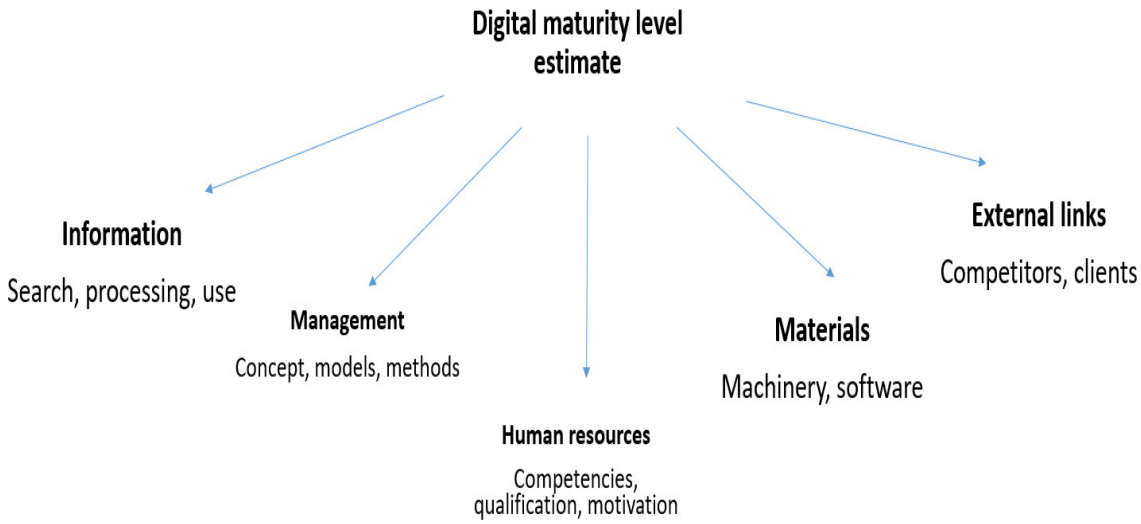

Figure 1. Authors' digital maturity level assessment model

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7. Conclusion

Determining the level of digital maturity makes it possible to identify the causes of digital transformation problems and even outline ways to solve them. As a rule, a considerable share of these problems is due to the need to restructure managerial thinking, change organizational culture, revise the roles of leaders at different levels, as well as mechanisms for strategies development (McKinsey Digital, 2020).

A deeper analysis of the obstacles to digitalization includes studying examples of digital transformation (both international and Russian), surveys of business representatives and summarizing scientists and experts' points of view. One of little-studied areas is cultural problems, such as unwillingness of population to change, new ethics of digital reality.

The spread of coronavirus has coincided with and accelerated active digitalization that has covered the world. The pandemic contributed to the realization of accumulated potential for the use of digital technologies, and also forced to look for new ways to overcome the impact of coronavirus on economy and social sphere. The pandemic has caused an increase in demand for digital tools, primarily in those sectors of the economy that are especially closely related to vital services provision: healthcare, telecommuting and education, e-government, Internet commerce (Lola & Bakeev, 2020).

The unique situation in which the whole world is today requires reflection and use of past experience to solve emerging problems. The introduction of digital technologies confirms the idea that human society is always waiting for a precedent to happen in order to begin to regulate a relevant sphere (Zhulego et al., 2019).

Nowadays, formation of a scientific culture of using digital economy tools is taking place. Digital transformation is becoming more systemic and cross-functional. At the same time, the task of assessing the level of digitalization of a particular organization, industry and national economy comes to the fore. In Russia, digital transformation process is varying both in industries (leaders are IT sector and financial sector) and in the depth of transformation. Digital transformation is a global goal, and digital maturity, as one of its key indicators, must be achieved at all levels in all sectors, if we talk about digitalization of state economy. Only if these conditions are met digital transformation process can be called successful.

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