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Improving state regulation of the digital transformation in the investment and construction sector

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Abstract. Currently, the task of creating a digital economy is one of the priorities for various industries, including the investment and construction sector, ensuring the creation of fixed assets within individual regions and the country as a whole. The article substantiates the relevance of the digital transformation of the investment and construction sector, studied the experience of implementing digital tools in the construction sector and explores the main stages of the implementation of the digital transformation strategy at the state level. The conceptual foundations and the regulatory framework of state regulation of the digital transformation in the investment and construction sector in Russia are investigated. The concept of the digital economy implies a comprehensive transformation of all areas of the economy based on the introduction of the latest technological solutions from various fields of knowledge, which justifies the application of an interdisciplinary approach to develop recommendations for improving state regulation of digital transformations in construction. As a result, problems in the field of digital transformation of construction in Russia were identified and key directions were proposed for the effective improvement of state regulation of the investment and construction sector in Russia within the context of the digital economy.

1. Introduction

The formation of the digital economy is one of the priority directions in the field of ensuring the economic growth of the Russian Federation, which is reflected both in the adoption of state programs and the development of development strategies for individual industries, regions and the country as a whole, and in the increased attention of the professional community to the issues of digital transformation of organizations of various spheres.

The digital transformation of construction requires state support for this process, which implies the improvement of the regulatory framework of the investment and construction sector, as well as the creation of an environment that ensures effective interaction between participants in investment and construction activities.

The aim of the study conducted in this work is to analyze existing measures to implement the industry concept of digital transformation of the investment and construction sector and develop proposals with directions for further improving state regulation of the digital transformation of construction in Russia.



Many authors recognize that digital transformation implies a concept that encompasses political aspects, business processes, as well as social issues [1, 2, 3]. Moreover, the widely used concept of the “smart city” is also closely related to the concept of digital transformation of the investment and construction sector [4].

In general, digital transformation is understood as revenue generation and / or associated positive effects based on the use of digital assets [5]. Moreover, digital transformation can improve the efficiency of organizations by increasing productivity [6]. Thus, the digital transformation process affects all aspects of society, creating new opportunities for public administration and making more rational decisions by the management of individual organizations [7, 8].

2. Methods

Currently, Russia is taking steps to digitally transform construction in accordance with the state program “Digital Economy of the Russian Federation”, its areas are the improvement of regulation, the development of human resources, the creation of technological reserves and the development of research competencies, the creation of an information infrastructure and an increase in information security [9]. On July 19, 2018, the President of the Russian Federation issued an order No. Pr-1235 “On the modernization of the construction industry and improving the quality of construction”, according to which information modeling technologies should be introduced at all stages of the life cycle of capital construction projects [10]. Also, in accordance with the federal project “Digital Construction”, by 2024 a digital platform will be created in Russia, including various information systems in the field of investment and construction activities [11]. Achieving the targets stated in the listed documents is possible only with the introduction of advanced developments and innovations in various areas and branches of science in the process of implementing investment and construction projects. Thus, we can conclude that in order to analyze the existing mechanism of state regulation of the investment and construction sector and develop recommendations for its digital transformation, it is necessary to use an interdisciplinary approach.

An important stage in the digital transformation of construction is the improvement of information support for urban development. The existing information systems designed for city planning (ISDCP) are a systematic set of documented information on the development of territories, their development, land plots, capital construction facilities and other information necessary for urban development activities [12]. Currently, the Federal State Information System for Territorial Planning (FSIS TP), created in 2011, operates at the federal level, and its own ISDCP are being maintained at the municipal level [12]. It should be noted that the formation of regional ISDCP at the level of constituent entities of the Russian Federation is not provided with the necessary regulatory framework, although the completed structure of the FSIS TP assumes the availability of information systems at the federal, regional and municipal levels. Nevertheless, some constituent entities of the Russian Federation have a two-tier system, within the framework of which automated municipal waste management systems are integrated with the information system of the constituent entity of the Russian Federation. In 2018, the Ministry of Construction of the Russian Federation drafted a bill on the transfer of authority to maintain ISDCP to the regional level [13], according to which the use of ISDCP by the constituent entities of the Russian Federation will become mandatory. Thus, the information support system for urban development is an important element in creating a unified digital environment in construction, however, integration of ISDCP into the Federal State Property Fund and other information systems in the investment and construction sector is necessary.

The creation of the federal state information system of pricing in construction (FSIS PC) is also not only a tool for reforming the pricing system in Russia, but also acts as one of the stages of the digital transformation of construction. FSIS PC should be used in determining the estimated cost of capital construction projects financed with budgetary funds [14]. A full-fledged launch of the FSIS PC is planned in 2022 [15], and it should be noted that the implementation of this system is a lengthy process that not only cannot be carried out in a short time, but also requires constant adjustment of functioning due to the scale and significance of the system.

In general, according to the authors, the creation and development of digital platforms leads to a comprehensive improvement of all spheres of society, affecting both the processes within individual organizations and the results of the interaction of various industries, which ultimately leads to the solution of social problems [16].

Transformation of the public procurement process is another important stage in the transition to digital construction. Public procurement accounts for 31% of total construction costs in the UK, 44% in Germany, 57% in the USA [17] and 44% in Russia [18]. Therefore, the state, as the largest consumer of construction products (works, services), should actively coordinate processes in the field of public procurement in construction in order to intensify the digital transformation of the industry.

In Russia, the strategic development of public procurement is based on innovative principles and includes the following areas [19]:

- the formation of an integrated federal contract system that allows for medium- and long-term planning of public procurement in order to predict the need for innovative products within the framework of the state order;
- development of procurement methods and procedures taking into account the innovative development of the economy;
- increasing the efficiency of competitive procedures in the framework of public procurement by improving the criteria for the selection of performers, including increasing the importance of qualifications of performers;
- increasing the openness and transparency of the public procurement process;
- development and application of lists and information bases of innovative technologies and solutions in order to intensify the digital development of the economy through public procurement.

One of the main directions of the digital transformation of public procurement procedures in Russia is the creation and improvement of a unified procurement information system (PIS) in accordance with Federal Law No. 44 [20]. Standardization is an important step towards the digital transformation of all processes in the economy, including public procurement procedures [21], and the catalog of goods, works and services [20] acts as part of the PIS, which, through standardization of the description of procurement objects, improves transparency of public procurement procedures and reduces corruption component through the introduction of uniform names of goods, works and services.

On July 1, 2018, amendments to Federal Law No. 44 and Federal Law No. 223 [20, 23] entered into force, in accordance with which tenders, requests for quotations and offers, which were previously available only for auctions. Initially, the paper form will be canceled for unclassified procurements, but in 2019 the phased process of transferring state secrets to electronic forms of procurement will also begin [24]. Closed procurement procedures should be carried out on specialized electronic platforms, which will simplify the formation of the list of bidders by expediting the search and selection of participants to be implemented using digital technologies.

Thus, the digital transformation of construction requires an integrated approach to improving various processes related to the implementation of investment and construction projects, which is reflected in the state policy of Russia.

3. Results

State regulation of the process of digital transformation of construction is primarily aimed at maintaining the safe operation of facilities, protecting the environment, and observing safety measures during work, which does not exclude the need to develop requirements for innovative development of the industry in order to maintain the competitiveness of domestic organizations in the construction sector. The main direction in the field of state regulation in construction is the harmonization of standards and the formation of an effective system of interaction between organizations and the state, which requires taking into account promising areas of development of the industry and the economy. The implementation of this direction is expressed [17]:

- to consolidate the standards of the investment and construction sector by creating a single regulatory framework with a minimum number of territorial clarifications, as well as simplifying access to standards through the development of the Internet;
- regular updating of accepted standards, since the effective implementation of new digital technologies requires constant adaptation of the legal framework to rapidly changing business conditions;
- in creating standards focused on the results of project implementation, and not just on how to achieve them, which is necessary to indicate a single vector for the development of construction;
- to simplify the interaction between business and the state when issuing permits, putting the facility into operation in order to accelerate the implementation of projects on the principle of creating a “single window” and multifunctional centers;
- in the division of construction projects depending on the degree of risk during their implementation, which will allow, when approving permits, to reduce the time required to process information on standard and low-risk projects.

Digitalization of public procurement is also one of the elements of the transformation of the investment and construction sector, and the key direction in this case is the organization of the procurement process based on a strategy that takes into account priority areas of economic development. To this end, the following measures can be taken: the development of clear models for planning and conducting public procurement, the formation of target groups for the most priority projects, the establishment of requirements for the degree of digital transformation of bidders, and the improvement of the state procurement process with modern technologies. Performance of work for the public sector should also be attractive to potential bidders, for which transparency and openness of the public procurement process should be ensured, clear rules for bidding should be defined, as well as an opportunity for participants to increase their awareness of public procurement procedures, which is especially important for subjects of small and medium business.

Note that the focus of government procurement on innovative technologies is one of the elements of successful digital transformation of the investment and construction sector. The process of selecting a tender winner should not be based solely on the minimum bid price, but should take into account specific indicators, such as the degree of digital maturity of the organization; the total cost of the project at all stages of the life cycle, including operation; bidder's adherence to modern standards of digital construction; an indication of the innovative materials and technologies used by the organization.

Compliance with the transparency of the public procurement process is not only a condition for the digital transformation of the economy, but also a mandatory requirement for public procurement procedures. In the framework of this direction, it is necessary [17]:

- development and implementation of relevant anti-corruption policies;
- raising the awareness of bidders about anti-corruption measures;
- the use of anti-corruption methods such as checking the qualifications and experience of employees, staff rotation;
- establishment of clear procedures in the framework of public procurement, including the openness of information on selection criteria, tender dates, data on the procurement object;
- ensuring the independence of the evaluation of the procurement object through the involvement of independent auditors;
- ensuring transparency of public procurement through open access to data on the process and results of tenders through the use of modern channels for transmitting information through the Internet.

4. Discussion

On the one hand, the digital transformation of the construction sector is aimed at the development of information modeling technologies for buildings and structures (BIM-technologies), for which the regulatory framework is being improved. The updated and updated regulatory and technical base in

construction covers the general principles, conceptual framework and methodology of information modeling, considers standards for working with individual elements and catalogs of the information model, fixes the rules for organizing collective work on the project, defines the rules for ensuring information security and considers standards for monitoring quality. In world practice, BIM technologies are already being introduced at all stages of the life cycle of construction projects, although design and construction are the primary areas of application of these technologies, while the renovation stage remains less involved in the process of digital transformation [25].

On the other hand, digital construction involves the automation of procedures for the interaction of participants in investment and construction projects with government bodies. In this area, by 2020, an all-Russian classifier of building information should be formed, and by 2021 it is planned to convert the normative and technical documentation into digital format in order to create a single fund of documentation in construction [11].

Nevertheless, information support for construction at the present time often does not have a single coordinated vector of strategic development. So, FSIS PC, as well as other information systems in construction, is the basis for the formation of a single digital environment, necessary during the implementation of the investment and construction project, in particular, FSIS PC provides participants of the construction market with prices for construction resources. However, the professional community believes that the FSIS PC does not reflect current data on prices, nor does it provide for the possibility of introducing the system into a digital environment based on BIM technologies [26, 27, 28]. Prices for construction resources will have to be downloaded by suppliers on their own through the use of special software, which creates the preconditions for the biased formation of estimated construction costs due to the possibility of entering data that does not correspond to market value. Also, the practice of pricing in construction shows that the price of the same building resource depends on the volume of supply, however the FSIS PC implies the presence of a single price assigned to a specific resource. Moreover, the functioning of the FSIS PC is inextricably linked with the Classifier of building resources currently being developed. This Classifier should become the basis for the effective use of BIM technologies, however, it is not only not yet fully filled, but, according to experts, is not compatible with BIM software, since it does not have the function of automatic loading into construction software resources [26].

Particular attention is currently paid to the issues of building information and communication infrastructure in construction, which not only leads to improved procedures for the interaction of investment and construction entities, but also helps to increase entrepreneurial activity [29].

Another important element of the digital transformation of the construction sector is the improvement of procurement procedures. Experts note that in the Russian Federation public procurement is based on traditional principles and methods, which excludes the openness of this process to innovation [30]. In aggregate, the changes currently taking place in the field of public procurement in Russia lead to an increase in the efficiency of bidding, contribute to budget savings, reduce the time spent on public procurement procedures, and ultimately lead to increased transparency in this area.

Within the framework of the strategic programs adopted in Russia for the transition to a digital economy, it is also important to rank industries according to their investment needs, which is already reflected in the development of models to assess the level of development of industries, which can be further improved in the context of data accumulation and emergence new digital technologies for their analysis [31]. Moreover, the authors of [32, 33] recognize that the digital economy implies the interaction of many economic entities, and one of the global results of the digital transformation of the economy should be the formation of a “green economy” as an important tool for sustainable development in the 21st century.

Thus, the digital transformation of construction should be carried out simultaneously in various areas of improvement, which requires consistency of decisions at the state level. Moreover, the digital transformation of construction is a long process, during which collisions and the incorrect functioning

of information systems are inevitable, which together requires an effective and timely response by the state to changes in the internal and external environment.

5. Conclusion

The digital transformation of the investment and construction sector is an integral condition for the formation of the digital economy, since by enhancing the effective interaction between the state and business, developing the country's human potential, intensifying innovative activity and improving the processes of intersectoral cooperation, it becomes possible to fully realize the planned goals of the digital transformation of the Russian economy.

The digital transformation of construction is often understood in a narrow sense as the dissemination of information modeling technologies for buildings and structures at all stages of the life cycle of capital construction projects, although this process involves the comprehensive improvement of processes related to the implementation of investment and construction projects at all levels of government, from state to direct management at the construction site. The application of an interdisciplinary approach in the analysis of state regulation of the digital transformation of the investment and construction sector made it possible to formulate the main areas in which advanced developments and digital tools from different branches of knowledge should be introduced in the first place. The article systematizes the features of construction organizations, which should be taken into account when choosing a tender winner in a digital economy.

So far, the digital transformation of the construction sector in Russia does not have a full legal basis, so now the authorities are focusing on the creation and improvement of the regulatory framework for the use of information modeling technologies for buildings and structures, since it is BIM technologies that should become the main substantive element of digital construction. In our opinion, the improvement of state regulation of the digital transformation of construction is the first step towards the establishment of the concept of a digital economy both at the level of investment and construction sphere, and at the national level.

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References

- [1] Collin J, Hiekkanen K, Korhonen J, Halén M, Itälä T and Helenius M 2015 IT Leadership in Transition - The Impact of Digitalization on Finnish Organizations *Aalto University publication series SCIENCE + TECHNOLOGY* **7/2015** 1-121
- [2] Gimpel H and Röglinger M 2015 Digital Transformation: Changes and Chances – Insights Based on an Empirical Study https://www.fim-rc.de/wp-content/uploads/Fraunhofer-Studie_Digitale-Transformation.pdf
- [3] Kane G C, Palmer D, Phillips A N, Kiron D and Buckley N 2015 Strategy, not technology, drives digital transformation *MIT Sloan Management Review and Deloitte University Press* **14** <https://sloanreview.mit.edu/projects/strategy-drives-digital-transformation/>
- [4] Vishnivetskaya A and Alexandrova E 2019 “Smart city” concept. Implementation practice *IOP Conference Series: Material Science and Engineering* **497** <https://doi.org/10.1088/1757-899X/497/1/012019>
- [5] McDonald M and Rowsell-Jones 2012 A The Digital Edge: Exploiting Information & Technology for Business Advantage *Gartner Inc* 1-130
- [6] Westerman G, Calmèjane C, Bonnet D, Ferraris P and McAfee A 2011 Digital Transformation: A roadmap for billion-dollar organizations *MIT Center for Digital Business and Capgemini Consulting* **1** 1-68
- [7] Martin A 2008 Digital literacy and the “digital society” *Digital literacies: Concepts, policies and practices* **30** 151–176

- [8] Stolterman E and Fors A 2004 Information technology and the good life, *Information Systems Research IFIP International Federation for Information Processing* **143** 687–692
- [9] Decree of the Government of the Russian Federation, July 28, 2017 N 1632-r “On approval of the program Digital Economy of the Russian Federation”
<http://static.government.ru/media/files/9gFM4FHj4PsB79I5v7yLVuPgu4bvR7M0.pdf>
- [10] The order of the President of the Russian Federation, July 19, 2018 N Order-1235 “On the modernization of the construction industry and improving the quality of construction” *SPS ConsultantPlus*
- [11] A digital platform that combines information systems in the field of construction will be created by 2024 2018 *The Ministry of Construction of Russia*
<http://www.minstroyrf.ru/press/tsifrovuyu-platformu-obedinyayushchuyu-informatsionnye-sistemy-v-oblasti-stroitelstva-sozadut-k-202/>
- [12] Code of the Russian Federation dated December 29, 2004 N 190 "Town Planning Code of the Russian Federation" (changed 02.08.2019)
http://www.consultant.ru/document/cons_doc_LAW_51040/
- [13] Maintaining UPIS can be transferred to the level of entities 2018 *The Ministry of Construction of Russia* <http://www.minstroyrf.ru/press/vedenie-isogd-mozhet-byt-peredano-na-uroven-subektov/>
- [14] Decree of the Government of the Russian Federation dated September 23, 2016 N 959 “On the federal state information system of pricing in construction”
<https://base.garant.ru/71498282/>
- [15] Decree of the Government of the Russian Federation dated 05.15.2019 N 604 "On amendments to some acts of the Government of the Russian Federation"
<http://publication.pravo.gov.ru/Document/View/0001201905240024>
- [16] Ablyazov T and Rapgof V 2019 Digital platforms as the basis of a new ecological system of socioeconomic development *IOP Conference Series: Materials Science and Engineering* **497**
<https://doi.org/10.1088/1757-899X/497/1/012002>
- [17] World Economic Forum 2016 Shaping the Future of Construction: A Breakthrough in Mindset and Technology
http://www3.weforum.org/docs/WEF_Shaping_the_Future_of_Construction_full_report_.pdf
- [18] National procurement transparency rating 2018 <https://www.nrpz.ru/2018>
- [19] Decree of the Government of the Russian Federation dated 08.12.2011 N 2227-r "On the strategy of innovative development of the Russian Federation for the period until 2020"
http://www.consultant.ru/document/cons_doc_LAW_123444/
- [20] Federal Law dated 05.04.2013 N 44-ФЗ “On the contract system in the sphere of procurement of goods, work and services to ensure state and municipal needs”
<https://fssprus.ru/2315090/>
- [21] The procurement contract system must meet the challenges of modern digital technologies 2017 *Official website of the Mayor of Moscow* <https://www.mos.ru/news/item/31588073>
- [22] Government Decree dated 08.02.2017 N 145 “On approval of the Rules for the formation and maintenance of a unified information system in the field of procurement of a catalog of goods, works, services to meet state and municipal needs and the Rules for the use of this catalog”
<http://d-russia.ru/wp-content/uploads/2017/02/EIS.pdf>
- [23] Federal Law dated 18.07.2011 N 223 “On the procurement of goods, works, services by certain types of legal entities” http://www.consultant.ru/document/cons_doc_LAW_116964/
- [24] Pudov A 2017 Transfer of closed procurement procedures into electronic form will significantly increase the efficiency of their implementation. *Federal Antimonopoly Service* <https://fas.gov.ru/news/25440>
- [25] Vishnivetskaya A and Mikhailova A 2019 Employment of BIM technologies for residential quarters renovation: global experience and prospects of implementation in Russia *IOP*

- Conference Series: Material Science and Engineering* **497** <https://doi.org/10.1088/1757-899X/497/1/012020>
- [26] Malakhov W 2018, BIM adaptation of GIS is the cornerstone of implementation BIM <https://samovod.ru/upload/iblock/8d6/2018-10-BIM-%D0%B8%D0%BD%D0%B6%D0%B8%D0%BD%D0%B8%D1%80%D0%B8%D0%BD%D0%B3-18%20-%20BIM-%D0%B0%D0%B4%D0%B0%D0%BF%D1%82%D0%B0%D1%86%D0%B8%D1%8F%20%D0%93%D0%98%D0%A1-%20%D1%83%D1%81%D0%BB%D0%BE%D0%B2%D0%B8%D0%B5%20%D0%B2%D0%BD%D0%B5%D0%B4%D1%80%D0%B5%D0%BD%D0%B8%D1%8F%20%D0%98%D0%9C.pdf>
- [27] FSIS CP launch postponed to 2019: expert comments 2018 *Rambler* <https://erzrf.ru/news/zapusk-fgis-tss-perenesen-na-2019-god-kommentarii-ekspertov>
- [28] Gusev A 2017 The game with the state in the FSIS is not as simple as it might seem *Stroitelstvo.ru* <https://rcmm.ru/vlast-i-samoregulirovanie/40977-igra-s-gosudarstvom-vo-fgis-ne-tak-prosta-kak-mozhet-pokazatsya.html>
- [29] Ablyazov T and Petrov I 2019 Russian practice of providing a construction industry with information and communication infrastructure in conditions of a digital economy establishment *Advances in Economics, Business and Management Research 1st International Scientific Conference "Modern Management Trends and the Digital Economy: from Regional Development to Global Economic Growth" (MTDE 2019)* **81** <https://doi.org/10.2991/mtde-19.2019.70>
- [30] Minin A 2018 How the digital economy is changing business *Business Saint-Petersburg* https://www.dp.ru/a/2018/06/19/Kak_cifrovaja_jekonomika_me
- [31] Skotarenko O, Babkin A, Senetskaya L and Bessalova S 2019 Tools for digitalization of economic processes for supporting management decision-making in the region *IOP Conference Series: Earth and Environmental Science* **302** <https://doi.org/10.1088/1755-1315/302/1/012147>
- [32] Dyatlov S A, Didenko N I, Lobanov O S and Kulik S V 2019 Digital transformation and convergence effect as factors of achieving sustainable development *IOP Conference Series: Earth and Environmental Science* **302** <https://doi.org/10.1088/1755-1315/302/1/012102>
- [33] Aleksandrov I N and Fedorova M Y 2019 Digital economy and green economy: Rural unemployment and territorial self-development in Russia *E3S Web of Conferences* **110** <https://doi.org/10.1051/e3sconf/201911002019>