

**TIES 2020****International conference «Trends and innovations in economic studies»****THE HOUSING AND UTILITIES SECTOR UNDER THE DIGITAL  
TRANSFORMATION**Lyubov G. Nikityuk (a)\*, Oksana G. Timchuk (b), Eugene Yu. Gorbachevskaya (c), Garik A.  
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***Abstract***

Currently, the housing and utilities sector requires an innovative development path. Therefore, the key direction is creation of conditions and implementation of measures aimed at improving quality of urban management, company efficiency, reducing costs, as well as providing digital services. The purpose of the article is to transform business processes of the housing and utilities sector as one of the most problematic economic sectors. This is due to the high degree of deterioration of the housing stock, high costs of housing and utilities services, the low level of control over spending and the low level of quality of services provided. The object is digital transformation of the housing and utilities sector. The methodological basis of the article is results of research on innovative activities of housing and utilities companies. The novelty is due to the theoretical justification and development of approaches to the transformation of digital technologies used by the housing and utilities sectors. The authors analyzed advantages of digital technologies used by the housing and utilities sector, assessed the effectiveness of their implementation and identified targets. The main directions of development of the housing and utilities sector and the stages of implementation of digital technologies were identified. They allow us to assess the feasibility and effectiveness of digital technologies and increase the innovative potential of this sector. Thus, the need for transforming the housing and utilities sector was substantiated.

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## **1. Introduction**

The issue of relevance and the need to modernize and reform the housing and utilities sector has been analyzed. Over the past two decades, it has been the most acute for specialists and the population.

## **2. Problem Statement**

The authors consider issues related to the digitalization of the housing and utilities sector (HUS) as one of the most problematic areas. This is due to the high degree of deterioration of the housing stock, the high cost of housing and utilities services, the low level of control over spending and the low level of quality of services provided. The housing and utilities sector is one of the largest and most important sectors of the Russian economy.

## **3. Research Questions**

The difficult situation in the housing and utilities sector is caused by a weakly adaptive and not flexible management system, inefficient allocation of financial resources, attempts to get away from the need to provide state subsidies, high costs for certain services, the lack of economic incentives to reduce costs, and the underdeveloped competitive environment and depreciated fixed assets.

## **4. Purpose of the Study**

The need to develop theoretical and methodological solutions for the improvement of organizational and economic support of housing and utilities services is relevant.

## **5. Research Methods**

The research methods are as follows: 1) general research methods: analysis, generalization, analogy and abstraction; 2) empirical research methods: observation, description, comparison; 3) theoretical research methods: idealization and formalization, systematization of scientific knowledge – typologization and classification.

## **6. Findings**

It should be noted that the housing and utilities sector carries a significant social burden. We should analyze this sector in terms of interests of the population. To reduce the burden of payments and increase real incomes and living standards of the population, create a stable economy, it is necessary to take into account natural monopolies, regulate actions of economic entities and distinguish between their two independent control units:

- Housing management as an area with a high competition potential (Balapuwaduge, Li, Rajanna, Kaveh, & Channel, 2016);

- Management of the engineering infrastructure as a natural monopoly, where the competition is limited.

In recent years, ownership of housing and utilities facilities has changed in the following way:

- Mass privatization of the housing stock;
- Transfer of the housing and utilities facilities from state to municipal ownership;
- Incorporation of some housing and utilities facilities, mainly electricity and heat supply facilities,

which are part of the national unified energy supply system.

These processes were prerequisites for the development of competition and demonopolization in the industry (Smirnov, 2018; Veselovsky, Izmailova, & Abrashkin, 2018). Issues of development of market relations in the housing and utilities sector are acute.

Having studied the history of development of the housing and utilities sector, we identified the main stages:

Stage 1: Creation of a housing and utilities sector management system: 1721–1916.

Stage 2: Centralized management (administrative economy): 1917–1991.

Stage 3: Transition to the market management system: 1991 till present.

This chronology indicates significant “fluctuations” in the housing and utilities sector. The market management system is taking shape, which explains current challenges.

Currently, the normal functioning of the housing and utilities sector is impossible without its administrative subordination to municipal governments. On the other hand, municipal authorities should not have unlimited monopoly powers in this area (Legner et al., 2017; Nikityuk & Timchuk, 2015).

The role of the government in regulating development processes in the housing and utilities sector can vary from direct management to coordination of actions of independent entities. The task of the government is to adopt rules of behavior of business entities, requirements for effective state regulation (Kovaleva & Chernov, 2017).

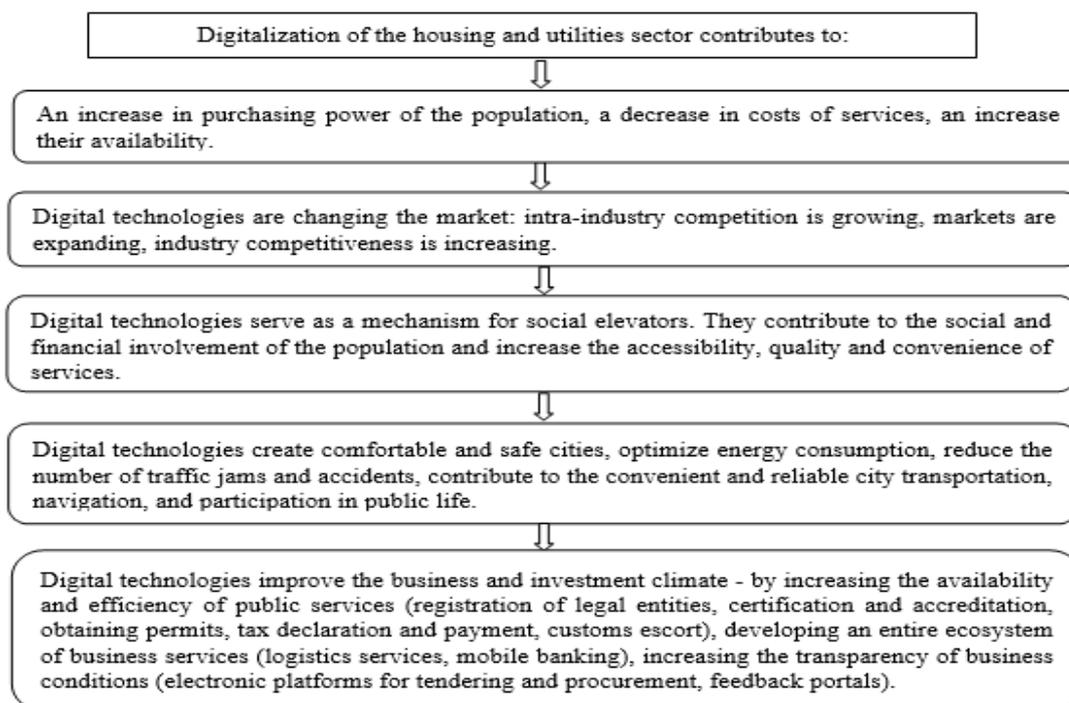
The market of perfect competition is characterized by a high level of competition and a significant number of participants. The competitive environment and pricing laws dictate the need for digitalization of services, which will contribute to the rapid and high-quality transformation of the industry.

The idea of digitalization implies the transformation of business processes using modern information and telecommunication technologies. Business processes are subject to conversion, at the output of which a quality-transformed service can be provided.

The results of this conversion are as follows:

- 1) providing information about the amount of resources consumed and creating incentives for owners to increase energy efficiency of buildings (Nylen & Holmstrom, 2015; Sudarushkina & Stefanova, 2017);
- 2) providing full and open information about costs of each object;
- 3) improving the efficiency of emergency dispatch management;
- 4) increasing the energy efficiency of facilities, as a result of the desire to reduce the cost of services provided;
- 5) improving the system for handling and sorting waste, etc.

The above list of digitalization results is an example. Benefits and results of this process are more diverse. The organizational and economic approach to this process should be uniform. Given the potential of digital technologies, it is possible to single out the main advantages of the system (Figure 01).



**Figure 01.** Advantages of digital technologies in the housing and utilities sector

Digital technologies are mainly used for the construction of new facilities, neighborhoods or cities. For example, the digital technology is applied when implementing zero radiation construction projects (Chuprynousky, Sinyakov, & Lipatov, 2016). There are several pilot projects in Norway which are implemented in zero-emission areas which serve as research centers for innovation in energy efficiency.

However, one of the key points is the trivial fact that only houses built using modern technology can be digital or intelligent. In Russia, this creates serious difficulties for the digitalization processes.

Another challenge is negative social consequences of digitalization (Popov & Semyachkov, 2017; Veselovsky, Izmailova, & Abrashkin, 2018). Digitalization embraces and revises our social and economic life (Averyanova, 2019; Sagynbekova, 2018). Given that not everyone has access to the latest digital technologies, people concern about the emerging digital divide between generations, socio-economic groups, urban and rural areas.

Therefore, one of the key political issues is how society and an individual can exist in the era of digital technologies. Interests of citizens should be a priority.

The risk of threats to national economic security, security and confidentiality of personal data is growing (Kryukova, 2017).

In contrast to negative factors, one can note the positive experience of European cities developing an interactive space that improves the city management system. One of the areas of an interactive city is to improve quality of public services in various areas, including housing management.

The use of digital technologies changes the structure of business processes and the business model in general (Chuprynousky, Sinyakov, & Lipatov, 2016; World Bank. Russia Digital Economy Report..., 2020). The updated structure creates new opportunities for profit and the ultimate value of the service and manufactured (sold) products.

The domestic strategy of transition to digital technologies in the housing and utilities sector should be built in accordance with priority areas of development (Table 01). Based on the analysis of the described areas, digitalization will affect the energy efficiency system and the organization system of management companies.

**Table 01.**The main directions of development of the housing and utilities sector

№	Development areas	Content
1	Development of management and maintenance of the housing stock.	Today, 81.3% of housing belong to individuals which contributes to a more responsible attitude to housing management. Owners of more than one million apartment buildings have already chosen a management form. The market infrastructure was created the Housing and Utilities Reform Support Fund, the Federal Housing Development Fund and the Agency for Housing Mortgage Lending”).
2	Development of the property management system for the utilities sector using concession agreements and other mechanisms of public-private partnerships.	In 2018, the share of property transferred for management, lease, concession to private owners was 12,8% in the total volume of state (municipal) property.
3	Completion of the transfer of benefits and subsidies for payment of housing and utilities in a cash form, which forms the basis of the reform of the housing and utilities sector.	These measures are aimed at implementing market economy mechanisms and increasing responsibility of enterprises providing housing and utilities services.
4	Development of the resource and energy conservation system.	Control over resources consumed is carried out by communal and individual instrument metering. According to the results of 2018, 96.2 percent of electric energy, 82.7 percent of gas, 48.7 percent of cold and hot water were supplied to consumers in accordance with metering devices

To solve the above problems, the authors identified the main stages of implementation of digital technologies for the development of the housing and utilities sector.

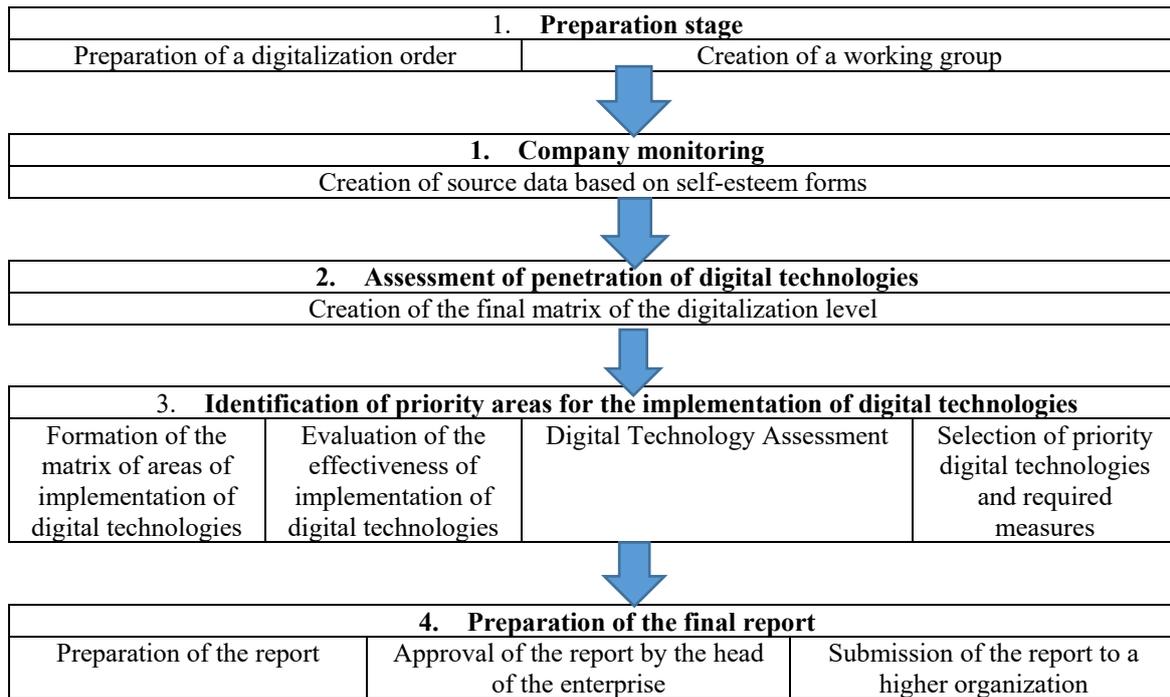
The main stages of implementation of digital technologies in the housing sector are presented in Figure 02.

The preparation stage is an important stage of implementation of digital technologies in the housing and utilities sector, since it is important to digitalize the industry and hire qualified specialists who will be able to carry out new tasks.

It is necessary to assess the readiness of enterprises to use digital technologies.

At stages 3 and 4, it is necessary to identify priority areas of the housing and utilities sector and evaluate the matrix of the digitalization level of housing and utilities enterprises. Compliance with the sequence of stages will allow for the effective implementation of digital technologies in the housing sector.

According to the authors, the high-quality digitalization of the public administration system of the housing and utilities sector is required. This applies to document management, provision of digital services to the consumer, etc. (Collection of laws of the Russian Federation no. 20...; Production management. Digitalization...).



**Figure 02.** The main stages of implementation of digital technologies in the housing and utilities sector

It is also important to develop legislation on regulation of digital technologies in the housing and utilities sector, pay attention to issues of highly qualified personnel and security issues.

## 7. Conclusion

In conclusion, it is worth noting that new (digital) technologies contribute to a more systematic approach, taking into account the wider infrastructure of activities. However, for the housing and utilities sector, this transition will take a long time and will be fully realized only when new technologies make housing more affordable, which will accelerate the process of updating the housing stock.

Thus, in the context of digitalization of the housing sector, it is necessary to focus on the following problems:

- to strengthen the role of the state in the development of the digital economy and the digital transformation of housing and utilities services, increase the level of readiness of the HUS, management companies and resource-supplying organizations to use digital technologies, and assess possibilities of the housing and utilities market;

- to intensify the process of creating public-private partnerships for the development of the digital economy in the housing and utilities sector aimed at implementing the national project “Creation of a comfortable urban environment” as part of the digital economy development program and its impact on the digital transformation of the housing and utilities sector;

- to intensify implementation and further development of the GIS housing and utilities services, as well as creation of a unified information environment for monitoring the housing sector;

- to intensify creation of the infrastructure for collecting and storing information, using block chain technologies, implementing unmanned and intelligent robotic systems;

- to analyze the state and prospects of using renewable energy sources in the heat supply systems of the housing and utilities sector, develop intelligent decision support systems in emergency and crisis situations that provide information and cyber security of the housing and utilities sector, create digital platforms for intelligent energy saving management in the housing and utilities sector;

- to create a unified information and analytical system for monitoring and controlling the housing and utilities services; to use GLONASS / GPS navigation systems in Io T / M2M.

## References

- Averyanova, D. A. (2019). Stages of development of the digital economy. *Economics and business: theory and practice*, 3/1, 10-13.
- Balapunwaduge, I. A., Li, F. Y., Rajanna, A., & Kaveh, M. (2016). Channel occupancy-based dynamic spectrum leasing in multichannel CRNs: Strategies and performance evaluation. *IEEE Transactions on Communications*, 64(3), 1313-1328.
- Chuprynosky, V. P., Sinyakov, S. A., & Lipatov, S. I. Digital economy-"" he Smart way to work". *VP Su-prunovskiy, SA Sinyakov, Lipatov SI//International Journal of Open Information Technologies.-2016*, 2(4), 26-32.
- Kovaleva, I. V., & Chernov, M. V. (2017). Concept of state regulation of entrepreneurial activity. *Bull. Altai State Agrar. Univ*, 12, 163-167.
- Kryukova, A. A. (2017). Digital Economy Instruments. *Karelian Science Journal*, 3(20), 108–111.
- Legner, C., Eymann, T., Hess, T., Matt, C., Böhmman, T., Drews, P. ..., & Ahlemann, F. (2017). Digitalization: opportunity and challenge for the business and information systems engineering community. *Business & information systems engineering*, 59(4), 301-308.
- Nikityuk, L. G., & Timchuk, O. G. (2015). Investment of innovative activity in the housing and communal services sector on the basis of public-private partnership. *Bulletin of the SSGUTU*, 5,101–108.
- Nylen, D., & Holmstrom, J. (2015). Digital innovation strategy: A framework for diagnosing and improving digital product and service innovation. *Business Horizons*, 58, 57–67.
- Popov, E. V., & Semyachkov, K. A. (2017). Management of digital economy. *Management in Russia and abroad*, 2, 54–61.
- Sagynbekova, A. S. (2018). Digital Economy: Concept, Prospects, Development Trends in Russia. *Theory. Pract. Innovat.*, 4(28), 255–267.
- Smirnov, E. N. (2018). Evolution of innovative development and prerequisites for digitalization and digital transformation of the world economy. *Issues of innovative economy*, 8(4), 553-564.
- Sudarushkina, I. V., & Stefanova, N. A. (2017). Digital economy. *Azimuth Nauchnykh Issledovani: Ekonomika i Upravlenie= ASR: Economics and Management*, 6(1), 182-184.
- Veselovsky, M. Ya., Izmailova, M. A., & Abrashkin, M. S. (2018). Priorities and main instruments for the development of the digital economy of Russia. *(WORLD) Modernization Innovation. Development*, 9(2), 192–199.
- World Bank. Russia Digital Economy Report, September 2018, Competing in: Policy Implications for the Russian Federation (2020). Washington, D.C.: World Bank. License: Creative Commons Attribution CCBY 3.0 IGO.