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"Global Challenges and Prospects of the Modern Economic Development"****DIGITALIZATION OF THE HOUSING AND UTILITIES AS  
STRATEGIC PLANNING OF ITS DEVELOPMENT**

Yu. I. Efremova (a), O. V. Petryanina (b), Yu. V. Semochkina (c)\*

\*Corresponding author

(a) Samara State University of Economics, Soviet Army Str., 141, 443090, Samara, Russia, yul-efrem@yandex.ru

(b) Samara State University of Economics, Soviet Army Str., 141, 443090, Samara, Russia,  
petryaninaolga@rambler.ru

(c) Samara State University of Economics, Soviet Army Str., 443090, Samara, Russia, semyulia@gmail.com

***Abstract***

The housing and utilities sector of the Russian economy is one of the crucial factors to provide citizens with satisfying living conditions. It concentrates a third of all the country's capital funds. The reform of housing and communal services (hereinafter referred to as housing and utilities) and the objective needs of this industry have led to the demand for modern information technologies. The benefits are obvious: improving the quality of urban management, improving the performance of industry enterprises, and reducing costs. Finally, it is the provision of normal services for citizens. The relevance of the research is determined by the problems which exist in this field related to the process of integration of housing and utilities enterprises into a single state system. The lack of the available, standardized program which is carrying out information transfer in a single state information system (database) imposes a ban on the housing-and-municipal enterprise activity. The object of the study is information technologies in housing and utilities on the territory of the Russian Federation. The subject of the study is the economic relationship between managing companies and the state information system of housing and communal services. During the course of the study, the scientific works devoted to the study of problems of information support of housing and utilities organizations as well as scientific materials on this issue were studied.

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**Keywords:** Housing and utilities reform, digitalization, Internet of Things, billing systems, development of information technologies, state information system SIS housing and utilities.



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## **1. Introduction**

The development of the IT infrastructure of large companies in recent years has been under the sign of two interrelated but to some extent contradictory trends. On the one hand, IT is becoming more important to support and grow core business, and on the other hand, reducing (or at least limiting) IT maintenance costs is coming to the fore. The optimal operation and maintenance of the information management system, especially the developed one, requires considerable human, material, temporary, financial, relevant professional knowledge and skills. At present, the problem of automation of activities has become important for all enterprises, regardless of their type of activity. According to many experts, it is housing and utilities that are among the most important areas from which the digital transformation of the Russian economy should begin. Nowadays, the problem of automation of activities has become crucial for all enterprises, regardless of their type of activity. According to many experts, it is housing and utilities that are among the most important areas from which the digital transformation of the Russian economy should begin. Indeed, the domestic housing and communal complex accounts for about 6% of GDP, the industry employs more than 30 thousand enterprises, the total number of personnel exceeds 2 million people. The transition to automation of business processes of housing and utilities, to technologies of the Internet of Things gives new opportunities through the formation of a single information space of the industry, it allows to create IT-systems of customer information and processing of their data, to introduce mobile and cloud solutions, including tools of big data analytics.

## **2. Problem Statement**

A large number of works of Russian and foreign authors have been published on issues of theory and practice of development of the system of management of activities of production enterprises of the communal services system. In this article we relied on research of such domestic economists as Vasileva and Deeva (2017), Vakhrushev (2016), Parshkov (2018), Yumatov (2019) and others. From the western authors it should be noted works of Janowski (2015), Nord, Koohang, and Paliszkievish (2019) and others. The article discusses the specifics of the application and the problem of the introduction of information technologies into the housing and communal services system. The concept of "diagnostic map of the house" is introduced to assess the efficiency of the functioning of the housing and communal unit.

## **3. Research Questions**

During the study of this work, the following tasks were formulated and solved:

1. The main problems accompanying the processes of digital transformation of the housing and utilities industry have been identified.

2. Modern information technologies in the reform of housing and utilities, which have testing and the greatest spread, have been analyzed.

3. The model of the information and intellectual system of the housing and communal enterprise is being analyzed.

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

The purpose of this study is to improve the efficiency of management companies by introducing an automated system to optimize the public infrastructure. To achieve this goal, the analysis of modern information technologies is carried out as a tool to improve the performance of employees by using the information support of the system. Digitalization of this industry will contribute to the creation of a holistic picture of the state of service, to ensure all levels of management of information and analytical materials necessary for high-quality and timely management decisions.

#### **5. Research Methods**

The scientific validity of the results obtained is determined by the application of general and special methods of scientific knowledge. In theoretical terms, the study is based on methods of scientific generalization, comparative, systemic and multi-factor analysis. Methods of generalization, systematization, modeling were used to obtain quantitative characteristics. The methods used in the study have achieved the objectives.

#### **6. Findings**

The development of digital technologies in the Russian housing and utilities is connected with the introduction of the state information system (SIS) of housing and utilities, developed to strengthen the control over all spheres of the housing and communal industry, as well as to increase transparency of the activities of management companies. However, due to the presence of obvious functional shortcomings and technological miscalculations in the system GIS housing and utilities has not yet become a full-fledged platform integrating the industry. Not all management companies post information there. This is due to the fact that not everyone still has the technical capabilities to transfer data to a single information system. Therefore, an important aspect is the prospect of integration of SIS housing and utilities with existing IoT technologies (Yumatov, 2019).

To date, many digital user services have been created by managing companies at the regional and municipal levels, settlement centers, not to mention resource-supplying organizations. Many of them develop their own IT platforms and services: mobile rooms, software robots for client communications, etc. For instance, the digital platform RIAS Housing and Utilities, introduced in Ulyanovsk, Vladimir, Kirov and some other regions. This is actually digital double of the city. A system in which in addition to geospatial data information from the RITs and UK billing systems, the scheduling given about the consumption of resources from systems, history of addresses and complaints of citizens is stored. RIAS housing and public utilities allows to control life cycle of objects of housing stock. In addition to RIAS housing and public utilities it is possible to remember also the intellectual system of scheduling "AIS the City. Instrument accounting" which provides effective control of consumption of energy resources by means of intellectual accounting and the automated remote control. AIS PU is implemented in Ulyanovsk, Dimitrovgrad, Samara and has potential to scaling.

As an example we will consider the application of one of the intellectual management systems on the basis of mobile technologies and the Internet of things for the housing and public utilities enterprises

which is developed by the Lingerquo company. The products of this company are successfully approved not only in Yekaterinburg, but also in Chelyabinsk, Tyumen, Kirov, Krasnoyarsk, Moscow. Lingerquo is a service for ensuring uninterrupted transfer of correct data from accounting items of energy resources for operating control and drawing up the reporting, with the minimum maintenance overheads of a system of remote scheduling. The service is developed on the cloudy based technology (SAAS). This software exists by default and is capable to support business processes of the housing and public utilities enterprises. Before this service all difficult calculations were carried out by means of a pen, a sheet of paper and a calculator, and it is no wonder that in accounts for utilities errors crept in. (Dobrolyubova, Alexandrov, & Yefremov, 2017). The modern online system calculates fees for housing and utilities, receives payment data, issues receipts. Due to billing, tenants do not wonder how and why they were counted the specified amount: the calculation is transparent. The plus of the billing system is that it is flexible and productive. It works with large flows of information, considers old data, so they will not be lost when switching to a new system (Parshkov, 2018).

The fact that its application allows to build the system of scheduling with simpler architecture also belongs to advantages of this software (without the need for purchase and installation of the server hardware). At the expense of it costs of implementation and service are reduced, the cost efficiency of a system increases. The service software monitors connection existence. In case of any failures the program carries out a set of algorithms to diagnose and fix a problem, including on the party of the equipment.

It is possible to demonstrate the economic efficiency of the system by carrying out a comparative analysis of changes in some economic indicators in the activities of the Criminal Code of the Academic district of Yekaterinburg, carried out on the basis of quarterly reporting.

**Table 01.** Economic efficiency of LINGERGUO

| <b>Indicators (for one unit)</b>  | <b>Expenses without LINGERGUO</b> | <b>Expenses with LINGERGUO</b> | <b>Saving on expenses</b> |
|---|-----------------------------------|--------------------------------|---------------------------|
| Elimination of consequences of accidents (including direct and indirect losses)   | 50000 rubles                      | 25000 rubles                   | 50% (25000 rubles)        |
| Correct generation of the report (reduction of cases of accrual according to standards, penalties, outputs of nodes from operation) | 6000 rubles                       | 3600 rubles                    | 40% (2400 rubles)         |
| Limit management (optimization of power system operation modes)   | 150000 rubles                     | 97500 rubles                   | 35% (52500 rubles)        |

As it can be seen from the data given in the table 01, the modern information management systems in the sphere of housing and utilities allow public utilities to effectively manage the quality of the services provided, to launch new networks of tariff regulation, which leads to reduction of consumers "expenses for their payment. On the one hand it will contribute to the satisfaction of consumers with the work of communal enterprises, and on the other hand it provides social support to the processes of modernization and reform of the industry and lead to the reduction of social tensions in the society (Vakhrushev, 2016).

At the present stage of development of housing and public utilities as the innovation aspect it is necessary to consider and pay special attention to automation of administrative processes at the level of the first link, i.e. development of own system of automation and scheduling of administrative process of each utility company. It will allow to give an adequate assessment to quality of the provided housing and communal services, to reveal the most abnormal sections, to study mobility in elimination of addresses of citizens (Chia, Li, & Tang, 2017).

In our opinion, the most effective way is to create the intellectual information system for an individual household and to apply the term "diagnostic map of a housing and communal enterprise." This will allow to assess its level of "health" and subsequently build a strategy of "treatment," that is, to eliminate the main problems (Le, Ta, & Dang, 2017).

With the help of this system, it is possible not only to present a financial plan for the future, but also to assess the structural elements of the objects, the actual physical wear and tear, to obtain an overall picture of the need to implement the identified deviations from the normative values and to gain a clear idea of the consequences that may arise in the decision-making (Maalsen, 2019).

The Intelligent Information System (IIS) should include two levels: the level of expertise and the level of the decision support system, which should be consistently interconnected. Since most of the managing companies use the program "1C: Enterprise", the ideal option will be to develop a configuration, or an inhouse program, fixed on the basis of the browser search string. Such an algorithm of solutions in optimization of housing and communal services will allow to solve the following problems in practice:

- to create information support in the operation of buildings and structures;
- to increase the assessment of control and assess the technical condition of buildings and structures;
- to carry out the rational distribution of funds of the managing company;
- to estimate the cost of works for reconstruction of buildings and structures according to the established standards;
- to form a sequence of repair works, to optimize the call of specialists to eliminate accidents and carry out scheduled works according to quantitative and qualitative characteristics.

This model of forecasting the efficiency of the adopted management decisions of housing and utilities is necessary for managing companies not only for simplified management of economic activities, but also for coordination of the actions of senior management.

It is reasonable to carry out the choice of the software for automation of housing and communal services considering observance of conditions of the maximum compliance of technology of work of management companies and also taking into account architecture of an enterprise information system. By results of the analysis of software solutions a choice was made in favor of own software providing data for the SIS housing and public utilities system. Despite it, the majority of the existing systems the lack of systematicity and uniform standards and formats of collection of information differ in problem lines, such as local character, isolation of information which is stored and circulating in them. Therefore, operation algorithms of the used programs need careful completion and improvement.

Therefore it is necessary to focus on a solution of the following tasks:

1) to strengthen the role of the state in the development of the digital economy and digital transformation of housing and utilities, increase the level of readiness of managing companies and resource-supplying organizations to introduce digital technologies, assess the opportunities and potential of the housing and utilities market;

2) to intensify the implementation and further development of SIS Housing and utilities, as well as the creation of a unified information environment for control and supervision in the sphere of housing and utilities;

3) to improve the unified information and analytical system for monitoring and control of housing and utilities in the city.

## 7. Conclusion

For the success of housing and utilities systems it is necessary to use information technologies, which allows to create a qualitatively new system of housing and utilities management. The basis of this system should be a unified information system, which allows to overcome gaps between the already relatively developed regulatory framework and law enforcement practice, as well as to improve the quality of decisions taken, social protection of the population and to strengthen control over the housing and communal sphere of activity. The result of this work was to analyze the applicability of information technologies in the sphere of housing and utilities. By results of comparison of the software solutions a choice was made in favor of development of inhouse software. However, for this purpose it is necessary to ensure investment in innovation and development of communal sphere not only from public, but also from private sources. In order to create attractive and profitable conditions for private investors in Russia, it is necessary to develop not only institutional, organizational and managerial innovations, but also material assets, as well as information systems, automation projects and calculation and analytical Internet systems.

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