

Formation of programmes the housing-and-communal utilities complex development

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Abstract. The article is devoted to the problems of housing-and-communal services in the cities of Russia and their development in modern conditions. The research purpose was to give the theoretical justification as well as to develop some methodical recommendations on formation and implementation of the programmes of complex development of housing-and-communal services in the municipal units. The authors systematized the typical properties and specifics of housing-and-communal utilities, the role of the sector in preserving the environment, revealed the factors complicating their development significantly, carried out the analysis of the housing-and-communal sector condition and the sector's needs for investments. According to the analysis results, the authors prove that modernization and improvement of housing-and-communal sector demands drawing up target programmes of complex development. In article Principles and stages of the development of the programmes of the improvement of the housing-and-communal utilities were offered, the directions, considered to be the most relevant, were pointed out. The authors recognize such consequence of the housing-and-communal utilities modernization as the increase of the utility tariffs and the need of assessment of the availability of housing-and-communal services for consumers. The authors offer the new indicator, namely, the share of the provided subsidies in the total amount of payments for premises and utilities, for the improvement of such assessment. The results of the research can be used by the practitioners, forming target municipal development programmes of housing-and-public utilities development within the general strategies of the cities and regions development, aimed at the improvement of the population life quality and at the decrease in the environmental risks.

1 Introduction

The Housing-and-Communal Utilities make up one of the leading branches of the municipal economy, which efficiency determines the quality of the population life directly. Demonopolization and development of the competition in the housing-and-communal sector is one of the main directions of the development of housing-and-communal utilities, most of which is within the competence and possibility of the municipal authorities. The balance of economic interests of the subjects of this relationship including the state's

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interests, both within the implementation of its functions, and when forming the municipal strategic innovation programmes of the housing-and-public utilities development, has to become the basic principle of the state regulation of housing-and-communal utilities. In this regard the scientific research, aimed at the creation of any effective mechanisms and methods of formation and implementation of strategic innovation programmes of the housing-and-communal utilities development in the municipal units is very relevant.

Because of the technology features the systems of housing-and-communal utilities have to function continuously, uninterruptedly and without accidents. However, the analysis of the actual situation proves, that some problems is peculiar to the industry. Social research [1, 2, 3] list the most current problems, such as:

- high tariffs for the communal utilities;
- low quality of housing-and-communal services;
- the lack of proper control from the managing companies, municipal bodies;
- the absence or insufficiency of parkings;
- unsatisfactory work of janitors;
- high tariffs for housing services;
- unsatisfactory quality of water;
- interruptions in water supply;
- great number of the migrants, working in the housing-and-municipal sector, unsatisfactory quality of their work, deterioration in criminal situations and social tension;
- the lack of proper control from the condominiums, etc.;
- low level of comfort in the adjoining territories;
- interruptions in power supply;
- problems with garbage removal;
- high tariff for garbage removal;
- dilapidation of the housing stock;
- heating which is not corresponding to the climate and weather.

The effective solution of these problems requires the formation of programmes of complex development of the housing-and-communal utilities.

According to the results of the analysis, the situation in the housing-and-communal sphere, improved a little in 2019. Thus, the index of the municipal infrastructure development grew by 0.03 points and made up 6.93 (countrywide). And we should mention, that is the trend proceeding since 2018 and there are hopes, that it will remain in the end of 2020. On the other hand, the wear of the housing-and-communal facilities is high; that in turn determines the considerable need for investments for its overcoming (Table 1) [3].

Table 1. Wear of the housing-and-communal facilities and the need for investments.

Housing-and-communal sector block	Wear, %	Need for investments, trillion rubles
Housing	39.5	not less than 4
Communal services	70-80	not less than 6

It is obvious that such need for financing cannot be satisfied without any serious purposeful measures.

A lot of scientific works by such authors as Yu.P. Alekseev, L.A. Velikhov, A.G. Voronin, I.P. Malikova, Yu.S. Popkov, E.I. Pupyrev, V.I. Resin, A.N. Ryakhovskaya, V.Z. Chernyak and others is devoted to the research of the problems of management of municipal units development. The social-and-economic problems of housing-and-communal utilities, caused by internal market transformations as well as the matters of the development strategy are revealed in the works by A.A. Abolin, A.G. Bykov, SYu. Glazyev, E.B. Davydova, V.F. Novitsky, S.L. Postnikova, B.V. Rakitsky, V.G. Sadkov,

L.A. Solovyova, A.A. Turovsky, Yu.P. Tyrtyshev, L.N. Chernyshov and some other authors.

A.A. Adamesku, A.G. Granberg, V.V. Kistanov, N.V. Kopylov, V.N. Leksin, D.S. Lvov, G.S. Pospelov, B.A. Rayzberg, A.I. Tatarin, A.N. Shvetsov, A.G. Shelomentsev, B.M. Shtulberg devoted their works to the matters of the use of the target programmes in the strategic management of territorial subjects of the Russian Federation as well as to the formation of the programmes of social-and-economic development of the regional systems. The study of the theoretical bases of the complex artificial systems management was based on works by R. Akkof, R. Bellman, L. Bertalanfi, A.S. Malinin, M.M. Maksimov, M. Messarovich, V.I. Mukhin, V.S. Simankov. Scientific works by I.V. Bychkovsky, M.I. Zavarovsky, A.I. Kabalinsky, V.V. Kuzmenko, D.G. Rodionov, V.N. Rybalkin, S.B. Sivayev, Yu.F. Simionov, S.A. Taran, F.G. Tagi-Zade, E.V. Chekalin, A.V. Cherepanov are devoted to the matters of reforming and modernization of the housing-and-communal sector in the regions. The economic-and-mathematical apparatus of the development and optimization of development programmes at the municipal and regional level is provided in the scientific and practical works by N.G. Andronikova, S.A. Barkalov, V.N. Burkov, S.E. Gilev, N.V. Zubanov, A.P. Karavayev, S.V. Leontyev.

However, the aforesaid works are concentrated, mainly, on the separate problems and aspects of reforming and development of the housing-and-communal utilities. At the same time, proceeding from the social-and-economic importance of the industry for the municipal units' development, the programmes of complex development of housing-and-public utilities, combining economic, social, technical and ecological aspects are necessary in modern conditions.

2 Materials and Methods

The general scientific principle of the system approach made up the methodological basis of the work. The authors used such methods as logical and morphological analysis, comparison, economic-and-mathematical modeling, complex economic and investment analysis, program-and-target method, etc. during the research and preparation of this article. Laws and regulations of the Russian Federation, territorial subjects of the federation and municipal units, official statistical information, methodical, reference and instructive materials, periodic literature and works by domestic and foreign scientists as well as data on the production business activities of the utility companies formed the information base of the research [4, 5, 6].

3 Results

The conducted research allowed to claim that housing-and-communal sector has signs, characteristic of the modern complex organizational-and-economic system (COES) [7]. The features are the following:

1. Openness. The features of the housing-and-communal complex as the open organizational-and-economic system are defined by the mechanisms and conditions of the its integration into the general system of the territories development as well as by the specifics of the organizational-and-financial relations, developing in the complex.
2. Nonlinearity. The essence of the nonlinearity of the development of the housing-and-communal complex as a complex organizational-and-economic system is demonstrated by the fact that insignificant impacts on the parameters of their functioning can lead to large-scale consequences. The wear of the housing-and-communal complex infrastructure is so high now, and the growth of tariffs for housing-and-communal services is so sensitive for

most of the population of the country, that incorrectly organized and planned change of these parameters can lead to uncontrollable consequences. With respect thereto the high level of risk of the housing-and-communal complex functioning is greatly depending on the nonlinear effects, which hardly give in to control from the persons, making decisions, without the use of effective management tools.

3. Dissipativity. The crisis condition of the housing-and-communal complex promotes the increase in the financial load of services consumers and, as the result, the growth of the social tension in the society caused by the growth of tariffs, existing along with the worsening quality of housing-and-communal services. Thus, the stability of functioning of the housing-and-communal complex is in many respects maintained due to strengthening of the instability in the social-and-economic environment now.

The absence of thorough investigation and non-compliance with the system principles of the development during reforming of the housing-and-communal complex do not allow to achieve all the desirable results of the development of this sphere.

Besides, there are some specific features complicating the development of the housing-and-communal complex significantly [8]. The authors believe, that the main features are:

1) Scale. The share of the housing-and-communal complex in the fixed business assets in the Russian Federation makes up 26% and only concedes a little to transport (29.5%) and to the industries (27.4%).

2) The technological and technical backwardness predetermining the considerable level of accident rate and losses of resources. The average wear of fixed assets of the municipal infrastructure is especially high for production, transfer and distribution of heat energy, for collecting, cleaning and distribution of water and for removal of sewage and municipal solid waste. Losses of heat and water during the transporting and distribution are considerable.

3) High social importance. The share of the households expenses on housing and communal services in some regions of Russian Federation makes up 6.1%, in some areas the share of the households, receiving subsidies reaches 15-20% of the total number. However, the trend of financing of the capital investments at the expense of allowances to tariffs for housing-and-communal services can lead to the growth in volumes of the budgetary subsidies by 2-3.5 times in the next years.

4) Imperfection of the financial development mechanism. The analysis, carried out, as well as the data of previous works, studied by the authors, prove, that the renovation of fixed assets in the domestic housing-and-communal sector (without new construction) requires twice as much as the actual volume of the mastered capital investments in the sector.

Thus, the reasonable approach to the formation of the programmes of the housing-and-communal utilities development assumes the need of accounting of the principles of systemacity, focus and complexity and it also has to be based on the theory and methodology of management of complex organizational-and-economic systems in the conditions of risk and uncertainty.

The authors suppose it possible to provide the following stages of the formation of the programmes of complex development of the housing-and-communal utilities (Figure 1):

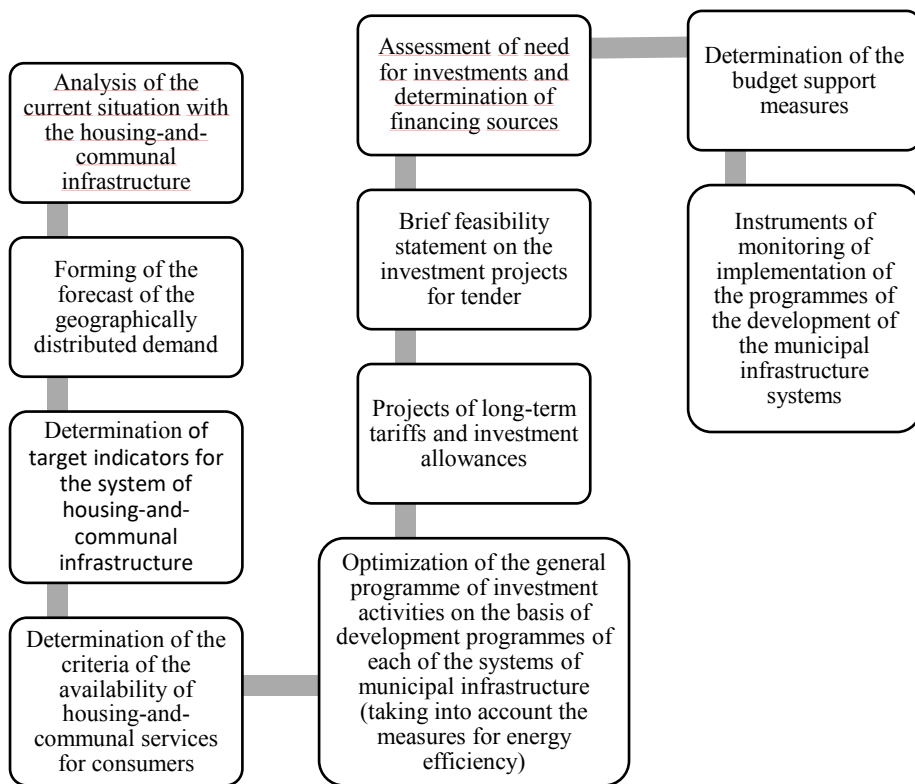


Fig. 1. Stages of the formation of the programmes of complex development of the housing-and-communal utilities [1, 2, 3, 4].

The major directions provided by the programmes of complex development of the housing-and-communal sector include:

- modernization of housing stock [9, 10];
- creation of common information space, e.i. the municipal information system of housing-and-communal utilities (MIS, which is similar to GIS);
- improvement of the pay system for the housing-and-communal utilities [2, 3, 12].

Modernization of housing stock is aimed at the decrease in the actual wear first of all. In addition to the decrease in physical deterioration of residential buildings such relevant task as the increase in the energy efficiency of buildings, energy saving and resource-saving is on the agenda [11].

The use of the municipal information system of housing-and-communal utilities both by state bodies and municipal authority will allow them to receive analytics, statistical reporting quickly and the maximum volume. At the same time, it will provide the population with services in the electronic form, Internet reception, invoices for payment, reports, reference information in electronic form [12].

As for the improvement of the pay system for housing-and-communal utilities, the organization of calculations for services with the use of cards of residential and non-residential premises should be noted first of all.

4 Discussion

It is necessary to recognize that the development of the housing-and-communal sector, expenses on any improvement lead to the growth of tariffs for the population [13, 14]. It inevitably sparks criticism and it is fraught with unacceptance of reforms from the population. To level this negative consequence of the programmes of the housing-and-communal utilities development in the regions of Russia, it is important to carry out the assessment of the availability of payments for utilities and to enter the indexation of tariffs only after such assessment (Figure 2).

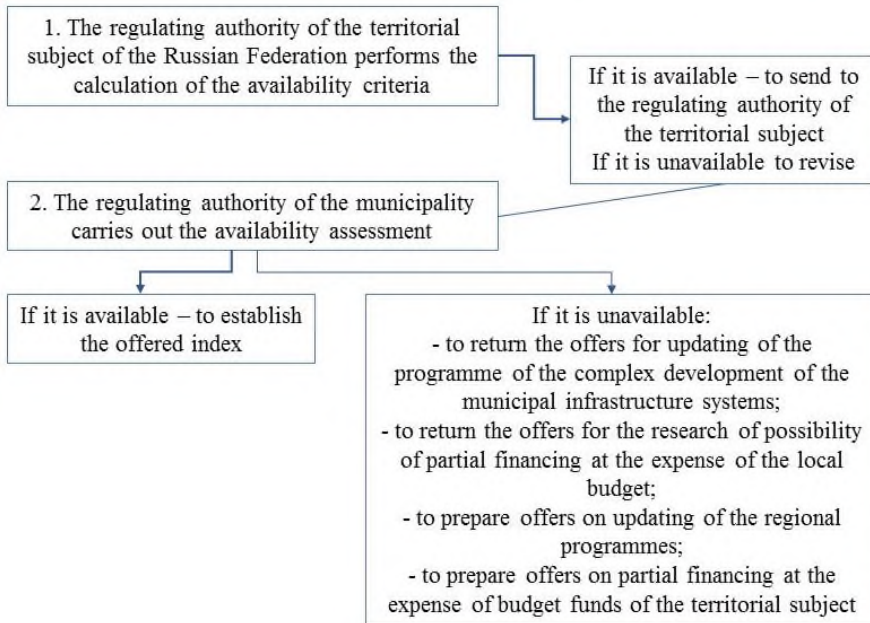


Fig. 2. Stages of the assessment of the availability of payment for the housing-and-communal utilities.

The authors offer to add a new criterium to the criteria of availability, e.i.:

- the share of the provided subsidies in the total amount of payments for premises and utilities as the indicator of criterion of the sufficiency of budgetary funds for granting subsidies for payment of housing-and-communal services.

The growth of tariffs and the increase of the share of the consumers' expenses on the communal services in the consumers' income was observed in Russia during 2008...2020. However, this trend is compensated by the fact that the increasing share of families receives subsidies for housing-and-communal services.

5 Conclusions

The study of the housing-and-communal utilities in Russian regions allowed:

- to reveal some typical properties and specifics of housing-and-communal utilities as a complex organizational-and-economic system, functioning and developing in the conditions of risk and uncertainty, including economic, demographic, political and environmental risks.

- to prove the principles and the stages of the development of the housing-and-communal utilities improvement programmes.

- to reveal the directions of the programs of housing-and-public utilities development, which are the most relevant nowadays;
- to add the technique of the assessment of the economic development and implementation of the innovation programmes of the housing-and-public utilities system development, as the authors offered such an indicator as the share of the provided subsidies in the total amount of payments for premises and utilities.

The analysis proves some progress of the programmes of complex development of the housing-and-communal sector in Russia in 2008-2020 [15]:

- the 100-percent scope of the apartment houses is provided with devices of all-house accounting,
- the housing-and-communal utilities become more and more resource-saving;
- the annual number of accidents and incidents per 1 km of networks of utility companies in the sphere of heat and water supply is reduced;
- the improvement of provided utilities quality.

References

1. A. Yumatov, *Intelligence. Innovations. Investments* **S1**, 51-54 (2012)
2. M. Fomenko, I. Novikova, *Avenue of science* **4.9(25)**, 238-240 (2018)
3. V. Shapovalenko, E. Dekhtyar, M. Kostyshak, *Economy and entrepreneurship* **7(96)**, 519-523 (2018)
4. *Order of the Ministry of Regional Development of the Russian Federation of May 6, 2011 No. 204 "On the development of programs of complex development of systems of municipal infrastructure of municipal units"* (Moscow, 2011)
5. *Order of the Ministry of Regional Development of the Russian Federation of October 1, 2013 N 359/GS "On the approval of Methodical recommendations about development of programs of complex development of systems of municipal infrastructure of settlements, city districts"* (Moscow, 2013)
6. *Order of the Government of the Russian Federation of June 14, 2013 N 502 Moscow "On the approval of requirements to programs of complex development of systems of municipal infrastructure of settlements, city districts"* (Moscow, 2013)
7. S. Shulepina, *Eurasian Journal of Economics and Finance* **3(3)**, 65-71 (2015) DOI: 10.15604/ejef.2015.03.03.006
8. T. Zhurkina, T. Sabetova, *Proceedings of the Voronezh State University of Engineering Technologies* **82(1)**, 304-312 (2020) DOI: 10.20914/2310-1202-2020-1-304-312
9. E. Vasilyeva, *Economy and entrepreneurship* **10(99)**, 1130-1133 (2018)
10. E. Vasilyeva, *IOP Conference Series: Earth and Environmental Science* **90(1)**, 012216 (2017) DOI: 10.1088/1755-1315/90/1/012216
11. E. Chibisova, T. Meshcheryakova, *Science Krasnoyarya* **6(2-2)**, 146-148 (2017)
12. Dražić, J., Vatin, N. *Procedia Engineering*. 2016. **165**. Pp. 883–890. DOI:10.1016/j.proeng.2016.11.788.
13. Dudin, M.O., Vatin, N.I., Barabanshchikov, Y.G. *Magazine of Civil Engineering*. 2015. **54(2)**. Pp. 33–45. DOI:10.5862/MCE.54.4.
14. E. Polson, L. Scales, *Social Work & Christianity* **47(3)**, 100-122 (2019) DOI: 10.34043/swc.v47i3.144
15. G. Kozlov, M. Pushkarev *E3S Web of Conferences* **135**, 01058 (2019) doi:10.1051/e3sconf/201913501058