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MECHANISM OF SUPPORTING THE ECONOMIC BALANCE IN THE SPHERE OF HOUSING AND COMMUNAL SERVICES

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Abstract. *Housing and communal services is one of the leading branches of the municipal economy at the present time, the quality of life of the population directly depends on the effectiveness of its development. Despite the high level of development of many socio-economic entities in the Russian Federation, in the housing and public utilities sector today there is no uniform effective methodology for assessing ongoing activities. Creating a universal methodology for assessing regional authorities in the implementation of measures to reform housing and communal services can be an important element in the information management of the industry. The scientific paper uses mathematical tools to build effective mechanisms for the functioning of programmes for housing and public utilities.*
The purpose of this study is a theoretical justification, the creation of an effective mechanism to maintain the economic balance in the housing sector.
In this case, effective monitoring of management companies is considered as an important element of the economic mechanism of management of housing and public utilities, which will improve the quality of public services and ensure the level of satisfaction of the population.
Keywords: *classification, construction, mathematical analysis, municipal economy*

Introduction

In recent years, the prevalence of administrative methods of managing the utilities industry over economic ones has been noticeable. Due to the underdeveloped system of contractual relations, management companies enter into agreements in which there are no obligations for the executive authority to provide financing. From this fall's the stability of income and debt is growing, there is a delay in payments, management companies are trying to get away from the application of sanctions. So, one problem leads to another, which leads to contradictions of interests of consumers and the municipality.

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One of the main directions of development of housing and communal services related to the competences and capabilities of municipal authorities is demonopolization and the development of competition in the field of housing and communal services. The main principle of state regulation in this case should be to maintain a balance of the economic interest of the subjects of these relations and the state.

In this case, the aim of the study is a theoretical justification, the creation of an effective mechanism to maintain the economic balance in the housing sector.

The main methods used are system-functional analysis, empirical materials on the state and functioning of the housing and communal services of Russia, economic analysis related to mathematical and statistical calculations.

This paper proposes the establishment and improvement of real contractual relations in order to develop competition in the housing sector. Within the framework of this agreement, five integrated indicators were defined, on the basis of which it is possible to assess the performance of the management company.

The paper also proposes the introduction of a set of the most important indicators for assessing the performance of management companies and monitoring. Thus, the system of criteria acquires the most integral character. The determination of the weight of each indicator and the selection of the most significant of the aggregate is carried out using statistical methods for analyzing expert assessments.

Problem analysis and justification of the prospects for the development of housing and communal services in municipalities

Socio-economic problems of housing and communal services, due to its internal market transformations, as well as development strategy issues are disclosed in the works of Yu.P. Alekseev (Alekseev, 2006), A.G. Voronin (Voronin, 1997), Yu.S. Popkov (Popkov, 1979), L.A. Velikhov (Velikhov, 1996).

Analysis of the development of housing and communal services revealed the need to solve the following major tasks and problems:

- social protection of the population in the implementation of housing and communal services reform reducing the standard of living;
- consequences of unsatisfactory work of public utilities;
- problem related to the interests of the participants in the housing and communal sphere;
- deterioration of housing and engineering communications.

The situation in the market is exacerbated by shortcomings and inconsistencies in the regulatory documents that housing and utilities specialists work with.

The problem of the formation of contractual relations between public utilities, management companies and the population in municipalities pulls along a number of other problems associated with the formation of the tax base of enterprises and the pricing system.

During the period of reforming the housing and utilities sector, the controversial nature of the exercise of state functions was most clearly manifested, reinforced by the impact of systemic crisis trends in the economy. Attempts to solve one problem aggravate the development of another problem, the economic support of one of the participants in the housing and utilities sector causes an increase in discontent on the part of others (Primak, 2007).

Under these conditions, the main principle of state regulation of the development of housing and communal services is to maintain a balance of economic interests of all market participants when all economic actors in the housing sector: the population, utilities, repair and maintenance enterprises, the management company, the state determine equal responsibility for solving many problems in this area.

Currently, at the federal level, the Rosstat, the Ministry of Regional Development of Russia and the Federal Agency for Construction and Housing and Public Utilities are monitoring the state of the housing and utilities complex (Monitoring volumes…, 2019). The information collected is reflected in the Russian Statistical Yearbook (Main indicators…, 2017).

The analysis of the content of statistical reporting forms allows us to conclude that there are informational deficiencies in the state statistics service, such as the lack of statistics on the number of homeowners 'partnerships at the federal and regional levels, as well as the need for additional processing of the data in order to improve the performance indicators of the housing and utilities reform. Consequently, the resulting set of indicators is a little close to the practice of management and requires perfection.

Mechanism of supporting the economic balance in the sphere of housing and communal services

The object of the research is housing and communal services of Russian cities. The subject of research - an assessment of the effectiveness of the management companies.

The solution to the problem is to create such a management structure for housing and communal services in the municipality, which would be strictly based on real contractual relations, while attracting organizations of various forms of ownership on a competitive basis.

As part of the improvement of contractual relations, it is necessary to conclude a new contract for the management of the housing stock between management companies and executive authorities.

The contract between the Municipality and private operators (management companies) will be a document whose structure reflects its main provisions. The contract consists of several sections, presented in Table 1.

Each section contains a description of the problems and risks taken into account when forming the contract.

The predicted results of the introduction of such a contract are as follows:

- the creation of favourable conditions for attracting new organizations in the sphere of housing stock management;
- reduction of interventions by the administration, priority use of economic regulation methods;
- ability to control the quality of services provided;
- increasing the level of economic interest in managing the housing stock and providing quality services;
- ability to regulate the cost of services depending on their quality.

Table 1 ***Content of the agreement between the Municipality and the Management Company*** *(compiled by the authors on the basis of scientific research on selected topics)*

No. p/p	Section Name
1	Objectives of the Agreement
2	Contract time
3	Service zone
4	Fixed assets
5	Obligations of the Company in raising a loan
6	Contractual relations with consumers
7	Purchase of goods and services by the Company
8	Investment activity of the Company
9	Tariff regulation
10	Monitoring and reporting
11	Financial responsibility
12	Force majeure
13	Dispute resolution
14	Terms of termination of the Agreement

All this will contribute to increasing the level of profitability of housing and utilities organizations and the establishment of optimal market relations. Improving contractual relationships also affects the system of accounts for various energy resources, which will reduce the level of debt and increase the responsibility of managing organizations.

Research results

Within the framework of this agreement, five complex indicators were identified, on the basis of which it is possible to carry out an assessment of the performance of the management company:

1) quality of services provided;
2) amount of work performed by the management company;
3) cost structure of the management company for the maintenance of housing and documents supporting these expenses;
4) collection of payments for organizations;
5) organization of the management company.

Each of these indicators is divided into some sub-indicators, according to which monitoring and evaluation of the management company's activities is possible.

Increasing the level of competition is now an impetus to the improvement and development of new technologies, information systems, allowing having reliable and reliable information. Due to this, it is possible to optimize costs and prevent accidents. In addition, the most effective management factor in the housing sector is the availability of adequate feedback to controlled objects. In reality, this can be achieved by creating a market monitoring at the municipal level.

Thus, it is advisable to create an effective system for monitoring and evaluating the activities of management companies.

The proposed algorithm for assessing the performance of the management company for the indicators we considered using indicators is presented in Fig.1.

The evaluation system of the management company includes five integrated indicators identified previously. Each of these indicators is divided into some sub-indicators, which will be evaluated.

Recommended indicators for the organization of monitoring and evaluation of the management company:

1. The number of complaints of the population to local authorities on the unsatisfactory quality of housing and communal services per 100 serviced personal accounts.
2. The dynamics of complaints to local authorities.
3. The number of repeated complaints to management companies and local governments on the unsatisfactory quality of housing and communal services.
4. The number of accidents on the housing stock per quarter per 1000 square meters of the serviced area.
5. The scope of maintenance work per 1000 square meters of the serviced area.

6. The number of unfulfilled orders of regulatory authorities.
7. The collection of payments of the population, %.
8. The share of the wage fund in the cost of maintaining the housing stock, %.
9. The share of administrative and management costs in the cost of maintaining the housing stock, %.
10. The volume of accounts payable per 1000 square meters of the serviced area.
11. The dynamics of accounts payable.
12. The share of housing stock, equipped with house-floor commercial water and heat metering devices, %
13. Training and certification of staff.

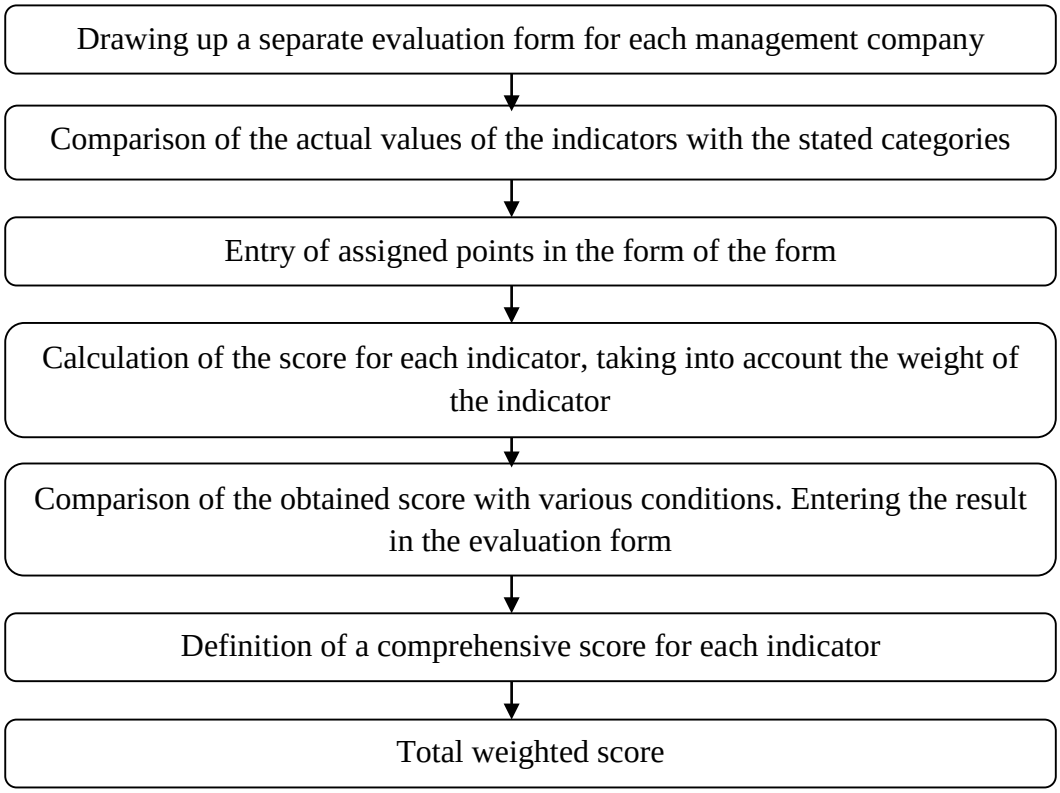

Figure 1 ***Algorithm for assessing the performance of the management company according to the declared indicators*** *(compiled by the authors on the basis of scientific research on selected topics)*

The algorithm for evaluating the activities of the management company is as follows:

1. Drawing up an evaluation form for each management company.
2. Comparison of the actual values of the indicators with the stated categories.

To conduct a quarterly comparative assessment of the management company's activities, a scale will be used, providing for the distribution of the obtained indicator values according to three categories with the assignment of a score for each category:

— High - 3 points;
— Medium - 2 points;
— Low - 1 point.

3. After determining the grade for each QM, the results are recorded in the relevant documents. Maximum score - 3 points.
4. Calculation of the score for each indicator based on the weight of formula 1:

$$x_{bi} = x_i \times k_i, \quad (1)$$

where x_i - assessment,

k_i - indicator weight reflecting the significance of indicators

Table 2 defines the weight of each indicator by an expert method. The sum of all weights of indicators is 1. The degree of influence of factors is estimated on a five-point scale, as the most common and simple to choose and understand, where:

1 - factor is not important,
2 - weak influence of a factor,
3 - mean factor,
4 - significant factor influence,
5 - strong influence of the factor on the building organization.

Table 2 ***Results of the expert survey*** *(compiled by the authors on the basis of an expert survey)*

Factors	Expert estimates														Average	Weight
	1	2	3	4	5	6	7	8	9	10	11	12	13	14		
1	5	5	5	5	5	4	5	5	5	4	5	5	5	5	4.9	0.09
2	3	3	3	2	3	4	4	3	3	3	3	3	4	3	3.1	0.06
3	5	5	5	5	4	4	5	5	5	4	5	4	5	5	4.6	0.08
4	4	4	4	5	4	4	3	4	4	4	4	3	4	4	4.0	0.07
5	3	4	3	4	4	3	3	3	3	3	3	3	3	3	3.15	0.06
6	4	4	4	4	5	5	4	4	5	4	4	4	4	5	4.4	0.08
7	5	4	4	5	5	5	4	4	5	4	4	4	4	4	4.5	0.08
8	5	4	5	4	5	4	5	4	4	5	4	4	5	4	4.5	0.08
9	5	5	5	5	5	5	5	5	4	4	5	5	5	4	4.8	0.09
10	4	4	5	4	4	5	4	4	4	4	5	4	4	4	4.2	0.07
11	2	2	3	3	2	1	1	3	2	2	2	1	2	3	2.15	0.05
12	5	5	5	4	5	5	5	5	5	4	5	5	4	5	4.7	0.09
13	5	5	5	5	4	4	5	5	5	4	5	5	4	5	4.4	0.08
Total:															53.4	1

The calculation of the average estimate for each of the factors is carried out according to formula 2:

$$a_j = \frac{\sum_{j=1}^{p} a_{ij}}{p}, \tag{2}$$

where $\sum_{j=1}^{p} a_{ij}$ - the sum of the elements of each line,

p - number of line items

We will identify the significance of each indicator / factor by assigning it a weighting factor. The average rating of each element is divided by the sum of the average ratings by formula 3:

$$K = \frac{a_j}{\sum_{j=1}^{n} a_j}, \tag{3}$$

where a_i - average grade,

$\sum_{j=1}^{n} a_j$ - amount of average ratings

Position in the competition of external factors is defined as:

— strong (in the range of 3.5–5 points),
— average (2.5–3.5),
— weak (less than 2.5 points).

For us, the most important are those that have a strong rating ranging from 3.5 to 5.0. According to the results of the assessments, we make the selection and ranking of the most important factors (average rating is 3.5 to 5).

Based on the analysis of the data obtained in Table 2, the largest weighting factor corresponds to the following factors: 1, 3, 6, 7, 8, 9, 12, 13.

Next, you need to check the results of the assessment by experts for consistency, that is, whether you should trust our survey (Bekirova & Trifonova, 2016). To do this, we calculate the coefficient of concordance of Kendall by formula 4:

$$W = \frac{12\sum_{j=1}^{m} d_j^2}{n^2(m^3 - m) - n\sum_{i=1}^{n} T_i}, \tag{4}$$

where d_j - deviations of the sum of ranks in the j- th direction from the average value of the sum of ranks,

T_i - equal rank indicator,

t_i - number of equal ranks in i- th group

The coefficient of concordance shows the degree of consistency of expert opinions. The value of W ranges from 0 to 1.

Kendall's coefficient of concordance is:

$$W = \frac{12 \times 19578.11}{14^2(13^2 - 13) - 14 \times 6752} = \frac{191737.3}{(535276) - 94528} = 0.59.$$

The obtained value indicates a high degree of consistency of expert opinions.

For the new ranks, the sum of related ranks was calculated, presented in Table 3.

The average sum of all object ranks is:

$$\overline{S} = \frac{1119.25}{13} = 86.1.$$

The conclusion about the significance of the Kendall coefficient of concordance is made using the Pearson approval criterion, if the condition $x^2_{clclt} \rangle x^2_{tbl}$.

We use formula 5 and carry out the calculation:

$$x^2_{clclt} = \frac{12 \sum d_j^2}{n \times m \times (m+1) - \frac{1}{m-1} \times \sum_{j=1}^{n} T_j}, \quad (5)$$

$$x^2_{clclt} = \frac{12 \times 19578.11}{14 \times 13 \times (13+1) - \frac{1}{13-1} \times 6752} = \frac{191737.3}{2184 - 562,6} = 118.2^2.$$

Table 3 ***Calculating the sum of related ranks***
(compiled by the authors on the basis of an expert survey)

Expert	Related ranks	Sum
1	$(7^3-7)+(3^3-3)+(2^3-2)=336+24+6$	366
2	$(5^3-5)+(6^3-6)=120+210$	330
3	$(7^3-7)+(3^3-3)+(3^3-3)=336+24+24$	384
4	$(6^3-6)+(5^3-5)=210+120$	330
5	$(6^3-6)+(5^3-5)=210+120$	330
6	$(5^3-5)+(6^3-6)$	330
7	$(6^3-6)+(4^3-4)+(2^3-2)=210+60+6$	276
8	$(5^3-5)+(5^3-3)+(3^3-3)=120+120+24$	264
9	$(6^3-6)+(4^3-4)+(2^3-2)=210+60+6$	276
10	$(9^3-9)+(2^3-2)=720+6$	726
11	$(6^3-6)+(4^3-4)+(2^3-2)=210+60+6$	276
12	$(4^3-4)+(5^3-5)+(3^3-3)=60+120+24$	204
13	$(4^3-4)+(7^3-7)=60+336$	396
14	$(5^3-5)+(5^3-5)+(3^3-3)=120+120+24$	264
Total		6752

Next, you need to calculate the number of degrees of freedom. In this case, it is equal to the number of compared objects minus one (13-1=12).

The probability will be equal to 0.05%. The value in the table is 21.026. We get $x^2_{clclt} \rangle x^2_{tbl}$. ($118.2^2 > 21.026^2$).

Having the weight of each factor in their total population and a group of the most significant factors, we proceed to the next stage of determining the indicator score, taking into account the weight.

5. For each indicator, a score is determined based on the weight and correction factors used to compare the performance of managing organizations operating in the housing stock, depending on the conditions: К1 - coefficient characterizing the level of depreciation of houses; К2 - coefficient characterizing the level of home improvement; К3 - budget financing ratio.
6. Then, a comprehensive score of 5 groups of indicators specified earlier, taking into account the weight and coefficients of indicators according to formula 6:

$$B_j = \sum X_{bi}, \qquad (6)$$

where B_j - comprehensive score for the relevant group (j=1, 2, 3),

x_{bi} - score based on weight

7. The total score is defined as the sum of points for all indicators, taking into account the weight and coefficients.

Thus, this algorithm allows obtaining a comprehensive assessment of the performance of management companies.

Conclusion

The identified criteria provide an opportunity to monitor and have reliable data on the dynamics of the development of the competitive environment of the housing and communal services market in municipalities. Effective monitoring of companies is an important tool in solving a number of problems with regards to the objectivity of information and making management decisions.

Thus, monitoring the activities of management companies is an effective way to assess the quality of the maintenance of the housing stock of municipalities, which will solve the following problems:

- monitoring the fulfilment of the obligations by the management company;
- tracking of relevant indicators of management companies at the moment;

- obtaining by owners of operational information about the state of housing and communal services;
- early and timely correction of deficiencies and improvement of the quality of services provided by management companies.

The recommended theory of using a monitoring system can be used in local government at the city or city district level.

At the level of municipalities, monitoring will be an effective tool in obtaining reliable information and further adoption of administrative management decisions in the municipal sphere. On the basis of the identified indicators, it will be possible to make choices better in their field of management companies to work with consumers and provide quality services. It will also help the public to independently choose the desired capital for their home.

The monitoring systems used in practice are methodological tools that have important characteristics and properties: completeness, flexibility, measurability, clarity and ease of use.

Summary

The scientific paper uses mathematical tools to build effective mechanisms for the functioning of programmes for housing and public utilities, aimed at maintaining the balance of economic interests of the subjects of the relationship and the formation of a competitive environment.

As part of the improvement of contractual relations, it is necessary to conclude a new contract for the management of the housing stock between management companies and executive authorities.

Within the framework of this agreement, five complex indicators were identified, on the basis of which it is possible to carry out an assessment of the performance of the management company.

Each of these indicators is divided into some sub-indicators, according to which monitoring and evaluation of the management company's activities is possible.

Ultimately, conducting competent and effective monitoring of the activities of management companies will promote the development of competition in this area and improve the use of financial resources. At the level of municipalities, monitoring will be an effective tool in obtaining reliable information and further adoption of administrative management decisions in the municipal sector.

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