Cost model for managing an apartment building in Kazakhstan

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Abstract. The article presents foreign experience in managing the housing stock, utilities, and also considers the main tariffs for utilities. Payment for utilities by the population is carried out on a monthly basis by transferring cash flows between various service providers from representatives of condominiums. Meanwhile, payment for utilities in various CSCs is carried out at different rates. This article also considers domestic experience in cost optimization in the management of an apartment building, which helped to identify various problem areas that require research, this explains the relevance of the topic of this article. In addition, practical approaches and procedures have been developed to optimize the costly part of housing and communal services management in high-rise buildings. Also, the study evaluates the cost model for managing an apartment building, which relies on certain services provided by a cooperative of owners. At the same time, based on the analysis, the optimal amount is determined for the effective functioning of the management company.

1 Introduction

At the moment, the management of an apartment building is an urgent task aimed at modern management in the activities of housing and communal services. There are 2.3 million houses in Kazakhstan, over 2 million of which are private. High-rise buildings - 314 thousand. Most of them are located in Karaganda (42.3 thousand), Almaty (35.9 thousand) and East Kazakhstan (31.7 thousand) regions. The majority of residential properties in Kazakhstan are two-room (1.2 million). [1]. At the same time, by July 1, 2022, many cooperatives of apartment owners (KSK) must be transformed and switch to new forms of management. In total, 50,427 multi-apartment residential buildings in Kazakhstan are subject to the transition to OSI and PT. At the moment, 3,594 associations of property owners (OSI) and 35,033 simple partnerships (PT) have been created [2].

Currently, the demand for new formations in the housing management system is relevant.

Creation of a society of property owners (OSI)At the same time, apartment owners' cooperatives (COOs) will not be abolished automatically, but must be reorganized before...
2 Materials and methods of research

2.1 Cost models for managing an apartment building are designed to estimate the costs of maintaining and operating the building and surrounding areas. They are used to determine the best building management strategies and allocate costs to apartment owners.

2.1.1 Fixed cost model
- In this model, all costs for the maintenance and operation of the building are fixed and do not depend on the number of residents. Expenses, such as payment for the services of a management company, repair and maintenance of common premises, insurance, etc. are distributed among residents in proportion to the area of their apartments.

2.1.2 Variable cost model
- In this model, costs depend on the number of dwellings and the services they use. For example, gas, electricity, water, and sewer costs can be calculated based on each occupant's consumption.

2.1.3 Flexible cost model
- In this model, costs can change based on changing needs and services provided to residents. For example, if it is decided to install new security systems or elevators, then the cost of their installation and maintenance will be considered in this model.

2.1.4 Cost management model
- In addition, there is a cost management model that optimizes the cost of managing an apartment building by identifying and eliminating excess costs. This model uses cost analysis to identify costs that can be reduced without sacrificing service quality and occupant comfort.

2 Results

International experience in multifamily building cost management may vary from country to country depending on local regulations, economic situation and culture. However, there are several common approaches and practices that are widely used in different countries and can be useful for managing the costs of multifamily buildings.
consumption-based cost management

In this approach, the costs of services (e.g., electricity, water, gas, etc.) are allocated to residents in proportion to their consumption. To do this, each tenant installs an individual consumption meter, which allows you to accurately determine the volume of services consumed by each tenant. Thus, tenants pay only for the services they actually consume.

energy efficient technologies

Many countries are actively implementing energy efficient technologies to reduce utility costs. For example, installing smart meters, insulating facades, replacing windows with more energy efficient ones, etc. These measures reduce energy costs and improve occupant comfort.

budgeting

Budgeting-based cost management involves setting an annual budget for building management, which is developed based on an analysis of past costs and a forecast of future ones. This allows the management company to have a clearer idea of the cost of maintaining the building and plan their costs in advance.

outsourcing

Many management companies engage third-party companies to perform certain tasks, such as cleaning common areas, maintaining elevators, repairing roofs, etc. This allows you to reduce the cost of maintaining the building and provide a higher quality of service.

investment in building improvements

Some countries provide subsidies and incentives for apartment owners and management companies that invest in building improvements. For example, replacing old heating systems with more efficient ones, installing solar panels on the roofs of buildings, etc. These measures reduce energy costs and reduce the burden on the environment.

In general, international experience in managing the costs of apartment buildings shows that there are many approaches and methods that are used in different countries. For example, in the United States and Canada, the costs of managing multi-family buildings are typically allocated to residents based on their area of the apartment, and some costs (such as common areas) may be evenly distributed among residents. Also, in the United States and Canada, the condominium system is often used, when residents own their apartments and have common ownership of common house premises and territories.

In Europe, there is a widespread approach in which the costs of managing apartment buildings are distributed among residents in proportion to their consumption of resources (gas, water, electricity, etc.). In addition, in some European countries (for example, in Germany and Austria) there is a management system for apartment buildings, when residents choose a management company that services their home and makes decisions on management and cost allocation.

In Japan, the cost of managing apartment buildings is often allocated to tenants based on their income, as well as other factors such as age and size of the apartment. In general, international experience in managing the costs of multi-family buildings shows that there are many different approaches and methods, and each of them can be effective depending on local conditions and the needs of residents. It is important to choose the most appropriate cost management model to ensure efficient management of an apartment building and meet the needs of residents.
One of the important aspects of cost management in multi-family buildings is the use of new technologies and innovations to reduce costs. For example, smart building management systems have already begun to be introduced in some countries to optimize energy and water consumption, control lighting and heating, and automatically control repair and maintenance costs. Such technologies help reduce the overall cost of building operation and improve the quality of life of residents [7].

International experience in managing the costs of multi-family buildings shows that effective cost management is one of the key factors for ensuring the sustainable and cost-effective operation of residential complexes. In many countries such as the USA, Canada, Australia, Germany and others, managing the costs of multi-family buildings is a complex process involving many different aspects. For example, in the United States and Canada, a cost management model based on the distribution of costs among apartment owners based on their area is popular. In this model, all tenants pay the same amount for the maintenance of common areas and areas, and the cost of individual services, such as electricity and water, is calculated depending on the consumption of each tenant.

In Finland, the average Finnish citizen spends about 20% of income on utility bills. Reliable functioning of housing and communal services is ensured by the fact that the management system is built according to the same rules: minimizing costs, eliminating losses and using advanced technologies. For example, three sources can be used to generate electricity and heat - coal, gas and hydropower. Whichever is cheaper is chosen. And in case of severe frosts (-30 ° and below), there are reserve stations in the city that run on oil [7].

In Germany and other European countries, cost management models are used based on more detailed costing of services and resources such as energy and water. Also, the costs of maintaining the building and territory can be divided into two parts - general costs and costs for a specific apartment.

In Australia and New Zealand, a cost management model is practiced based on a monthly tenant contribution that includes all costs for the maintenance and operation of the building, as well as a reserve fund for future repairs and upgrades to the building.

In general, international experience in multi-family building cost management shows that there are many different cost management models and approaches that can be adapted to suit local conditions and needs. It is important to choose the most effective cost management model for a particular residential complex in order to ensure maximum economic benefit [7].

In general, multi-family building management cost models help management companies and apartment owners effectively manage the costs of maintaining and operating a building, reducing costs and improving the quality of life of residents.
P. Kuznetsov and Khazova E. O., the main approaches and housing complex management methods.

Researchers V. Alexeeva, K. Mathur and A. Stone believe that the reform of utilities has never been more important. The COVID-19 pandemic has greatly impacted utilities around the world. Many utilities are currently under severe financial stress due to budget cuts and loss of revenue due to sudden drops in collection rates, billing suspensions and tariff adjustments in some countries. This, in turn, has made it difficult to ensure continuity of service delivery [7, 4].

At the same time, researcher Lomova M.N. interprets that reforming the housing and communal services (HUS) requires an integrated approach, carrying out systemic measures to improve the efficiency of its functioning. One of the main ways of transformation is a radical change in the system of providing housing and communal services, that is, ways to manage residential multi-apartment buildings [7].

So, for example, P. Kuznetsov says that “The choice of a specific method is determined based on:

- how much residents are willing to pay for housing services (for example, if the house is small, then it may be expensive to maintain it by a specialized consumer cooperative, and the managing organization will be able to compensate for its costs in volume by cooperating with simultaneous maintenance of neighboring houses)

- the presence of the desire of the owners to participate in the life of their home, make proposals for the improvement, organize and direct the intra-house and yard life [8].

Given the need to reform housing and communal services, one should understand the points that relate to this area.

Khazova E. O., in her study, believes that the housing and communal sector has a high social significance as it provides an improvement in the quality of life of the population, therefore, the urgent goal of housing and communal services enterprises is to modernize the technology of providing services and guarantee their quality [7].

There are three well-known models of reforming the housing and communal services, based on the degree of state participation in the privatization of property—English, German and French. Most European countries have these models.

The English reform model, which operates in the US and the UK, involves the complete privatization of housing and communal facilities.

The German and French management models provide for a combination of separate ownership of the apartment along with common ownership of the land and the main structures of the building [8].

Payment for utilities by the population is carried out on a monthly basis by transferring cash flows between various service providers from representatives of condominiums. Meanwhile, payment for utility services in various CSCs in Almaty is carried out at different rates. This model is distinguished by a variety of options for organizing the housing services market, which is represented by the following subjects of market relations (Figure 1):
The market model is characterized by the mobility of restructuring depending on the type of city, as well as the multivariate organization of the housing services market. Thus, the construction of a market model of housing management, reflecting the interests of all subjects of housing relations, is the most important task of reforming the housing and communal services sectors.

An innovative (software) model of housing management in various combinations is based on innovative energy-saving processes that ensure maximum efficiency of the housing sector under various scenarios.

For the developed model, the following goal is defined: optimization of the customer relationship management system for the implementation of such a tariff and pricing policy, which will achieve the collection of funds for the services provided at the level of up to 100% and at the same time minimize the costs of operating activities with possible changes in legislation.

A study of the dynamics of the transformation of the infrastructure of the housing and communal services (HCS) market shows that enterprises and organizations created in the centralized management system are currently, as a rule, in a state of survival (survival networks), newly created private companies and, in general, small businesses form new entrepreneurial networks focused on profit and market penetration.

An analysis of the level of interaction between enterprises and organizations in the housing and communal services market indicates the expansion of relationships between them.

In Kazakhstan, during the current year, the creation of a society of property owners (OSI) is being carried out. However, this level of development of housing relations should be financially efficient. Given this, it is necessary to consider the available rates for service providers.

Table 1 shows the approximate rates of the main items on which the tariffs of service providers and costs for managing housing associations of houses are calculated.

It is clear that many of the services provided by suppliers are not the income of the society of property owners. For the efficiency of the society, it is necessary to evaluate the items that will be income, first of all, they include the cost of housing maintenance (sq.m), emergency lighting (sq.m), cleaning of entrances (point), cleaning of the house territory (sq.m) and homeowners (regardless of the form of ownership), represented by housing authorities, act as customers of housing services, thus forming the composition, structure and volume of the housing services market; operating contractors perform the role of a production link in the provision of housing services; investment companies, as market participants, finance expensive projects for the modernization and reconstruction (rehabilitation) of the housing stock; trust companies can alternatively replace investment companies, but their main purpose is to manage the cash funds for maintenance and capital repairs in the face of changing market conditions; expert organizations, on the one hand, participate in monitoring (together with municipal administrations) the state of the housing stock, tracking all technical and organizational changes, on the other hand, assisting housing authorities, allowing them to make the most effective management decisions.
Table 1. Approximate rates of main items by service providers

<table>
<thead>
<tr>
<th>Supplier costs</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity (Kwh)</td>
<td>22.66</td>
<td>28.32</td>
</tr>
<tr>
<td>Heating (sq.m)</td>
<td>85.41</td>
<td>257.4</td>
</tr>
<tr>
<td>Hot water (cub.m)</td>
<td>361.51</td>
<td>155.5</td>
</tr>
<tr>
<td>Cold water (cub.m)</td>
<td>48</td>
<td>54.27</td>
</tr>
<tr>
<td>Sewerage hot water (cubic meters)</td>
<td>25.87</td>
<td></td>
</tr>
<tr>
<td>Sewage cold water (cubic meters)</td>
<td>25.87</td>
<td>42.26</td>
</tr>
<tr>
<td>Gas (per person)</td>
<td>31.72586</td>
<td></td>
</tr>
<tr>
<td>Solid waste removal (per person)</td>
<td>553.04</td>
<td>390</td>
</tr>
<tr>
<td>Intercom (apartments)</td>
<td>390</td>
<td>350</td>
</tr>
<tr>
<td>Housing expenses (sq.m)</td>
<td>15.3</td>
<td></td>
</tr>
<tr>
<td>Emergency lighting (sq.m)</td>
<td>0.26</td>
<td></td>
</tr>
<tr>
<td>Maintenance of in-house gas equipment (VDGO) (point)</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Heating maintenance hot/cold water (sq.m)</td>
<td>9.7</td>
<td></td>
</tr>
<tr>
<td>Cleaning of entrances (point)</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>Cleaning of the house territory (sq.m)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Accumulated repair (sq.m)</td>
<td>15.31</td>
<td></td>
</tr>
<tr>
<td>Installation and purchase of PU heat/energy devices</td>
<td>463.75</td>
<td></td>
</tr>
</tbody>
</table>

At the same time, the accumulated repair per square meter is actually cash, which can be accumulated in a certain period. In fact, these expenses can be in bank accounts, like deposits. Therefore, only the expense items listed above are used. Using all costs, you can make an equation that must strictly comply with the condition $y = z$ and satisfy the system of equations (1) [13,14].

\[
y = 15.3x_1 + 0.26x_2 + 300x_3 + 5x_4 z = \\
= 0.24x_1 + 0.19x_2 + 0.05x_3 + 0.1x_4 + 0.11x_5 + \\
+ 0.16x_6 + 0.16x_7 \\
\]

At the same time, considering this system of equations, a management model is formed with fixed costs for an apartment building, established by the management company. The model estimates that the break-even point occurs when servicing 800 apartments, that is, a condominium - a modern city block [15].

At the same time, studying the rates for the services provided by managers in the owners' cooperative, it can be determined that there is a certain relationship between these variables. The optimal model for the existing costs for the management company looks like this (2):

\[
y = -162763 - 13578,5x_1 + 5511,064x_2 + 40117,2x_3 \\
\]

4 Discussion
is also an increase in all utility bills. This leads to the fact that on average one has to pay about 15 to 25 thousand tenge for one apartment, which shows with an official median wage of 173 thousand tenge which is from 8% to 15% of the nominal income.

At the same time, the average Finnish citizen spends about 20% of income on utility bills. Reliable functioning of housing and communal services is ensured by the fact that the management system is built according to the same rules: minimizing costs, eliminating losses and using advanced technologies. For example, three sources can be used to generate electricity and heat - coal, gas and hydropower. Whichever is cheaper is chosen. And in case of severe frosts (-30°C and below), the city has backup stations that run on oil.

In addition, the following approaches can be used to optimize the cost management model in city apartment buildings:

- introduction of modern technologies: it is necessary to use modern technologies for cost management, such as automation of accounting for resources and services, installation of accounting meters, management of ventilation, heating and air conditioning systems. This will reduce utility costs, reduce resource consumption and improve the quality of life of residents.

- development of energy saving programs: it is necessary to develop programs for energy saving and energy efficiency improvement of apartment buildings. This may include installing new windows, insulating facades and roofs, replacing outdated heating and ventilation systems with more efficient and environmentally friendly ones, and teaching residents how to use resources economically.

- involvement of residents in building management: It is necessary to involve residents in the management of an apartment building. Residents can help manage the home, control spending on resources and services, maintain common areas, and make repairs. This will help to improve the quality of life in the home, increase the economic efficiency of management and reduce costs.

- monitoring and control: regular monitoring and control of expenditures and resource consumption should be carried out. This will allow timely identification of risk areas and problems and taking measures to eliminate them.

- development of the management system: it is necessary to constantly improve the management system of the apartment building. This may include the improvement of management processes, the introduction of new technologies, staff training and professional development. This will help ensure effective cost management in the home and improve the quality of life for residents.

Also, to optimize the city model for managing costs in apartment buildings, the following recommendations can be applied:

1. Introduction of modern cost accounting and control technologies: it is necessary to introduce modern cost accounting and control systems for electricity, water, heating and other resources in order to improve the efficiency of cost management. This may include the use of automated accounting systems, resource metering, and other technologies.

2. Development of individual cost optimization plans for each building: it is necessary to develop individual cost optimization plans for each apartment building, considering its characteristics, capabilities and needs of residents. The plan may include measures to improve energy efficiency, install resource consumption meters, optimize the use of common resources, and other measures.

3. Resident training and consultation: Residents should be trained and consulted on cost optimization and energy efficiency to increase their awareness and engagement in cost management. This may include the organization of seminars, consultations and distribution of information materials.
4. Cooperation with manufacturers and suppliers: Cooperation with manufacturers and suppliers of equipment and materials should be established to improve energy efficiency and reduce operating costs. This may include the conclusion of contracts for the supply of equipment and materials with conditions for granting discounts and preferential terms.

5. Monitoring and analysis of results: it is necessary to establish a system for monitoring and analyzing the results of cost optimization in order to evaluate the effectiveness of the measures taken and make the necessary adjustments to cost optimization plans.

Optimization of the cost management model in multi-apartment buildings in Almaty can be carried out as follows [21]:

- analysis of costs and consumption: it is necessary to conduct an analysis of all costs associated with the operation of an apartment building, including the costs of electricity, water, heating, cleaning, repairs, etc. You also need to study the consumption of resources and services by each apartment;

- identification of risk areas and problems: based on the analysis of costs and consumption, it is necessary to identify areas of risk and problems that may be associated with excessive consumption of resources or inefficient use of common resources. For example, to identify apartments that have too high electricity or water consumption, or common areas that need repair or improvement;

- development of an optimization plan: based on the identified risk areas and problems, a cost optimization plan should be developed that will consider both short-term and long-term goals. For example, the plan may include measures to improve the energy efficiency of the building, optimize water and electricity consumption, and improve the condition of common areas;

- implementation and control: it is necessary to implement a cost optimization plan and establish monitoring and control over its implementation. For example, you can install resource consumption meters for each apartment and monitor their consumption, as well as monitor the condition of common areas and repair work;

- occupant involvement: it is important to include occupants in the cost optimization process and ensure their active participation in projects to improve energy efficiency and optimize consumption. For example, information campaigns, workshops and consultations can be held to raise awareness among residents.

It follows that effective utility management can help water utilities improve the management of their infrastructure, increase productivity in many critical areas, and respond to current and future challenges. Addressing these challenges also requires ongoing collaboration between government, industry, elected officials, and other stakeholders [22].

After analyzing the results of this study, certain conclusions can be drawn that will allow assessing the management of utilities and the need for the required staff for the condominium. At the same time, it is also possible to determine the effectiveness of management, when assessing the costs of owners.

5 Conclusion

Comparison of different ownership structures is a widely debated issue with economic, socio-environmental and political implications. Different ownership structures can affect tariffs, investments, operating and capital costs. One of the social consequences is the choice between alternative ownership structures, which will be greater accessibility and fairness of water supply services for all citizens through lower tariffs charged for wholly owned public water supply. In addition, a negative social and environmental impact is the low quality of service due to the small amount of investment [22,23].
At the same time, it should be noted that the global utilities market is on a growth curve. Business Research predicts that the industry will reach $5,996.57 billion in 2025 at a compound annual growth rate of seven percent. Utilities must embrace digital transformation and overcome several key challenges to achieve such growth [24].

Based on this, we can say that the public services market in Kazakhstan is also a very profitable area, where the turnover of financial resources will also grow.

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