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Economic Assessment of the Current State of the Housing and Communal Services of the Republic of Kazakhstan, Taking into Account the Influence of Foreign Experience

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ABSTRACT

The essence of institutional housing and communal reforms is to change the elements of the institutional system, which can be carried out through legal coercion by the state or with the active participation of economic agents. The development of theoretical and methodological approaches to substantiate the mechanisms for creating an appropriate innovative environment and stimulating the innovative activity of enterprises in the housing and communal services, including the construction industry, is carried out to a large extent on the basis of the modernization of investment policy, taking into account the economic, geographical, social, environmental and other features that make up the economic space of a country or region. In this connection, the new generation of housing and communal services at the present stage faces the task of increasing the comfort of living for the population, taking into account regional characteristics and existing trends in design based on the use of new technologies or the so-called green economy - green innovations. The purpose of the study is an economic analysis of the current state of the housing and communal services of the Republic of Kazakhstan, taking into account the influence of foreign experience and the identification of factors affecting the environment during the construction of facilities.

INTRODUCTION

The construction industry of a new generation at the present stage is faced with the task of increasing the comfort of living for the population, taking into account regional characteristics and existing trends in design. At the same time, an integrated approach is needed to the formation of a socially oriented architectural environment in a sharply continental climate in the structure of the city, which contributes to the formation of a comfortable urban environment and the improvement of the ecological situation, which, in the end, will lead to a balance of wildlife and human activity. The formation of a favorable architectural environment in the urban structure will ensure the social orientation of large cities and will contribute to the implementation of the trend to improve the quality of life of the population. Of course, when designing and building residential complexes and buildings, it is necessary to comply with technical regulations that regulate the construction industry and safety during commissioning. Since non-compliance with technical norms and rules during construction can lead to adverse consequences.

An analysis of the development of housing construction and the features of modern program-targeted management of the formation of an affordable housing market in Kazakhstan showed that attention is paid to this issue in the republic, housing programs are being implemented, there is a positive trend in the growth of housing commissioning, but more attention should be paid to new technologies in construction aimed at on the protection and protection of the environment, considering the building as a single complex complex, selecting the most appropriate and progressive solutions that meet the requirements of energy efficiency, resource saving, using materials and equipment that meet environmental safety requirements.

In this regard, the development of "green" construction is important for Kazakhstan as a state that has embarked on the path of environmentally friendly and highly efficient development. Obviously, without the use of "green" construction technologies, it is impossible to implement any of the "green" programs adopted by Kazakhstan and, in particular, the Concept for the country's transition to a "green" economy, the Energy Saving - 2020 program, the initiative of the President "Partnership Program" Green bridge".

1. LITERATURE REVIEW

Today, only two countries around the world are developing their own BIM standards - England and the United States of America, others comply with their developments. By far, the most complete standard among all is the US National Standard (NBIMS) BIM v 3.0. The UK standards are not as perfect as the US family of standards, and include their own take on some of the fundamental BIM forms. G. Astratova and A. Zlokazova (2018) considers the issue of housing and communal services not only as an economic category, but also as a resource of public administration. The authors show that the housing and communal services market is one of the components of ensuring the quality of life of the population. The need to develop professional standards should become part of a systematic approach to solving existing issues of industry development, where the state should not only provide regulatory and methodological support, but also act as an official customer of specialists for the industry.

According to S. Yekimov and V. Nianko (2021), and M. Sitek (2016) among the main reasons hindering the development of the housing and communal complex are physically and morally obsolete material and technical base, inefficient management structure and a significant share of state ownership. The lack of proper control over the tariff policy and the high cost of production necessitate the search for new approaches to solving problems related to the functioning of the housing and communal services. Attracting private investors to the housing and communal sector reduces the financial burden on the budget, and also makes it possible to make enterprises that are part of the housing and communal services profitable and ensure the provision of public services of adequate quality (Abdullahi et al., 2022). The transfer of the use of housing and communal services to concession management is a fairly effective form of public-private cooperation in this area.

The international experience of reforming the housing and communal services is considered, where the main scientific and methodological approaches to the systemic transformation of the housing sector are analyzed, the main models of reform are indicated, the interaction of participants in the process of structural changes is characterized in terms of their commercial and social significance, advantages and

disadvantages are identified, model elements of reformist transformations in terms of the formation of investment attractiveness, competitiveness, energy efficiency and social significance of the events (Yan et al., 2020; Stanczyk-Hugiet & Stanczyk, 2020). The essence of institutional housing and communal reforms is to change the elements of the institutional system, which can be carried out through legal coercion by the state (on a centralized basis) or with the active participation of economic agents (decentralized).

The main goal is to minimize transaction costs and solve the problem of externalities. Differences in the level of economic development, industrialization and innovation of the economic system predetermined several scientific and methodological approaches to the systemic transformation of the housing sector. When designing and building residential complexes and buildings, it is necessary to comply with technical regulations that regulate the construction industry and safety during commissioning. Since non-compliance with technical norms and rules during construction can lead to adverse consequences. In order to start adapting European standards for important buildings and infrastructures to the effects of climate change, the expected changes in climate load according to P. Croce et al. (2018), should be evaluated from the point of view of the concept of Eurocodes for the characteristic values of variable climatic influences.

Numerous user guides have been developed in recent years to reduce future damage to buildings and infrastructure, and to prepare society for future climate challenges. Å.L. Haug, et al. (2017) and M. Urbanski et al., (2019) present an overview and analysis of the characteristics of existing guidelines for adapting the built environment to changing climatic conditions. According to M.Roders and A. Straub, housing companies must constantly adapt their building stock to keep pace with dynamic changes. Housing associations have a strong interest and responsibility in managing the social housing stock and maintaining the quality of life, but they seem to be hardly aware of the challenges they face in adapting their housing stock to the effects of climate change (Roders and Straub, 2015)

2. METHODOLOGY

The construction industry in Kazakhstan is actively developing: new territorial entities appear (Turkestan region), state programs are being implemented to provide the population with housing. Housing construction and modernization of the housing stock contribute to an increase in the rate of economic growth, and the maintenance and service of the housing sector is a factor stabilizing the market situation, since the costs for these purposes are practically inelastic, they do not undergo noticeable changes depending on changes in the economic situation in the country. Construction is a "horizontal" industry serving all other industries. Construction interacts with all sectors of the economy, since the creation of assets in them always includes, among other things, the creation of buildings and structures.

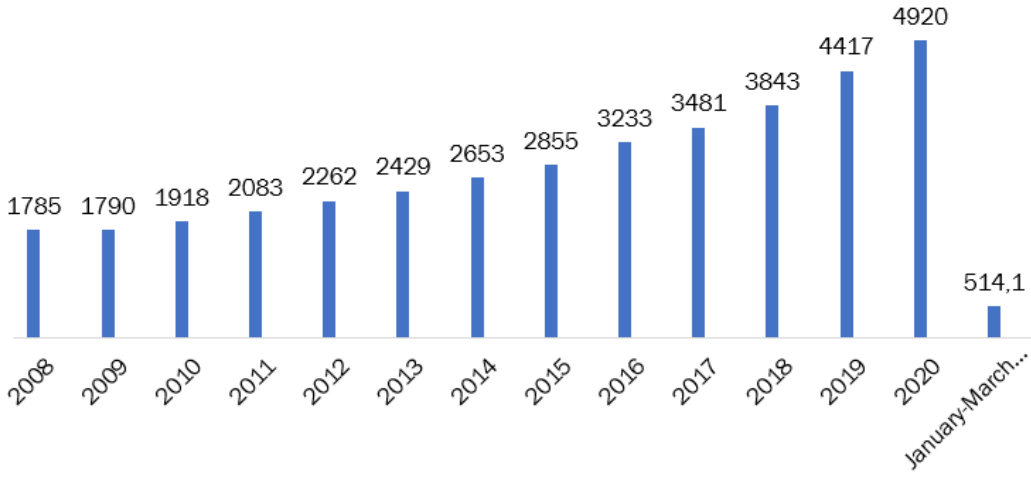

Figure 1. Volume of completed construction works, billion tenge

Source: compiled by the authors according to data of JSC «Samruk-Kazyna Construction»

The problem of ensuring the availability of comfortable housing for the population of Kazakhstan has always been in the center of attention of the state, since among the basic needs of people, housing is the main element that characterizes the quality of life. The volume of construction and installation works in January-March 2021 increased by 7.4% compared to January-March 2020 and amounted to 443.1 billion tenge. The volume of construction work on capital repairs increased by 54.7% compared to the corresponding period last year, and on current repairs increased by 69.9% (Figure 1). The largest volume of the total volume of construction work in the republic was performed by private individuals 85.26%, foreign - 14.72%, state - 0.02%.

In the context of the regions of the Republic, an increase in the volume of construction work was observed in all regions of the Republic of Kazakhstan, except for Mangystau and Zapardno-Kazakhstan regions, in which the volume of construction work decreased by 33.9% and 0.9%, respectively, compared to the same period last year. A significant increase in construction work occurred in the Turkestan region (2.6 times), North Kazakhstan (54.8%), Almaty (44.7%), Kyzylorda region (43%), Akmola region (33.8%), Kostanay (19.8%), Shymkent (17.2%). In Nur-Sultan, the volume of construction work in January-March 2021 amounted to 573.5 billion tenge (an increase of 5.4% compared to the same period in 2020). The volume of construction work by types of facilities under construction in January-March 2021 amounted to:

- for residential buildings 20.7% of the total volume of facilities under construction or 106.5 billion tenge;
- for non-residential buildings - 34% or 174.8 billion tenge;
- for facilities - 45.3% or 232.9 billion tenge.

The volume of investment in housing construction has increased compared to January-March 2020. In January-March 2021, 377.5 billion tenge was allocated to housing construction, which is 34% more than in January-March 2020 (Figure 2).

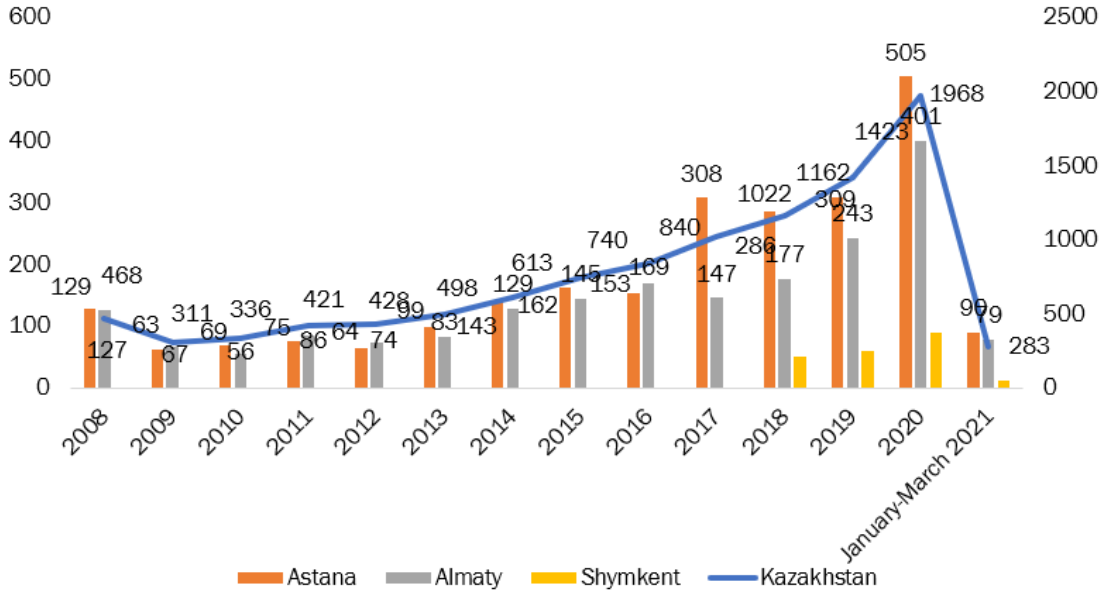

Figure 2. Investments in housing construction, million tenge

Source: compiled by the authors according to data of JSC «Samruk-Kazyna Construction»

In Nur-Sultan - 89.7 billion tenge (more by 94.6% of the same period last year), 79.3 billion tenge was sent to Almaty (more by 22.4% of the same period last year), and in Shymkent - 11.6 billion tenge (60.9% more than the same period last year - Figure 3).

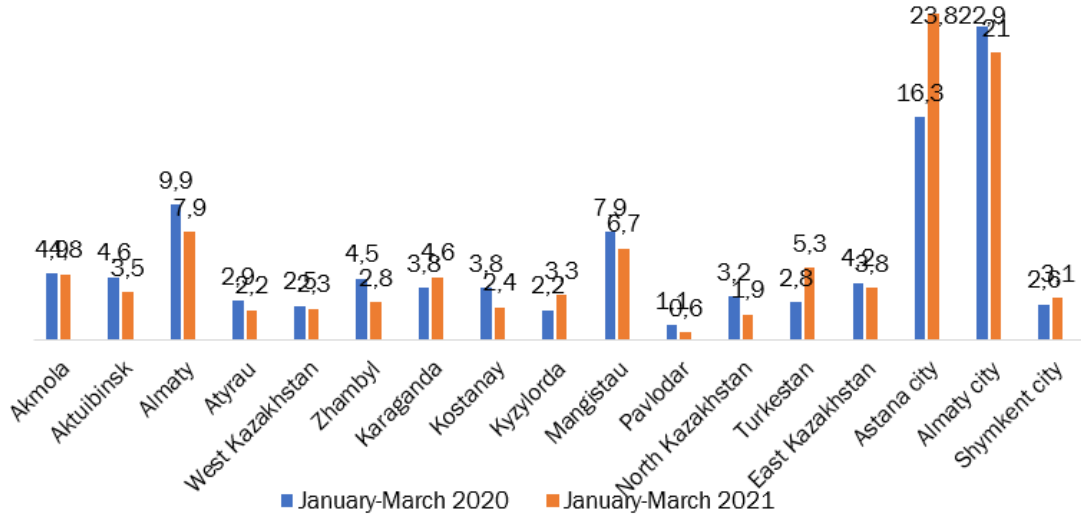

Figure 3. Share of regions in total investment in housing construction, in %

Source: compiled by the authors according to data of JSC «Samruk-Kazyna Construction»

The largest share in the total volume of investments in housing construction is still retained by the cities of Nur-Sultan and Almaty (23.8% and 21%, respectively). Sources of investment in housing construction. In the structure of investments in housing construction in Kazakhstan for the reporting period of 2021, the main share (82.3%) remains with the own funds of developers and the population. The share of funds allocated from the budget increased - 12.4% against 11.2% in the same period in 2020. The share of funds allocated by banks for housing construction decreased - 1.1% against 2.5% last year. Other borrowed funds (except bank loans) in the reporting period increased slightly compared to the same period last year - 4.2% against 4.1%. In Nur-Sultan, the share of other borrowed funds (except for bank loans) amounted to 8.3%, bank loans 0.2%, own and budgetary funds amounted to 88.6% and 3%, respectively. In Almaty, investments at the expense of the population's own funds and bank loans in the reporting period of 2021 amounted to 80.3% and 3.9%, respectively. The share of budget funds and other borrowed funds in the reporting period amounted to 6.6% and 9.3%, respectively. In Shymkent, the share of other borrowed funds (except for bank loans) amounted to 8.8%, own and budgetary funds amounted to 66.5% and 24.7%, respectively (Figure 4).

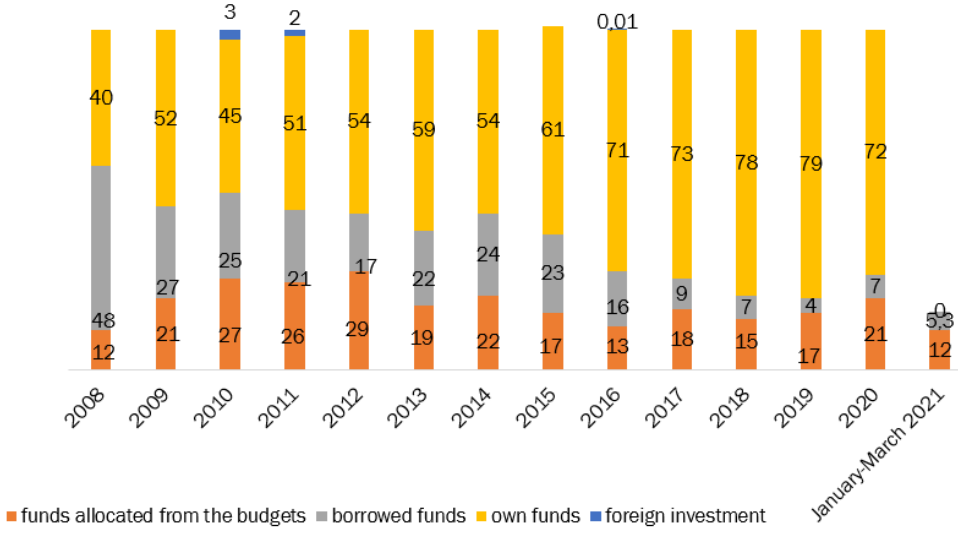

Figure 4. Sources of financing investments in housing construction, %

Source: compiled by the authors according to data of JSC «Samruk-Kazyna Construction»

3. RESULTS AND DISCUSSION

According to this development trend, we see that every year there is an increase in the level of activity in the field of innovation, respectively, the number of innovation-active enterprises increases. To determine the forecast values of the indicator "The level of innovative activity of enterprises %" for 2022-2024. a trend model was built, during which the following steps were performed:

– Checking the time series for anomalous observations. For this, the Irwin criterion was used (Table 1).

Table 1. Checking for anomalous observations in a time series

Year	*The level of innovative activity of enterprises, %*	*Observed value of the Irwin criterion*	*Calculation formulas*
2010	4,3		Observed value of the Irwin criterion $\lambda_t = \frac{\lvert y_t - y_{t-1}\rvert}{\sigma_y},\ t = \overline{2,11}$ Critical value of the Irwin criterion $\lambda_{0,05} = 1{,}5$
2011	5,7	0,618	
2012	5,7	0,000	
2013	8,0	1,016	
2014	8,1	0,044	
2015	8,1	0,000	
2016	9,3	0,530	
2017	9,6	0,132	
2018	10,6	0,442	
2019	11,3	0,309	
2020	11,5	0,088	

Source*:* compiled by the authors http://www.stat.gov.kz

The initial time series with a probability of 95% does not contain anomalous observations, since all observed values of the Irwin criterion are less than the critical value.

– Using the criteria of "ascending" and "descending" series, it was found that the considered time series contains a trend component (Table 2).

Table 2. Checking for a Trend

General view of the criterion of "ascending" and "descending" series *(violation of at least one inequality is sufficient for a trend to exist)*	*Estimated values with a chance of error* $0{,}05 < \alpha < 0{,}0975$
$\nu(n) > \left[\frac{2n-1}{3} - 1{,}96\sqrt{\frac{16n-29}{90}}\right]$	1 < 4
$K_{\max} < [K_0(n)]$	10 > 5

Source*:* compiled by the authors

– Approximation of the initial data was performed using a polynomial of the first degree:

$$y_t = a_0 + a_1 t + \varepsilon_t ,$$

The parameters of the selected growth curve were estimated using the least squares method. As a result, the following trend model was obtained:

$$y_t = 4{,}155 + 0{,}705t$$

– The evaluation of the quality of the obtained model was carried out in two directions: verification of the adequacy and evaluation of the accuracy of the model.

To test the adequacy of the model, a number of residuals were examined, i.e. discrepancy between the levels calculated by the model and actual observations. The most important properties of the residual component are: the equality of the mathematical expectation to zero, the randomness of the residuals and their compliance with the normal distribution law. The results of the analysis of a number of residuals in order to check the model for adequacy are shown in Table 3.

Table 3. Checking the adequacy of the model

Property under test	*Used statistics*		*The border*	*Conclusion*
	Name, calculation formula	*Received value*		
Accident	Criterion of "peaks" (turning points) $p > \left[\frac{2}{3}(n-2) - 1{,}96\sqrt{\frac{16n-29}{90}}\right]$	7 > 3	3	Adequate
Normality	RS- criterion $RS = \frac{e_{\max} - e_{\min}}{S}$	3,64	2,80-3,91	Adequate
Equality of the mathematical expectation of the levels of a series of residues to zero	*t*- Student statistics $t_{observ..} = \frac{\lvert\bar{e}\rvert}{S}\sqrt{n}$	0	2,23	Adequate

Source*:* compiled by the authors

To assess the accuracy of the model, the average relative approximation error was calculated:

$$E_{rel.} = \frac{1}{n}\sum_{i=1}^{n}\frac{\lvert e_t\rvert}{y_t}\cdot 100\% = 5{,}14\%,$$

a value that indicates a sufficient level of model accuracy. Thus, the model is qualitative and can be used for forecasting.

– To calculate the point forecast, the corresponding values of the variable were substituted into the constructed model. To build an interval forecast, a confidence interval was determined at a significance level $\alpha = 0{,}05$.

The results of building point and interval forecasts for 2022-2024 are presented in Table 4.

Table 4. Point and interval forecasts of the level of innovative activity of enterprises for 2022-2024

Year	*Point forecast, %*	*Interval forecast, %*	
		Max	Min
2022	13,314	11,917	14,711
2023	14,018	12,560	15,476
2024	14,723	13,199	16,246

Source*:* compiled by the authors

Thus, for the furt her development of high-tech industries in the construction industry, it is necessary to create an effective management structure, the activities of which should be subordinated to the implementation of a completely new applied task - the development of innovations, taking into account environmental factors. The latter is aimed at transforming ideas into concrete innovative products. The development of innovations is possible only if there are integrated production structures aimed at implementing the innovation process. At the same time, the innovation process determines the emergence of a new innovative technology.

CONCLUSION

Currently, in most developed countries, the state direction of development is associated with the formation of a "green" economy and the concept of sustainable development M. Guerrero and D. Urbano (2019b). The use of innovations cannot be only a private problem of a particular enterprise or region, it is increasingly acquiring a public character (Acs et al. 2017; Suchacek et al., 2018). This concept is based on a harmonious combination of environmental, economic and social factors. At the same time, the priorities of the development of society are built from environmental restrictions through a fair distribution of public resources to the effectiveness of economic development.

Traditional building methods have always played an important role in the housing sector. They can be effective for small, complex buildings, as well as for the repetition and restoration of historic buildings. However, prefabrication has the potential to lead us into a new era of more sustainable and cheaper housing. Digital technologies open up unprecedented opportunities to provide comfortable and affordable housing for an ever-growing world population. Studies have shown that the development of innovative processes reflects the general state of the economy and is due to socio-economic changes. The main background of these changes is associated with the formation of a new entrepreneurial culture, as well as the order and methods of coordination and interaction between the subjects of innovation.

Thus, without the introduction of innovations in the housing and communal services enterprises, further adherence to the sustainable development roadmap will be impossible. Therefore, it seems appropriate to develop organizational and methodological foundations for assessing the environmental and innovative activity of economic entities in order to ensure their sustainable economic development, taking into account the fact that the level of innovative activity of enterprises in the regions of Kazakhstan is increasing every year, as evidenced by the analysis carried out on the basis of a trend forecasting model and modeling.

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